

ON THE DEVELOPMENT OF PALAEOOLITHIC PHYTOTHERAPY IN WESTERN EURASIA AND EARLY AMERICAN INDIAN MEDICINE IN SIBERIA AND NORTH AMERICA

by

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Summary

For a time as early as the Pleistocene, namely 60,000 years ago for the Neanderthal people of Shanidar IV in Iraq, and 12,500 years ago for the American Indians of Monte Verde II in Chile, there has been evidence of the ethnobotanic experience of man's using a high percentage of his economic plants (above all timber and food plants) as medicinal plants. The high percentage (50 – 65 %) of this use in the American Indian as well as in the Central European popular medicine of today is a relic from the Palaeolithic period. The timber and food plants of *Homo erectus* and Neanderthal Man were even up to 100 % medicinal plants at the same time. They were used in a multifunctional way and were the core of Pleistocene phytotherapy.

Comparative indication statistics on the medicine of the Monte Verde Indians of the late Pleistocene period and on that of today's Mapuche in Chile permit an insight into phytotherapy and the medicinal needs in the late Pleistocene period (ROSSEN and DILLEHAY, 1997). In the paper presented here, this method is used to establish the corresponding dates for the people in Pleistocene western Eurasia and for early indigenous medicine in North America. As a result, the fact is established that – as a consequence of the conditions of life in the Pleistocene period – the therapy of affections of the urinary tract was of higher rank than in the post-Pleistocene period and today. On the other hand, respiratory diseases were of lower rank in former times – as a consequence of the very low population density – until, with the use of the first cultivated plants, the density and therefore the frequency of infections increased; in North America, this also applies to the indication for fever. Veterinary aids were missing in the Pleistocene period through lack of pets.

In view of the fact that certain mammals already use individual medicinal, stimulating and hallucinogenous plants, it is to be presumed that the early hominids in Africa also used individual plants in a similar way. The indication statistics indicates first signs of the use of medicinal plants in Europe for *Homo erectus* 370,000 years ago. For Neanderthal Man and *Homo sapiens ssp. sapiens*, there is definite evidence of shamanism and medicinal experience in the Pleistocene period.. The medicinal plants common in the circumpolar area of the Northern Hemisphere are the Pleistocene core of North American Indian medicine. This becomes evident through comparisons with Russian-Siberian popular medicine, North Asian shamanism and the indication statistics on the circumpolar medicinal plants within today's indigenous medicine in North America. After their immigration to North America, the American Indians first chiefly used circumpolar genera of economic plants (for nourishment as well as for

medicine), but in the course of the post-Pleistocene period, they used more and more specifically North American ones, as can be clearly proved.

1. Criteria for the evaluation of Pleistocene plant finds as potential phytotherapeutic agents

WHEN edible or technically usable plant organs or partly burnt pieces of wood are found in an archaeological finding place, no one will doubt that the people of that time used these parts of the plants as food, to produce tools or as wood for building and burning. Yet in the interpretation of many of such economic plants as medicinal plants – an interpretation equally justifiable – reserve is to be found most of the time. However, the ample pollen finds in the 60,000-year-old Neanderthal grave Shanidar IV in Iraq, after having been initially interpreted as flowers for the dead person (LEROI-GOURHAN, 1975), have been declared to be rests of medicinal plants since (SOLECKI, 1975), and with good reason (see below) – a conclusion generally accepted today (THOMSON, 1978; ERICHSEN-BROWN, 1979; STOCKWELL, 1988; LIETAVA, 1992; KAY, 1996). This also applies to the numerous rests of medicinal plants in the settlement site of Monte Verde II in Chile from the late Pleistocene period (RAMÍREZ, 1989; ROSSEN and DILLEHAY, 1997); for 11 of these plants, no other use can be seen as realistic. And this is why finds from the Palaeolithic age should, as a matter of principle, be examined and interpreted with regard to a possible medicinal use.

In general, medicinal plants only constitute 4 – 15 % of the total of the wild flora of a country or continent (e.g. Chile, North America, Mexico). But within the group of the wild economic plants, this percentage is by far higher (about 40 – 65 %).

Even hundreds of thousands of years ago, human beings certainly realized, while

consuming certain roots, wild vegetables, seeds and fruit, that a part of these victuals has, at the same time, a diuretic effect; within the respiratory tract, a secretolytic one; a laxative or an appetizing effect, and that in a famine, chewed bark had astringent (“drawing together”, i.e. haemostatic, disinfecting or constipating) or antirheumatic qualities.

IN NORTH AMERICAN INDIAN MEDICINE, for example (MOERMAN, 1998), more than half, in our Central European flora, some 65 % (WOLTERS, unpublished) of such economic plants were, or still are today, medicinal plants at the same time. In Germany, this applies to leaves, blossoms, fruit, the bark and balsam of timber trees such as birch, oak, linden, elm, ash, willow, and pine etc., in the same way as to those of food plants such as walnut and Spanish chestnut, both of which are also timber plants, and poppy, blackthorn, strawberry, raspberry, blackberry, cranberry, bilberry, elderberry and others, which were partly used in the Ice Age already (for more examples, see Tab. 5). In Monte Verde II, 12,500 years ago, 15 out of 39 food plants (= 38.5 %) and 16 out of 31 plants yielding wood (= 51.5 %) were medicinal plants at the same time, as measured by the Araucanian medicine of today (analysis of Tab. 7.4. in RAMÍREZ, 1989).

In 1997, ROSSEN and DILLEHAY compared the indications of medicinal plants of the Mapuche (Araucanians) in Chile present in ethnobotanic literature (HOUGHTON and MANBY, 1985) with those of the plants of Monte Verde II

declared as medicinal drugs. This comparative indication statistics by ROSSEN and DILLEHAY shows that the four most important among the principal indications 12,500 years ago (analgesics, wound healing, febrifuges, gastrointestinal aids) are still to be found among the principal indications of the Mapuche's medicine of today. This indicates a corresponding ancient tradition. And the authors were completely justified in including into their statistics not only the plants strictly used as medicine but also the timber and food plants that could be used as medicinal plants as well.

THE EVALUATION of the indication statistics on Pleistocene finds of economic plants on the basis of modern popular medicine – the method used by ROSSEN and DILLE-HAY (1997) for the first time – does not provide us with a mere reflection of present conditions, but with a varied image of early phytotherapy and the frequency of some diseases. It is thus to be presumed that an essential part of timber and food plants in archaeological finds had, at the same time, the function of medicinal plants; especially so when the percentage of medicinal plants within the total of the find of economic plants reaches 100 % - as is precisely the case in the oldest archaeological plant finds in connection with *Homo erectus* and Neanderthal Man (see below). The people of the Palaeolithic age obviously gave preference to the use of several organs (bark, seeds, fruit, leaves, roots) of their timber and food plants functioning as medicinal drugs at the same time. And by far a disproportionate part of such plants among the medicinal plants that are of multiple use is a Palaeolithic relic in the popular medicine of today, in American Indian societies as well as in ours in Central Europe.

The fact that the remedies for affections of the urinary tract were of a relatively higher rank in the Ice Age than today, whereas those

for respiratory diseases were of a relatively lower rank (WOLTERS, 1999b; for comparison, see Tab. 7 and 14) – a fact that can be clearly proved time and again in the following – proves that the evaluation of the indication statistics on Pleistocene finds of economic plants on the basis of the popular medicine of today does not merely reflect the latter but furnishes us with specific knowledge about the medicine of the Palaeolithic period. In the present popular medicine of Eurasia and North America and in modern phytotherapy, the proportion is inverted.

The reasons for this are plausible: life on the cold ground (during the ice ages even permafrost ground to a large extent!) and the primitive housing conditions (earth hollow houses, huts covered with stretched hides) promoted the development of affections of the bladder and kidneys. On the other hand, the extremely low population density prevented, to a considerable extent, the spread of influenza infections and similar diseases, in spite of a lack of hygiene. In Monte Verde II, which is situated in an extremely wet climate of the Antarctic floral zone and therefore cannot be directly compared with Eurasia and North America (Holarctic floral zone) in some respects, the situation concerning these indications is similar; there are three diuretics (urinary drugs) as opposed to only one expectorant (for the bronchial tubes) (for comparison, see ROSSEN and DILLEHAY, 1997).

OTHER PRINCIPAL INDICATIONS (dermatological aids, gynecological aids, antidiarrheals) do not at all or not distinctly show a general change of importance of this kind from the Pleistocene to the Holocene epoch (for comparison, see Chapters 2 and 3); as to antidiarrheals, the varying quality of the drinking water and the food provisions which could easily be ruined in the moist climate may have had a certain influence on

the respective position of this indication. It is understandable that in Pleistocene plant finds, there is a lack of veterinary medicine as an indication, since the dog, being the first pet, did not appear before the late Pleistocene period.

Although human beings have always suffered from the same diseases, a change occurred in the spread of some diseases and in the significance of their therapy after the end of the Palaeolithic period or the last ice age with the invention of the horticulture and agriculture of cultivated plants, with improved housing conditions, with a reduced dependence on the climate and an increase of the population density. Post-Pleistocene plant finds in North America clearly show this (WOLTERS, 1999/2,000; for comparison, see Chapter 4).

FOR THE INDICATIONS of medicinal plants in the popular medicine of the Northern Hemisphere (Holarctic floral zone, with the exception of the East Asian countries), the reference works by DRAGENDORFF (1898), UPHOF (1968) and HOCKING (1997) were used for western Eurasia, as far as the indications relate to this geographic area; for North America, those by MOERMAN (1986, 1998) were used.

The division of the indications uniformly follows the ethnobotanic compilation by MOERMAN, which is most adequate to the Palaeolithic plant finds; for the North American indigenous medicine has been a completely unaffected advancement of Pleistocene medicine into modern times. The respective individual indications for respiratory and rheumatic diseases and affections of the urinary tract and for laxatives, differentiated by MOERMAN, were put together because the medicinal plants are partly the same, and the indications in the other literature often did not allow a clear distinction (MOERMAN distinguishes,

for example, cold remedies, cough medicines, throat aids, respiratory aids and expectorants for respiratory diseases; diuretics, kidney aids and urinary aids for affections of the urinary tract; cathartics and laxatives for laxative effects, and for rheumatism, internal and external antirheumatics.)

32 economic plants of Pleistocene Europe and Southwest Asia and 77 medicinal plants common in the circumpolar area, as well as eight economic plants from the Pleistocene period of North America, have entered the statistic analysis – enough material for statements about the phytotherapy of the Ice Age. 41 economic plants of the post-Pleistocene period in North America are added to that.

Notes for the interpretation of the plant lists and indication statistics of the archaeological finds given in Tabs. 1 – 4 and 10 – 12:

1. Not all of the economic plants of *Homo erectus* and Neanderthal Man were necessarily used as medicinal plants as well in those days, but the great majority of them was, for the percentage of potential medicinal plants reaches 100 % in their case, by far more than in some of the finds from the late Pleistocene (for example, in Monte Verde II) and today. – It is to be presumed that there were also medicinal herbs besides, such as have been proved to have existed in Shanidar IV, thanks to the pollen finds, but which, apart from that, can scarcely be preserved.
2. From the late last ice age onwards, one can presume, as a parallel to Monte Verde II, that the medicinal effect of plants was even then discovered and used to its full extent.
3. No people uses all of the reasonable possibilities for application that a medicinal plant can have. Moreover, it is to be expected that the use conditioned

by rite or mythology can differ from one cultural complex to the other. As a result, the one-time designations of potential indications in the tables were probably seldom of any importance in the case of the plants in question. In case of multiple designations (= principal indications), a medicinal use has to be presumed as given. This is proved by the extreme correspondences among most of the principal indications of the economic plants - often very different from each other - of the different areas or times in which finds have been made, and especially by the general predominance of affections of the urinary tract, as

compared to respiratory diseases, that is, the remedies for them, in the whole Pleistocene of western Eurasia and North America (for comparison, see Tab. 7 and 14)

4. Occasional and rare differences of numbers from those in previous publications of essential results (WOLTERS, 1999/2000) are due to an additional incorporation of individual indications in HOCKING (1997) and the correction of a few isolated counting errors. The previous statements are not affected by this.

2. On the phytotherapy of the Palaeolithic period in Europe and Southwest Asia

2.1. Medicinal plants in Europe as early as 370,000 ears ago ?

SEVERAL MAMMALS (such as chimpanzees) use some of the medicinal plants (RODRÍGUEZ and WRANGHAM, 1993) or (such as elephants, reindeer, for instance) intoxicating drugs already (SIEGEL, 1995). It is thus to be presumed that the early hominids in Africa also knew several plants with a corresponding efficacy; proofs for this have not been given as yet.

The oldest plant finds in Europe are those for late *Homo erectus*, who was by no means a primitive "Pithecanthropus" (ape-man), as had been presumed earlier. There are finds, above all, in the settlement site near Bilzingsleben on the border between Thuringia and Saxony-Anhalt, discovered in 1969 and excavated under the direction of DIETRICH MANIA (1998). This site had been installed near a lake supplied by a karst source some 370,000 years ago during the interglacial period of that time. The site consisted of three dwelling huts and an area,

paved with flagstones to a great extent, which possibly served for cultural purposes.

Fragments of human skulls and stone rows ending with an elephant's tooth indicate unknown rituals (early shamanism?).

In the calcareous sinter (travertine), not only extensive rests of the flora of the natural site have been preserved; in addition to this, also wood that cannot stem from the immediate environment of source and lake but has probably been taken there by human beings. According to MANIA (1998), these are box tree (which in the warmer interglacial period of that time also grew in Central Germany), pear tree, yew, hazel, cornel, dogwood, ash, spindle tree and mealy tree. The timber was also partly worked, as the existence of chips of wood proves. On the other hand, almost half of the wood finds comes from alders from the nearest environment. Bird cherries have been preserved as fruit stones; they were obviously consumed.

IN 1995, near Schöningen-on-Elm in East Lower Saxony, H. THIEME found javelins made of small spruce trunks, one spear made of pine wood, as well as throwing sticks made of spruce branches, and handles made of fir wood, which probably served as holding devices for sharp-edged stone blades. They are 350,000 – 370,000 years old. A lance or spearhead made of yew from Clacton on Sea in England is of a similar age (MANIA, 1998).

Another use of these economic plants does not directly emerge from the finds mentioned. It is striking, however, that all of these plants were used in the popular medicine of Europe for a long time and are partly still in use (Tab. 1). Among the medicinal indications of these plants, dermatological problems, diarrhea, fever and infections of the urinary tract are at the top of the list with 6 – 7 plants each. Rheumatism/gout is represented with 5

plants, respiratory diseases, with 4, gynecological problems and constipation, with 3 plants each for treatment.

Six of these applications are also among the principal indications of the medicinal plants of Neanderthal Man (see Tab. 7). At the same time, the relative ratings of the urinary and respiratory aids, as well as the lack of veterinary aids, correspond to the usual image of Palaeolithic phytotherapy. This can hardly be accidental. (WOLTERS, 1999 b).

One can be curious as to whether this circumstantial evidence for a phytotherapy existing at such an early period will be confirmed by further plant finds for *Homo erectus*.

2.2. Medicinal plants of Neanderthal Man in the Middle East (Shanidar IV) and in Europe

NEAR SHANIDAR in the Iraqi part of Kurdistan, several graves of Neanderthal Man (*Homo sapiens ssp. neanderthalensis*) were found between 1953 and 1960 under the direction of RALPH SOLECKI (1971). The analysis of soil samples (LEROI-GOURHAN, 1975) showed that in the 60,000-year-old grave of Shanidar IV there were masses of pollen, namely of (Tab. 2):

yarrow (*Achillea* sp.), common groundsel (*Senecio* sp.), St. Barnaby's thistle (*Centaurea solstitialis*), marshmallow (*Althaea* sp.), grape hyacinth (*Muscari* sp.), and ephedra (shrubby horsetail, *Ephedra altissima*).

Pollen of 21 more plants were found only in small, probably accidental, traces. Since no

other Neanderthal grave in the world contains more than just traces of pollen, these six plants must have been very special tomb furnishings. An interpretation as a tomb decoration has to be excluded because there is no evidence whatsoever for this custom around Neanderthal graves, common as it is among us. The distribution of the pollen grains indicates that the first five plants mentioned seem to have been combined with twigs from a coniferous tree, while the dead body must have lain on twigs of *Ephedra*. The dead man was ill and severely injured.

SOLECKI (1975) thinks it possible that the dead man was a shaman, who was buried along with this otherwise unc customary gift. Shamanism was already developed to a certain extent with Neanderthal Man 120,000

– 30,000 years ago, as testimonies of ritual customs and ceremonial funerals (MÜLLER-KARPE, 1998) allow to suppose, and the treatment of ill people certainly is among the tasks of a shaman.

The fact that the six plants were not buried along with this man in the form of their partly edible organs (as has sometimes been proved later for funerals of *Homo sapiens ssp. sapiens*) but in a blossoming state, only allows to interpret them as medicinal plants. Neanderthal Man certainly did not use only blossoming herbal drugs, but other plant organs have not been preserved here. The sporopollenins of the pollen grains are the most lasting of all plant materials.

The medicinal plants of Shanidar IV were and are used in the popular medicine not only of the Orient. MARGARITA ARTSCHWAGER KAY has pointed out in an ethnohistorical context that the five genera *Achillea*, *Senecio*, *Centaurea*, *Althaea*, and *Ephedra* are used in the popular medicine of extensive parts of Eurasia and North America. They are not a specifically “Neanderthal” sort of medicinal plants, but parts of the general store of mankind’s medicine, many millennia old, for which the oldest direct proof so far has been found in Shanidar.

All of the six medicinal plants of Shanidar IV are also used as food plants in some regions of the world, and the Neanderthal people probably ate their roots, herbage and fruit, besides the medicinal use of the specimens in blossom. Fruit of *Ephedra*, roots and leaves of marshmallow, bulbs of grape hyacinth, herbage and leaves of yarrow and young plants of common groundsel were consumed in the Mediterranean region or elsewhere in Europe and the Near East; St Barnaby’s thistle is rich in nectar (KUNKEL, 1984).

AS REMEDIES, these plants have 3 – 15 different indications each in popular medicine (Tab. 2), which permit an insight into the dispersal of a number of diseases at that time. Principal indications were urinary aids, dermatological aids, stimulants (the latter’s being so far at the top is an exception), respiratory aids, febrifuges, gynecological aids and analgesics. Again, the urinary aids rank above the respiratory aids, and veterinary aids are lacking, which is typical for the Pleistocene era (WOLTERS, 1999 b).

Yarrow for indigestion, marshmallow and ephedra for cough are still in use among us. Neanderthal people presumably also already knew the euphorizing effect of ephedra, which is due to L-ephedrine. Nobody would have laid a dead person to rest on a cough remedy, but they would have used a drug with a stimulating and euphorizing effect in order to lighten their journey into the next world.

Neanderthal people possibly also knew a mineral cure. VELO (1984) has referred to ocher (a mineralogical mixture coloured yellow to red-brown through ferric hydroxides or alkaline iron sulphates) with its antiseptic and astringent effect. With some peoples, ocher as a burial object is considered to be a symbol of life. In shamanism, the term “medicine” comprises the art of healing and religion; and this can have been the meaning of ocher as a burial object in some Neanderthal graves.

Plant finds in context with Neanderthal Man in Europe have not been considered medicinal plants so far. There are edible nuts, pips and seeds. In the finding place Ehringsdorf in Thuringia, pre-Neanderthal people used, for instance, wild apples and cornelian cherries 200,000 years ago

(MANIA, 1998); in other places, over 50,000 years ago (that is, partly synchronous with Shanidar IV), Neanderthal people used walnut, hazelnut, Spanish chestnut, acorns, raspberries, strawberries, elderberries, sloes, and rowanberries (FRANKE, 1976). All of these plants are also medicinal plants (Tab. 3).

Their principal indications show an image that is typical for the Palaeolithic period: antidiarrheals, urinary aids, dermatological and gynecological aids, febrifuges, gastrointestinal and respiratory aids, and hemostats. Bladder and kidney aids (with five plant species) are more numerous than respiratory aids (only three), and again, veterinary aids are lacking, the typical image of Pleistocene phytotherapy (WOLTERS, 1999 b).

For comparison between Neanderthal medicine in Europe and the one used in the

Middle East: urinary and dermatological aids, febrifuges, gynecological and respiratory aids are principle indications, the same as in Shanidar IV (in spite of a complete difference in plants!). Gastrointestinal aids, antidiarrheals and hemostats appear in the middle category of the indications in Shanidar (Tab. 2), which with only six plants on hand is likely to be within the statistic range of variations. For the indication antidiarrheal, the quality of the drinking water could have had an influence, as already mentioned.

In Tab. 7, the most important indications of Neanderthal medicine in Europe and Shanidar have been added up in order to get more reliable and higher numbers for comparisons in terms of statistics.

2.3. Some finds of economic plants from the late Pleistocene period in Europe

Homo sapiens ssp. sapiens has been living in Europe for 40,000 years; during the first 10,000 years, in coexistence with Neanderthal Man, who then disappeared for reasons open to questions (KUCKENBERG, 1997).

More or less synchronously with Monte Verde II in Chile, there are finds of bird cherry, sloe, acorns, hazelnuts and walnuts in Europe near Mas d'Azil (TSCHUMI, 1949) in the Pyrenees (11,000 – 12,000 B.P.). Certain layers from the late Palaeolithic age in Franchthi cave on the Peloponnesus have received a similar dating (12,500 B.P.; HANSEN, 1978): with pistachio (*Pistacia* sp.), vetch (*Vicia* sp.), lentils (*Lens* sp.), wild oat (*Avena* sp), and wild barley (*Hordeum spontaneum*), as well as almonds (*Prunus amygdalus*). As to the seeds of some other plants (among them, corn gromwell,

Lithospermum arvense), there is no certain knowledge as to whether they were brought into the cave by human beings; yet a very small part of the seeds has been found in a carbonized form.

AS TO THE GENERA *Lens*, *Vicia* and *Avena*, the knowledge as to which species can be taken into consideration is too uncertain. The plants from Mas d'Azil can all have served as medicinal plants, too, those from Franchthi cave, partly (almond, pistachio, gromwell; Tab. 2). For the late Pleistocene period, this is practically certain, for if there was an obviously fully developed popular medicine in Chile at that time, this was also the case in Europe.

When the medicinal plants of both finds are interpreted together (because of their small

number) with regard to their indications, four out of the seven principle indications are identical with Shanidar IV, and there were three plants which could serve as urinary aids, but only two which could be used as respiratory aids. A proof for the existence of veterinary aids is lacking here, too. The phytotherapy of the people of the Pleistocene period had, for the most part, the same main fields, in spite of a partly great difference in medicinal plant species at their disposition (WOLTERS; 1999 b; also see Tab. 7 and Chapter 5).

It would probably be too daring to suppose a direct phytotherapeutic tradition over 370,000 years in Europe, although bird cherry, hazelnut, cornel, oak, walnut, and sloe appear several times in the finds within this period (for comparison, see Tab. 1, 3, 4). However, the health problems were similar everywhere in Holarctic Eurasia during the Palaeolithic age, and so they were, with certain variations, in late Pleistocene America.

3. The origins of the American Indians' medicine in their original Northeast Asian home

3.1. Common features of Russian-Siberian and North American-Indian popular medicine

MARGARITA ARTSCHWAGER KAY pointed out in 1966 that partly the same medicinal plants are used in the popular medicine of Russia as well as by peoples living in Alaska and in western North America. She concretely mentions the genus *Achillea* (yarrow), which is used in the same way by Siberian peoples as well as by Aleut, Eskimo and Tlingit in Alaska down to members of the Athapaskan language group in the Southwest of the USA. This concerns the species *Achillea sibirica* in Northeast Asia, *A. borealis* from Alaska to California, and *A. lanuginosa* in the west and the midwest of the USA, which all belong to the group of *millefolium* and are ranged among *Achillea milleforium* s.l. by some taxonomists. There is also, to a large extent, a correspondence between the American indications (MOERMAN, 1986, 1998) and those in European Russia (for comparison, see DEMITSCH; 1889; HENRICI, 1894).

Now, it is not surprising that a certain number of medicinal plants belongs to the European or Russian as well as to the North American-Indian store of remedies. In the Holarctic floral zone of the Northern

Hemisphere, there is a great number of species and genera common in the circumpolar region which exist in Eurasia as well as in North America and are partly also used for medicinal purposes. As far as objective therapeutical effects are known, these can have been found out empirically by different peoples of the Northern Hemisphere in an independent way.

FOR INSTANCE, the use of bog myrtle (*Menyanthes trifoliata*), a use given because of the bitter constituents of this plant, for an insufficient function of the secretion of the gastric juice is common in Europe, Russia, and partly in North America among American Indians (For comparison, see DRAGENDORFF, 1898; DEMITSCH, 1889; MOERMAN, 1998). The numerous further traditional indications which have not been given scientific evidence of, differ, however, to a large extent among the peoples of the two continents and may well be local "ingredients". In the same way, the urinally antiseptic effect of bearberry (*Arctostaphylos uva-ursi*) and of pipsissewa (*Chimaphila umbellata*), and the diuretic effect of field horsetail (*Equisetum arvense*) have been

known among Europeans and American Indians from ancient times. However, there are only a few equivalents in European popular medicine to the eight further American Indian indications for bearberry and field horsetail and the more or less 20 further ones for *Chimaphila* (MOERMAN, 1998). This would seem to indicate that there is no common basis for an ethnomedicinal tradition of these plants.

In the same way, Russian data on popular medicine from the 19th century (DEMITSCH, 1889; HENRICI, 1894) show no, or only little – supposedly coincidental – correspondences in the use of fireweed (*Epilobium angustifolium*), stinging nettle (*Urtica dioica*), purple (water) avens (*Geum rivale*), prostrate knotweed (*Polygonum aviculare*), moorwort (*Andromeda polifolia*), mountain raspberry (*Rubus chamaemorus*), and American pasqueflower (*Pulsatilla patens*) to the use of these circumpolar plants in North American Indian medicine (for comparison, see MOERMAN, 1998).

“Modern” *Homo sapiens* has lived in Europe for 40,000 years (MÜLLER-KARPE, 1998) and has built up his European store of remedies on the basis of his own experience, independent of influences from North Asia, which has been equally inhabited by him for 40,000 years. In historical time, medicine in Europe was extended through influences from the Mediterranean region and the Orient. The Russian popular art of healing also originated within this framework, the later contact with other cultural complexes coming about mainly via Constantinople (HENRICI, 1894).

BUT THERE WERE direct influences from Asia in East Europe. Finnish-Ugrian peoples (Mordwines, Komy, Karelians, Estonians, Finns, Lapps) immigrated from the Uralian region to North Russia and North Scandinavia in the post-Pleistocene era. In

the Middle Ages, Turko-Tatarian peoples ventured from Asia to the Volga (Kazan) and the Crimea, and South Russia was reigned by Mongols for some time (HENRICI, 1894), peoples who certainly all brought their knowledge about medicinal plants with them.

While independent traditions in the therapeutical use of 11 of the above mentioned circumpolar plants have to be presumed, there are striking correspondences in Russian-Siberian and American Indian popular medicine concerning yarrow (*Achillea millefolium* s.l.) and, in addition to this, five more species and three genera of plants (WOLTERS, 1999 b; 1999/2000).

The comparisons of individual plants described in the following are based essentially on data by DEMITSCH (1889) and HENRICI (1894) for Russia and Siberia (they already noticed parallels to American Indian medicine sometimes, without drawing any conclusions from this fact), and on those by MOERMAN (1986; 1998) for North America. The North American ethnobotany is fully included here, the Russian one, only to a limited degree.

Although field horsetail (*Equisetum arvense*) with its diuretic effect is common and also used in the circumpolar area, scouring rush (*E. hyemale* – see list of the medicinal plants of the circumpolar area in Tab. 8), also common in the circumpolar area, was preferred in Russia and by the North American Indians in spite of a certain poisonous property due to alkaloids (HAGER, 1992 – 94).

In Russian as well as in indigenous North American popular medicine, yellow marsh-marigold (*Caltha palustris*) is traditionally used in an identical way for poultices and wound irrigation in case of skin lesions and ulcers, also as a diuretic remedy and (among the Eskimo) as a laxative (HAGER, 1992 – 94).

A HIGH DEGREE of correspondence also results from the data for Russia or Siberia (DEMITSCH, HENRICI) and North America (MOERMAN) regarding common juniper (*Juniperus communis*), marsh and labrador tea (*Ledum palustre* and *L. groenlandicum*), fringed or prairie sagewort (*Artemisia frigida* and also the whole genus of *Artemisia*) as well as the genera of angelica (*Angelica*) and elder (*Sambucus*), and, to a considerable extent, birches (*Betula*):

Common juniper (*Juniperus communis*). In Russia or Siberia, mainly the berries are used as an antirheumatic and as a diuretic cure (the same as among us); other plant organs are also used as febrifuge, tuberculosis remedy, gynecological and gastrointestinal aids. Numerous applications of this kind can also be found among the Thompson Indians (cultural area "Plateau"), the use as tuberculosis remedy and bladder and kidney aid, among five to six American Indian peoples each. This species of juniper serves as a febrifuge among the Cheyenne, Navajo, and Cree, as a gynecological aid among the Lenni Lenape (Delaware), Cheyenne, and Cree. The Micmac (cultural area "Northeast") use juniper as an antirheumatic, the Bella Coola and Kwakiutl (cultural area "Northwest Coast"), as a gastrointestinal aid.

Crystal tea or marsh Labrador tea (*Ledum palustre*). This plant from the heath family is used as a remedy in North America by the Tanana (cultural area "Plateau") – for colds, other chest diseases and skin eruptions, the same as in Russia, and (the ssp. *decumbens*) by the Western Eskimo, as an analgesic. Other American Indians prefer bog Labrador tea (*Ledum groenlandicum*), which is similar and closely related, in addition to the diseases mentioned above, also as a febrifuge (Montagnais, Province of Québec) and for pains of different kinds (Algonquin, Cree, and Bella Coola in Canada); all of these are

the same indications as those for crystal tea in Russia and Siberia.

According to DEMITSCH (1889), fringed or prairie sagewort (*Artemisia frigida*) was a popular cure frequently used in Russia and America; in the Government of Perm, it was considered a very good cure for chest diseases and was also taken as a febrifuge. In Siberia, they drank a decoction as a cure for stomach ache, heavy breathing and cough. These applications also exist in American Indian medicine. About 80 % of the applications of other, non-circumpolar species of the genus of *Artemisia* in Russia correspond to those of the same genus in North America. For sagewort as a ritual plant in Europe and North America, see Chapter 3.2.

Angelica silvestris and *A. archangelica* (angelica) in Russia and *A. atropurpurea* in North America are also mainly used in an identical way. Here, the applications of *A. silvestris* among the Lapps in Northern Scandinavia (group of the Finnish-Ugrian peoples) are remarkable: stalks for "chest accidents", cough, hoarseness and other diseases of the chest; a bitter extract as a diaphoretic for catarrhs and as a stomach aid for "tummy ache" and diarrhoea; the root for colics (DEMITSCH, 1889). The same indications, though not always the same kind of preparation, are also to be found for *Angelica atropurpurea* among the Indians of North America (MOERMAN, 1998).

THE USE OF common elder (blossoms or bark of *Sambucus nigra*) in Russia, including Siberia, corresponds to a degree of 75 % to that of *S. canadensis*, *S. caerulea* and *S. racemosa* ssp. *pubens* among American Indian peoples; it is used for chest diseases, as a febrifuge, a remedy for dropsy, a diaphoretic, an emetic and a laxative. There

are only two indications that cannot be found in American Indian medicine. For a correspondence in analogy charm at the harvest of elder bark in Europe, Siberia and North America, see Chapter 3.2. Birches. The uses of our white birch (*Betula pendula*), common in Eurasia, in Russia and Siberia and those of North American species, above all, sweet birch (*Betula lenta*) and paper birch (*P. papyrifera*), show parallels in their use in Russia and North America, e.g. as a febrifuge (in North America among the Iroquois), as a laxative (in Russia, the juice of the tree, among the Chippewa, an infusion of the inner bark), as an antidiarrheal (infusion of the leaves and the whole bark among the Cherokee, Chippewa, Cree, and Menomini), as a stomach aid (Cherokee and Chippewa) and as a respiratory aid (Chippewa, Thompson).

THE TEMPORARY COLONIAL RULE of Russia over Alaska (till 1867) is not the cause of these common features in phytotherapy; for they reach far into North America down to the Eastern woodland

(among Iroquois, Cherokee, Micmac, Menomini, Chippewa, and other peoples).

The most simple and most plausible explanation of the correspondences in the use of these species and genera of medicinal plants common in the circumpolar area in Russia and North America is given through the common original home of Finnish-Ugrian, Turko-Tatar, Mongolian, and American Indian peoples in the Greater North Asian area from the Pacific Coast to the area of the Urals, from where they took their traditional phytotherapy to East and Northern Europe or to North America, where the same plants are found.

Since the American Indians definitely left Asia in the last millennia of the late Pleistocene – 14,000 – 12,000 years ago (FAGAN, 1991); then, 11,000 years ago, the Bering Strait separated North America from Asia -, the common features in the traditions of popular medicine must have been already existent during the last Pleistocene period. Without doubt, American Indian medicine partly goes back to North Asia (WOLTERS, 1999 b; 1999/2000).

3.2. Shamanism and magic rituals: Circumpolar correspondences

THE EXTREME CORRESPONDENCE as to shamanistic conceptions would seem to indicate that Pleistocene North Asia was the origin of North American Indian medicine (for comparison, see HOPPÁL, 1994; HULTKRANTZ, 1994; SCHADEWALDT, 1968; VOGEL, 1990; WOLTERS, 1999/2000):

Man has a soul, which appears in two forms, the first of which is related to the body, leaving it at the moment of death. The second form can leave the body while dreaming or during a trance state and go on a dream or visionary journey.

Visionary experiences can be intensified by narcotic drugs. The aspirant to the status of a shaman must meet his protecting spirit in the form of an animal, whose appearance signals that the initiated person has been chosen by the spirits. Helpful spirits mostly also have the appearance of an animal, since they are not limited to a place, the same as the shaman himself.

Before any ceremony, the shaman undergoes a rite of purification, keeps himself hidden for a longer period, fasts and then puts on a shaman's robe and a ritual headgear. The headgear has the function of making the shaman invisible.

The conjuring of the helpful spirits is performed through singing or drumming. Drumming and ecstatic dancing lead to an entranced state. The images on shamans' drums often represent the sun, the moon or the stars.

Serious diseases have been caused by some spirit or wizard. The most frequent therapy used is "sucking" the disease out of the body, or objects that have supposedly penetrated into the patient. The shaman fights in trance, if necessary, against opposing wizards and demons, or else, the helpful spirits fight in his place.

Several shamans can also predict the future.

There is a "world tree" in the mythology of Siberian shamans as well as in that of Meso-american Indians.

Respect for nature is part of the shaman's view of life.

Since the last American Indians (the Athapaskans) left Northeast Asia 12,000 years ago, these common ideas go down at least into the late Pleistocene.

The North American ethnomycologist R. GORDON WASSON (1898 – 1986) has given another hint to a common root of American Indian and North Asiatic shamanism. Fly agaric (*Amanita muscaria*) is a circumpolar hallucinogenic fungus common from Europe over Asia to Central America. WASSON (1986) pointed out extensive parallels in the mythology of fly agaric among the highland Maya in Central America and the early Aryans in North India. Among both, the fly agaric was called "one-leg" or "one-foot" and was related to lightning and the respective god of the thunderstorms (Parjanya in India), or, the god of the tropical thunderstorms, respectively (Hurakán among the Quiché-Maya). WASSON supposed that these common concepts were based on archaic ideas of the

people in North Asia during the late Pleistocene, i.e., had their roots in North Asian shamanism.

FLY AGARIC was also used as a hallucinogenic fungus in Europe; in Siberia, into our century, and in North America and Mexico, individually till today (see WOLTERS, 1996). Unfortunately, the mythology of this fungus common in the circumpolar area has not been handed down to us in Europe. But its current symbolism as a "good-luck" fungus (in spite of its well-known poisonous property!) seems to give a hint to an earlier use among us.

For elderberry (*Sambucus* sp.), HENRICI (1894) already pointed out that there is a "most strange identity" in the harvest of the bark: in some regions of Russia, as well as in Siberia and among the Winnebago in North America, the bark scraped off from top to bottom is said to cause diarrhea, yet scraped off from bottom to top, vomits. This analogy charm also exists among the Mohegan (MOERMAN, 1998). It also existed in Central Europe; ALBERTUS MAGNUS mentions it around 1250 A.D. (ABRAHAM and THINNES, 1995). Since the medicinal fields of application of elderberry species in Russia and Siberia coincide with those of North America to a large extent (see above), it is possible to suppose a common origin of this analogy charm in the production of the bark, the same as in the mythology of fly agaric in Pleistocene North Asia (WOLTERS, 1999 b).

Sagebrush (*Artemisia* sp.) is another example. Species of *Artemisia* were used as witchcraft medicine in Europe (Germany, England; ABRAHAM and TINNES, 1995), and they are still used as witchcraft medicine in North America: by the Winnebago, Dakota (Sioux), Omaha, Ponca and Pawnee in the Missouri region as well as by the Shuswap in British Columbia (MOERMAN, 1998). The

plants of *Artemisia* were and are ritually burnt, identically as a charm against disease, misfortune and all kinds of evil.

IN GERMANY for example, mugwort (*Artemisia vulgaris*) was an ingredient of wreaths of herbs which were burnt on St. John's Eve in order to avert all kinds of evil for a whole year (SCHÖPF, 1986). It is true that to this date, we lack a correspondent ethnologic proof of such ritual use in Siberia, but the parallels in the medicinal use of the genus in Russia, Siberia and North America (see Chapter 3.1) also point to Pleistocene North Asia as a common source, and

"medicine" represents a physical and spiritual unity in shamanism, but also a unity of religion and medicine derived from experience.

Along with Ancient Europe, the Near East, India and China, North Asian shamanism, which reaches to Lapland, Tibet and the north of Japan (among the Ainu; HOPPÁL, 1994), and which the basis of American Indian medicine is also derived from, was undoubtedly one of the main sources of early medicine in its largest sense, considering the numerous ritual practices as well as empirical medicine, with its emphasis on phytotherapy (WOLTERS, 1999/2000).

3.3. Medicinal plants common in the circumpolar area – the Pleistocene basis of American Indian medicine

THE CORRESPONDENCES between Russian-Siberian and American Indian phytotherapy in a number of medicinal plants common in the circumpolar area mean that the circumpolar medicinal plants used by North American Indians today represent the ancient core of their medicine, which they already possessed in Northeast Asia, their original home in the Pleistocene period. This conclusion was checked according to the indication statistics (WOLTERS, 1999 b; Tab. 9).

As to which of the North American medicinal plants are common in the circumpolar area, this was established according to German (OBERDORFER, 1962), Russian (MINAEVA, 1991; EDITING COLLECTIVE, 1983; additionally, some statements by DEMITSCH, 1889), and North American literature (HITCHCOCK and CRONQUIST, 1990; PORSILD and CODY, 1980), excluding species with very big spreading gaps, e.g., male fern, *Dryopteris filix-mas*, which is lacking in the Northeast Asian region (Atlas of the EDITING

COLLECTIVE, 1983) and therefore cannot be given evidence for with respect to the original home of the American Indians.

As to individual circumpolar plants, it is possible that they were actively (*tarragon*, *Artemisia dracunculus*, according to ERICHSEN-BROWN, 1979) or passively (possibly stinging nettle, *Urtica dioica*) carried off from Asia to North America by American Indians and only therefore then became common in the circumpolar area. Already the "first Americans" can have introduced some species.

The actually small percentage of the portion of circumpolar plants is disproportionately high in North American Indian medicine. While 11.4 % of all North American plants (2063 out of about 18,000 species; categories such as "poison" and "unspecified" in MOERMAN, 1986, have not been counted) are used in popular medicine, the percentage within the circumpolar species is 17.6 % (77 out of 430 – 440 species; for the list of

species, see Tab. 8). It is thus elevated by more than a half.

American Indians do not and did not have a reason to prefer circumpolar plants, for they do not choose their medicinal plants according to this criterion. The only reason can be a historical one: they already knew these plants in Asia. Once arrived in North America, they then extended their store of remedies considerably.

IN NORTHEAST ASIA, relatively poor in species, there were probably about 1800 species of vascular plants (as there are in central Canada, today), among them maybe 250 medicinal plants – more than two thirds of them purely Eurasian ones, a quarter to a third of them circumpolar ones. But a great portion of the Eurasian species belongs to circumpolar genera, so that the American Indians could also continue from there after their arrival in North America. Which they did, indeed, as the relative portion of circumpolar plant genera in archaeological finds shows, which was still high in the late Pleistocene, more and more decreasing in the post-Pleistocene period (for comparison, see Chapter 4).

The statistic analysis of the medicinal indications of all of the 77 circumpolar species of medicinal plants (Tab. 9) proves that only certain indications are clearly (with an elevation by 3 % or more) overrepresented to this day, as compared to the total of the current American Indian medicine; in individual cases, they are also underrepresented.

According to this analysis, the characteristic features of Pleistocene phytotherapy with a predominance of urinary aids are clear (22 out of 77 plants = 28.6 %, in position 4 of the indication list in Tab. 9). At the same time, the circumpolar plants used as urinary

aids are over-represented by 87 %, with 28.6 % as compared to the percentage of 15.3 % of such plants in the total of medicine – by far more than all other medicinal indications!

In contrast to this, the circumpolar medicinal plants used as respiratory aids are slightly underrepresented (23.4 % as compared to 26.8 %; position 7 of the indication list, instead of position 3 in the total of the plants). This, too, is a clear Pleistocene relic in current American Indian medicine.

Veterinary aids, too, are underrepresented (7.8 % in contrast to 12.5 %); a veterinary aid for dogs, the only pet of the late Pleistocene, is lacking completely (that is, 0 % in contrast to about 2.5 %; for comparison, see Tab. 9). The six circumpolar plants used in current veterinary medicine have probably been taken over from human medicine by American Indians later, the same as most of the phytotherapeutic agents.

So the typical Pleistocene features in popular medicine undoubtedly come through to this day in the use of circumpolar medicinal plants among North American Indians (WOLTERS, 1999 b).

AS A CONSEQUENCE, it seems to be suitable to investigate the different weightings of other indications of circumpolar plants, too, and to examine them with regard to the Palaeolithic life conditions of the Palaeo-Indians, particularly since the low number of medicinal plants in archaeological finds from the late Pleistocene in North America (Tab. 10) does not permit any conclusions which would go beyond the ones mentioned above. This also applies to the finds in the Old World.

Divergences of under 3 % between the numerical values in Tab. 9 are seldom taken

into consideration in the following, since they can hardly be considered statistically significant; the same applies to indications with less than 5 plant species out of 77 circumpolar ones, e.g. for “anthelmintics” or “mouth wash”, which appear in the archaeological tables from time to time. (The low number of plants used as anthelmintics seems to contradict the actually high frequency of worm diseases; but the number of plants containing active substances against them is low, a fact which, by the way, applies to heart ailments, too. As to these two indications, the significance of these diseases cannot be inferred from the number of medicinal plants!)

In the beginning (Chapter 1) I had already attributed the high numerical values and percentages for the indication “affections of the urinary tract” to the extreme climatic conditions and the primitive housing conditions of the Pleistocene, which favoured diseases of this kind; the numbers are mentioned above and in Tab. 9. It is striking that even the indication “antirheumatic” in the 10th position is slightly overrepresented with 16.9 instead of 13.9 %, relative by a fifth. This can be applied to the same causes.

THE HYGIENIC CONDITIONS too, and the preservation of food were probably critical in the Pleistocene, more than it was later. The antidiarrheals (19.5 instead of 15.8 %) and the gastrointestinal aids (35.7 instead of 26.7 %) are slightly overrepresented among the circumpolar medicinal plants (by about ¼), which is conceivable because of the quality of the drinking water and food. Tuberculosis remedies (15.6 instead of 10.1 %) and plants for the treatment of venereal diseases (16.9 instead of 13.2 %) are also represented above average among the circumpolar medicinal plants. In a way different from the mostly short-term respiratory diseases (colds etc.), these long-term infections had a greater chance to be communicated to other human

groups, in spite of the very low population density.

FURTHERMORE, the fact has to be mentioned that the “orthopedic aids” among the circumpolar medicinal plants are overrepresented by more than a half with 20.8 % instead of 13.2 %. However, this indication also comprises plants for the treatment of serious aftereffects of rheumatism (and antirheumatics are also represented more strongly, see above), not only remedies for the treatment of sprains and fractures etc.. A higher frequency of hunting accidents as a consequence of the use of more primitive weapons is conceivable. The Clovis people were the first to have better weapons for big-game hunting 10,000 years ago (FAGAN, 1991). Perhaps the fact that there was a greater need for analgesics with 36.4 % instead of 28.5 % has to do with the frequency of accidents and serious rheumatism. This could be a possible explanation of the exaggerated portion of “orthopedic aids” among the circumpolar medicinal plants.

Lower values (underrepresented by 13 – 20 %) do not only exist for circumpolar plants used as respiratory aids (see above), but also for those used as a febrifuge (11.7 instead of 14.8 %) and for those used for the – partly infectious – dermatological diseases (see Tab. 9). In all three cases, the extremely low population density in the Pleistocene probably made a spreading of the mostly short-term infections difficult. For the respiratory aids and febrifuges, this is obvious in comparison with the conditions in the late post-Pleistocene period with an increasing population density (for comparison, see Chapters 4.3 and Tab. 12).

For some ritual and “magic” indications, which are not considered as “medicinal” among us, there are excessive portions

among the circumpolar plants: For magic plants, 10.4 % instead of 5.4 %, for “panacea” (which are partly identical with ceremonial plants), 10.4 % instead of 6.3 %, for the ceremonial plants themselves, only slightly more (15.6 % instead of 13.0 %). Shamanism was probably developed to a high degree already in the late Pleistocene. Perhaps the high portion of “blood medicines” with 14.3 % instead of 10.8 % has partly to do with “magical” conceptions, too. In contrast to this, there is no difference to be seen in the emetics, which are often used for ritual purposes (Tab. 9).

The high estimation of gynecological and pediatric aids and of the sweat and medicated steam baths is typically American Indian. There is a relatively low overrepresentation of gynecological aids, with 26.0 % instead of 23.0 % among the circumpolar medicinal plants, of pediatric aids, by about a half with 24.7 % instead of 16.5 %. It can be supposed that these indications were very important to the American Indians even in the late Pleistocene.

Sweating as a method of treatment must also have played an important part among the American Indians even in the Pleistocene: plants used as diaphoretics constitute 9.1 % instead of 6.2 %; circumpolar plants for the sweat and medicated steam bath are overrepresented by almost 65 % with 13.0 % instead of 8.0 %. Here, too, the assumption is plausible that the sweat and steam cures were already developed in Northeast Asia before the American Indians moved to America 14,000 – 12,000 years ago (WOLTERS, 1999/2000).

IN OUR PHYTOTHERAPY, pediatric aids and bath essences claim a place among the main indications only today (for comparison, see Tab. 6 and 7) and were of relatively small significance before. In these fields of

therapy, the American Indians were many millennia ahead of us!

For the sweat and medicated steam bath, the American Indians use at least 164 different plants nowadays (WOLTERS, 1999 a). Among the circumpolar species, there are ten (out of 77), namely yarrow (*Achillea millefolium*), wormwood (*Artemisia dracunculus*), fringed sagewort (*Artemisia frigida*), pipsissewa (*Chimaphila umbellata*), common juniper (*Juniperus communis*), wild mint (*Mentha arvensis*), common selfheal (*Prunella vulgaris*), western brackenfern (*Pteridium aquilinum*), scarlet elderberry (*Sambucus racemosa* ssp. *pubens*), and stinging nettle (*Urtica dioica*). Except for the two species of *Artemisia*, and *Sambucus pubens*, the species mentioned above grow wild in Germany, too, only we do not prepare any medicated steam baths with them.

Extending the comparison to the plant genera, i.e. groups of species resembling each other, one finds that 55 % of all the species used for the American Indian steam bath belong to circumpolar genera, although their portion within the North American flora is only about a third. These are species of sagebrush, aster, yarrow, juniper, pine, spruce, angelica, cherry/plum, avens, mint, sage, sorrel or dock, nettle, lousewort, elder, honeysuckle, clematis, crowfoot, milk vetch, and myrtle flag (WOLTERS, 1999 a), and others. There can only be historical reasons for this percentage, which is by far excessive.

THE FACT THAT the sweat bath was totally unknown in Siberia before the Russian colonization is a seeming contradiction; the Russians themselves had probably taken it over from Finland. But there can be several reasons for the lack of the sweat bath:

Into the 20th century, many peoples of Siberia did not know the custom of ever having a

wash or even a bath (LOPATIN, 1960). With such a negative attitude towards personal hygiene, the American Indian sweat bath could not be imparted. Maybe the American Indians invented it a short time before their migration to America, without being able to spread it. And a look at the ethnological map of Siberia gives the impression that the Palaeo-Asians (Chukchi, Kamchadalians and others) were forced aside towards the Bering Sea by the Mongolian and Turko-Tatarian peoples (Tunguts, Yakuts, and others). This might have happened to the Palaeo-Indians, too, especially to their "rearguard", the Athapaskans. And where there is hostility, no customs are transmitted (WOLTERS, 1999/2000).

By the way, the comparison between western Eurasia (Tab. 7) and North America (Tab. 14) shows that the febrifuges were rated highly in Europe and in Shanidar IV, yet in North America, they only had an average value into the early post-Pleistocene period. In their original home, Northeast Asia, the American Indians lived in a cold, yet in some respects relatively healthy climate; as a consequence, they only carried off to America a part of the infectious diseases of the Old World. There, their total lack of immunity against European diseases such as smallpox, diphtheria, and others were their ruin after 1492.

4. The development of American Indian medicine in the late Pleistocene and the Holocene of North America

4.1. Finds of economic plants in late-Pleistocene North America

APART FROM mescal bean (*Sophora secundiflora*, a leguminous pant), used as a hallucinogen in the Pecos region in Texas, there is almost exclusive evidence (Tab. 10) for food plants that are medicinal plants at the same time.

In Mexico and Illinois, seeds of field pumpkin (*Cucurbita pepo*, still as a wild form at the time) were found. In the finding place Stroudsberg/Pennsylvania (8700 – 8500 B.P., towards the end of the late Pleistocene), there are (FAGAN, 1991): Alleghany blackberry (*Rubus alleghaniensis*), wild plum (*Prunus americana*), velvet leaf blueberry (*Vaccinium myrtilloides*), summer grape (*Vitis aestivalis*), goosefoot (*Chenopodium* sp.), and ground cherry (*Physalis* sp.).

Among these eight plants, 5 plants each are – and certainly also were in those times – used as dermatological, gastrointestinal, and

gynecological aids; 4 each, as urinary aids and antidiarrheals; three each, as analgesics, respiratory and pulmonary aids (without tuberculosis remedies; Tab. 10). Most of the main indications (8 out of 11) were – and still are today – among the most important indications of American Indian medicine, with respect to the circumpolar medicinal plants as well as in general. Urinary and respiratory aids were proportional to each other in the way that was typical for the Pleistocene (4 : 3); a veterinary aid for dogs is missing here as well.

THE SIX PLANTS from the finding place Stroudsberg belong exclusively to circumpolar genera – a proof that the American Indians first used such plants as resembled those in North Asia after their immigration to America. Only field pumpkin and mescal bean were completely new to them (WOLTERS, 1999/2000).

4.2. Medicinal plants in the early post-Pleistocene period

FROM THE FINDING PLACES of the early post-Pleistocene period (FAGAN, 1991; food and medicinal plants at the same time (Tab. 11):

From the Wendover period (7500 – 4000 B.P.) in the Great Basin, salt grass (*Distichlis spicata*, a grass), prickly pear (*Opuntia engelmannii*, a cactus), the leguminous plants mesquite (*Prosopis juliflora*) and screwbean (*P. pubescens*), further more, *Typha* sp., a marsh plant.

From Icehouse Bottom in the Tennessee area (7000 – 6000 B.P.), the following plants have to be named: one plum species (*Prunus americana*), one leguminous plant, honey locust (*Gleditsia triacanthos*), a number of hazelnut, walnut and hickory trees ((*Corylus americana*, *Juglans nigra*, *J. cinerea*, *Carya laciniosa*, and other species), one chestnut species (*Castanea dentata*). Even the blackberries (*Rubus* sp.), strawberries (*Fragaria* sp.) and currants (*Ribes* sp.) found here, the evidence of their existence there being given in the form of their seeds, are not only fruit, but also medicinal plants, especially their leaves.

Another finding place is Coster/Illinois (6500 – 3600 B.P.) with pecan (*Carya illinoensis*) and field pumpkin.

Cowboy Cave in the Great Basin is the finding place of the sunflower (*Helianthus annuus*) about 6000 B.P., a versatile medicinal plant of the American Indians. In South California (from 5800 B.P. on), archaeologists also found acorns (*Quercus* sp.) and sagebrush (*Artemisia* sp.).

Out of these 17 plant genera, which there is evidence for as having existed in the early post-Pleistocene period, 9 are also common

in the north of the circumpolar area, 8 are either specifically American genera (Indian fig, mesquite and screwbean, honey locust, field pumpkin, sunflower, hickory and pecan) or – when circumpolar (walnut, chestnut) – they do not occur in northern regions and therefore were not known to the American Indians from Northeast Asia. Almost half of the plants were therefore completely new in the store of medicine of that time, the circumpolar species in the Tennessee region slightly predominating as compared to the “new” purely American ones (5 : 4); in the Great Basin, it is vice versa (2 : 3), a fact that could hint to regional differences in the adoption of “new” medicinal plants due to the different geographical situation of the plants.

Among the 14 plants mentioned as species, four drugs can be listed now as respiratory aids (American plum and – as new ones – honey locust, chestnut and hickory), but only three as urinary aids (American plum, field pumpkin and butternut; for a comparison of the botanical and popular names of the plants, see Tab. 13).

IN THE LATE PLEISTOCENE, this was still vice versa, but in the post-Pleistocene period, the climatic conditions were by far better, and complaints of the bladder and kidneys decreased to a certain degree. Veterinary aids are represented for the first time now with chestnut bark (an anthelmintic for dogs).

Typical characteristics of “Pleistocene medicine” are therefore already cancelled in the early post-Pleistocene period through an improvement of life conditions (WOLTERS, 1999/2000). In Tab. 11, where the plant genera referred to are counted in addition to

the species above mentioned, the urinary aids are now also below the respiratory aids (9 : 10 indications of medicinal plants). Since the population density was still limited (exclusively hunter-gatherer peoples!), the

respiratory aids still remained in the same status no. 7 as among the circumpolar plants (Tab. 9) and those of the late Pleistocene (in Tab. 10, in positions 6 – 11, along with other indications).

4.3. Medicinal plants in the late post-Pleistocene period

THESE (Tab. 12) will be discussed only briefly; for 5000 – 2000 years ago, the North American Indians reached more or less the level of use of today. The plant finds come from different North American regions (FAGAN, 1991; GREMILLION, 1997):

from Kentucky, 5000 years ago, field pumpkin (*Cucurbita pepo*), 3000 years ago, seeds and fruit of tulip tree (*Liriodendron tulipifera*), honey locust (*Gleditsia triacanthos*), butternut and black walnut (*Juglans cinerea* and *J. nigra*), American chestnut (*Castanea dentata*), and the grass little bluestem (*Andropogon scoparius*);

from Arkansas, 3000 years ago, sunflower (*Helianthus annuus*) and giant ragweed (*Ambrosia trifida*);

from the Great Basin, 4000 – 2500 years ago, fruit of grasses (Canada wildrye, *Elymus canadensis*; panic, *Panicum* sp.);

from the buffalo-hunter cultures of the prairie, in addition to sunflower, scurf pea (*Psoralea* sp.), and hog peanut (*Amphicarpaea* sp.);

from the west coast, California buckeye (*Aesculus californica*), chia (*Salvia columbariae*), and yampah (*Perideridia* sp.).

From the southwest (Hohokam, Anasazi), from 250 B.P. on, banana yucca (*Yucca baccata*), cactus apple or prickly pear (*Opuntia engelmannii*), silverleaf nightshade (*Solanum elaeagnifolium*), and Mexican dock (*Rumex mexicanus*).

Out of the 18 genera mentioned, only six were known to the immigrated American

Indians from their home, Northeast Asia, namely *Rumex*/dock, *Solanum*/nightshade, *Salvia*/sage and the three grasses *Andropogon*, *Elymus*, and *Panicum*. The other 12 genera are either purely American genera, or they only grow in the deciduous forest zone, which did not exist in Pleistocene Northeast Asia (even today, they only grow in southern West Siberia and in China, Korea, and Japan). In terms of numbers, this corresponds more or less to the current conditions in the North American flora.

AMONG THESE PLANTS, there are now also the first cultivated plants, which have been grown by the North American Indians independently (without any influence from Mexico!): field pumpkin (*Cucurbita pepo*, from other varieties than those in Mexico), for about 5000 years, one goosefoot (*Chenopodium berlandieri*), for 3400 years, sunflower and giant ragweed (*Ambrosia trifida*), for 3000 years, maygrass (*Phalaris caroliniana*) and little barley (*Hordeum pusillum*), the seeds of which were harvested and consumed (GREMILLION, 1997). Then, around 1000 – 500 B.P., corn appears from Mexico, initially in the cultural area "Southwest". Field pumpkin, sunflower, giant ragweed and corn are medicinal plants at the same time (see Tab. 12).

THE NOURISHMENT, which had been improved through the cultivation of food plants, made a higher population density possible. This obviously resulted in a higher

demand of medicinal plants for respiratory diseases, which were now communicated more easily and more frequently than in times of a very low population density. This medicinal indication has advanced during the last 5000 years from Pleistocene position 7 to current position 3 (for comparison, see Tab. 14; WOLTERS, 1999/2000); the same as, by the way, the indication "febrifuge", which was only a medium-ranked minor indication until the early post-Pleistocene period (see

Tab. 9, 10 and 11), and which has been a main indication from the late post-Pleistocene period till today (Tab. 14).

Whether and to what extent the popular medicine of the indigenous peoples of North America has been influenced by the plants which were imported and introduced by the white people, is beyond the scope of this paper.

5. Discussion of the general results

ESSENTIAL RESULTS of the investigations have already been discussed in Chapters 1 – 4 for each case; yet let us reconsider them here coherently.

The geographic area of this study is limited to the cool climatic regions of the Holarctic floral zone of the Northern Hemisphere: North America, Europe and North Asia (with Pleistocene Shanidar IV in Iraqi Kurdistan as its most southern point), but without the East Asiatic countries. From a climatic and botanical point of view, it is a relatively homogeneous and therefore easily comparable area. This area has even 430 – 440 plant species and about a third of all existing plant genera in common. Furthermore, 5 out of the 6 medicinal plants of Shanidar IV belong to genera which are common all over the Northern Hemisphere.

The results of DILLEHAY et al. (1989/1997) in Monte Verde II in Chile are comparable to them only to a limited degree because this is a different area of the Antarctic floral zone from a climatic point of view (cool, indeed, but with an extremely high precipitation), with a different "offer" of medicinal plants for the most part. This is why they have been related to only in parts of the text.

But the method of ROSSEN and DILLEHAY's (1997) comparative indication statistics to find out to what extent there are common features between the phytotherapy or the extent of the spreading of diseases in the last Ice Age and current popular medicine has been adopted and extended in terms of time beyond Shanidar IV down to *Homo erectus* in Europe 370,000 years ago, which resulted in certain generally common peculiarities of the phytotherapeutical indications in the Pleistocene period – differing from those of the Holocene period.

IN THE PLEISTONE PERIOD, the urinary aids always ranked above the respiratory aids among the main indications, as judged according to the number of plants for diseases of that kind: for *Homo erectus* in Europe, for Neanderthal Man in Shanidar IV as well as in Europe, and for "modern" *Homo sapiens* in late Pleistocene South Europe as well as in North America. There, the circumpolar portion of the current American Indian medicinal plants shows the same characteristic feature and so discloses its identity as the late Pleistocene core of current American Indian medicine.

On the other hand, the indication "respiratory aid" always precedes the urinary aid, in early the same as in late post-Pleistocene North America, exactly like today, the same in Central European popular medicine and modern phytotherapy (Tabs. 7 and 14).

Even if the interpretation of one or two more archaeological finds gives another picture, this does not change the rule which can be identified from 11 statistics. Since often only a few plants are found (in Shanidar IV, there were only 6), statistic "runaways" can indeed be expected, yet they do not prove the contrary.

This result was already discussed in Chapter 1 (Criteria) because it shows that the method of a comparative indication statistics does not simply reflect current popular medicine, which is used for comparison, - although numerous diseases have maintained the extent of their spreading through hundreds of thousands of years -, but also shows differences from the present. When *Homo erectus*, Neanderthal Man, the early Europeans and the American Indians collected economic plants in the Pleistocene period, they obviously did not only take wood and edible parts of these plants with them, but also parts which could be used as medicinal drugs, a fact which influenced the combination of species in Pleistocene plant finds.

IN VIEW OF THE FACT that there are three medicinal plants serving as veterinary aids among 40 Central European medicinal plants in current popular medicine (Tab. 5), one should expect that there would be a number of veterinary aids among the plants in the Pleistocene finds of the Old World, which, summed up, result in an almost equal number (Tab. 7), - but there is not a single veterinary aid among them, as might be expected for lack of pets until the late Pleistocene.

Other indications do not allow any conclusions as to general differences between Pleistocene and Holocene phytotherapy. Dermatological aids have always been among the first (position 1 - 3), others have very changing positions for a part: those that are only mentioned once or twice among the main indications, maybe because of local requirements or traditions, or because of statistical accidents (especially when there is a low number of plants).

For this reason, almost only the main indications were taken into consideration in the Collective tabs. 7 and 14; the other tables serve more the purpose of documentation, to show what the main results are based on.

More comparisons of indications beyond the urinary and respiratory aids and veterinary aids are only possible within one and the same line of tradition:

- 1) In Chile: Monte Verde II 12,500 years ago, and the current medicine of the Mapuche (ROSSEN and DILLEHAY, 1997; see there).
- 2) In North America: circumpolar medicinal plants, or early North America, and the current American Indian medicine as a whole (Chapters 3 and 4). The indigenous North American phytotherapy has been a progressive development of Pleistocene medicine, completely undisturbed until the arrival of the white people. Without DANIEL MOERMAN's (1986; 1998) record of all ethnomedicinal dates from North America, this paper would not have been possible.
- 3) In Europe: Pleistocene Europe and current phytotherapy in Europe. In a way different from American Indian medicine, European popular medicine has been exposed to influences from other traditions for thousands of years:

from the Mediterranean area, the Middle East and Asia (the latter in a very remarkable way in Russia; see Chapter 3.1). In addition to this, ideas of doctors (e.g. Dioskurides, whose work was read from the Ancient World to the 16th century) and authors of herbal books have influenced popular medicine. These complex developments have not been recorded completely anywhere, at best in special parts. With this state of affairs, there is no "European MOERMAN". As a result, Europe has been used here more for comparison with American Indian medicine; in order to make clear statements about the general characteristics of "Pleistocene medicine" in the Northern Hemisphere, and also to see specific developments of American Indian medicine.

Characteristic features of North American indigenous phytotherapy are very old and obviously go back to the Pleistocene period; such as the high estimation of pediatric aids and of the sweat and medicated steam baths, which must have already existed before the immigration of the bulk of the American Indians to North America 14,000 – 12,000 years ago (see Chapter 3.3). The total of the basics of American Indian medicine, from shamanism to phytotherapy, come from the American Indians' original home in Northeast Asia. Other Asian peoples transported parts of North Asian medicine, originally a common property, down to East Europe (Chapters 3.1 and 3.2).

The development of American Indian medicine in North America's post-Pleistocene period (Chapter 4; Tabs. 10 – 14) clearly shows that the cause of the high weighting of the indication "urinary aid" was indeed in the hard Pleistocene climate and the primitive housing conditions; for with the milder climate of the early post-Pleistocene period and the improvement of tools since the end of the late Pleistocene, which also made

the construction of better dwellings possible, the rank of this indication drops to the current state.

By contrast, the indication "respiratory aid" does not reach its current state before the late post-Pleistocene period, after food was secured in a better way with the cultivation of the first cultivated plants, which permitted a higher population density than in Pleistocene and later hunter-gatherer cultures. This was a concomitant of a more frequent spreading of pathogens of viral respiratory diseases and fever and of a higher need of medicinal drugs for their cure. This rise was not caused by the diseases introduced by the white people, but earlier, with the transition from the Paleolithic to the Neolithic Age, from life as a hunter-gatherer to the settled state of the nations of farmers.

SO FAR, the medicinal plants of Shanidar IV and Monte Verde II appeared as isolated proofs of the existence of a Pleistocene phytotherapy, the same as GORDON WASSON's indications considering fly agaric, CHARLOTTE ERICHSEN-BROWN's, considering tarragon, and MARGARITA ARTSCHWAGER KAY's, considering yarrow seemed isolated proofs of common features that existed between Siberia and North America. The hints in earlier Russian specialized literature (DEMITSCH, HENRICI) were forgotten.

IN THIS PAPER, the attempt was made to draw a general picture of Palaeolithic phytotherapy in the northern regions of the earth and of the origin of American Indian medicine within Siberia and its first development in North America by including a greater number of economic and medicinal plants of the Pleistocene period common in the circumpolar area.

Tab. 1

Tab. 1. Potential medicinal use of economic plants of *Homo erectus* in Europe 370,000 – 350,000 years ago.
List of plants according to D. MANIA, 1998.

Indications in popular medicine	Alnus sp Alder.	Buxus sempervirens Box	Cornus mas Cornel	Cornus sanguinea Dogwood	Corylus avellana Hazel	Euonymus europaeus Spindle tree	Fraxinus excelsior Ash	Prunus avium Bird cherry	Pyrus pyraster Wild pear	Viburnum lantana Mealy tree	Abies alba Fir	Picea abies Spruce	Pinus sylvestris Wild pine	Taxus baccata Yew	Number of plants
Dermatological aid	+	+	-	-	-	+	-	+	+	-	+	+	-	-	7
Urinary and kidney aid*	-	-	-	-	+	-	+	-	+	+	-	+	+	-	6
Febrifuge	+	+	+	+	-	-	+	-	-	-	-	+	-	-	6
Antidiarrheal	-	-	+	+	-	+	-	+	+	+	-	-	-	-	6
Antirheumatic/ Remedy for gout	+	+	-	-	-	-	+	-	-	-	-	+	+	-	5
Respiratory aid*	-	-	-	-	-	+	-	-	-	-	+	+	+	-	4
Gynecological aid	+	+	-	-	-	-	-	-	-	-	-	-	-	+	3
Laxative	-	+	-	-	-	+	-	-	+	-	-	-	-	-	3
Disinfectant	-	-	-	-	-	-	-	-	-	+	+	-	-	-	2
Emetic	+	-	-	-	-	+	-	-	-	-	-	-	-	-	2
Tonic	+	-	-	-	-	-	+	-	-	-	-	-	-	-	2
Antiscorbutic	-	-	-	-	-	-	-	-	+	-	-	+	-	-	2
Anthelmintic	-	-	-	-	-	-	+	-	-	-	-	-	-	+	2
Mouth wash	+	-	-	-	-	-	-	-	-	+	-	-	-	-	2
Insecticide, Remedy for scabies	-	-	-	-	-	+	-	-	-	-	-	-	-	+	2
Venereal aid	+	+	-	-	-	-	-	-	-	-	-	-	-	-	2
Analgesic	-	+	-	-	-	-	-	-	-	-	-	-	-	-	1
Gastrointestinal aid	+	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Hemostat	+	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Stimulant	-	-	-	-	-	-	-	-	-	-	-	+	-	-	1
Orthopedic aid	-	-	-	-	-	-	-	-	-	-	+	-	-	-	1
Sedative	-	-	-	-	-	-	-	-	+	-	-	-	-	-	1
Diaphoretic	+	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Antispasmodic	-	-	-	-	-	-	-	-	-	+	-	-	-	-	1
Cardiac remedy	-	-	-	-	+	-	-	-	-	-	-	-	-	-	1
Asthmatic aid	-	-	-	-	-	-	-	-	-	-	+	-	-	-	1
Anemia remedy	-	-	-	-	-	-	-	+	-	-	-	-	-	-	1
Antidiabetic	-	-	-	-	-	-	-	+	-	-	-	-	-	-	1
Remedy for rabies	-	-	-	-	-	-	-	-	-	-	-	-	-	+	1
Veterinary aid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0

*see tab. 9

Tab. 2. Medicinal plants of Neanderthal Man of Shanidar IV. For comparison, see text.
List of plants according to LIETAVA, 1992.

Indications in popular medicine	<i>Achillea millefolium</i> Yarrow	<i>Althaea</i> sp. Marshmallow	<i>Centaurea solstitialis</i> St. Barnaby's thistle	<i>Ephedra altissima</i> Ephedra	<i>Muscari</i> sp. Grape hyacinth	<i>Senecio</i> sp. Common groundsel	Number of plants
Urinary aid*	+	+	+	+	+	-	5
Dermatological aid	+	+	-	+	-	+	4
Stimulant/euphoric	+	-	-	+	+	+	4
Respiratory aid*	+	+	-	+	-	+	4
Febrifuge	+	-	+	+	-	-	3
Gynecological aid	+	+	-	-	-	+	3
Analgesic	+	-	-	+	-	+	3
Antidiarrheal	-	-	-	+	-	+	2
Antirheumatic/Remedy for gout	-	-	-	+	-	+	2
Gastrointestinal aid	+	-	+	-	-	-	2
Hemostat/Wound healing	+	-	-	-	-	+	2
Blood pressure remedy	-	-	-	+	-	+	2
Diaphoretic	+	-	-	-	-	+	2
Tonic	+	-	-	-	-	+	2
Antispasmodic	-	+	-	-	-	+	2
Eye medicine	-	-	+	+	-	-	2
Tuberculosis remedy	-	+	-	-	-	-	1
Asthmatic aid	-	-	-	+	-	-	1
Emetic	-	-	-	-	+	-	1
Venereal aid	-	-	-	-	-	+	1
Anthelmintic	-	-	-	-	-	+	1
Remedy for dropsy	-	-	-	-	-	+	1
Burn dressing	-	+	-	-	-	-	1
Dépurative	+	-	-	-	-	-	1
Veterinary aid	-	-	-	-	-	-	0

* see tab. 9

Tab. 3. Potential medicinal use of economic plants of Neanderthal Man in Europe 200,000 – 50,000 years ago. List of plants according to data by FRANKE, 1976, and MANIA, 1998.

Indications in popular medicine	Castanea sativa Spanish chestnut	Cornus mas Cornel	Corylus avellana Hazel	Fragaria sp. Strawberry	Juglans regia Walnut	Prunus spinosa Sloe	Malus sylvestris Crab apple	Quercus sp. Oak	Rubus idaeus Raspberry	Sambucus nigra Common elder	Sorbus aucuparia Mountain ash	Number of plants
Antidiarrheal	+	+	-	+	+	+	+	+	+	-	+	9
Urinary aid*	-	-	+	+	-	+	-	-	-	+	+	5
Dermatological aid	+	-	-	-	+	-	+	-	+	+	-	5
Gynecological aid	-	-	-	+	-	+	-	-	+	-	+	4
Febrifuge	-	+	+	-	-	-	-	+	-	-	-	3
Gastrointestinal aid	-	-	-	-	-	-	+	+	+	-	-	3
Respiratory aid*	+	-	-	-	-	-	-	-	-	+	+	3
Hemostat	-	-	-	-	-	+	-	+	+	-	-	3
Anthelmintic	-	-	-	+	+	-	-	-	-	-	-	2
Veneral aid	-	-	-	+	+	-	-	-	-	-	-	2
Liver and bile aid	-	-	-	-	-	-	-	+	-	-	+	2
Antirheumatic/Remedy for gout	-	-	-	+	-	-	-	-	-	-	-	1
Pulmonary aid	-	-	-	-	+	-	-	-	-	-	-	1
Asthmatic aid	-	-	-	-	-	+	-	-	-	-	-	1
Eye medicine	-	-	-	-	-	-	-	-	+	-	-	1
Laxative	-	-	-	-	-	-	-	-	-	+	-	1
Disinfectant	-	-	-	-	-	-	-	-	-	-	+	1
Mouth wash	-	-	-	-	-	-	-	-	-	+	-	1
Tonic	+	-	-	-	-	-	-	-	-	-	-	1
Pediatric aid	-	-	-	-	-	-	+	-	-	-	-	1
Emetic	-	-	-	-	-	-	-	-	-	+	-	1
Diaphoretic	-	-	-	-	-	-	-	-	-	+	-	1
Foot bath	-	-	-	-	+	-	-	-	-	-	-	1
Insect repellent	-	-	-	-	+	-	-	-	-	-	-	1
Depurative	-	-	-	-	-	+	-	-	-	-	-	1
Remedy for chilblain	-	-	-	-	-	-	-	+	-	-	-	1
Veterinary aid	-	-	-	-	-	-	-	-	-	-	-	0

Tab. 4. Indications of the economic plants of *Homo sapiens ssp. sapiens* in popular medicine in South Europe at the end of the late Pleistocene. For comparison, see text.
List of plants according to TSCHUMI, 1949, and HANSEN, 1978.

Indications in popular medicine	<i>Corylus avellana</i> Hazel	<i>Juglans regia</i> Walnut	<i>Prunus avium</i> Bird cherry	<i>Prunus spinosa</i> Sloe	<i>Quercus sp.</i> Oak	<i>Pistacia sp.</i> Pistachio	<i>Prunus amygdalus</i> Almond	<i>Lithospermum arvense</i> Gromwell	Number of plants
Antidiarrheal	-	+	+	+	+	+	-	+	6
Dermatological aid	-	+	+	-	+	+	+	-	5
Urinary aid	+	-	+	-	-	-	-	+	3
Gynecological aid	-	-	+	-	-	+	-	+	3
Febrifuge	+	-	-	-	+	-	+	-	3
Anthelmintic	-	+	-	-	-	+	+	-	3
Venereal aid	-	+	-	-	-	+	-	+	3
Respiratory aid	-	-	-	-	-	+	+	-	2
Hemostat	-	-	-	+	+	-	-	-	2
Gastrointestinal aid	-	-	-	-	-	+	-	-	1
Antirheumatic/ remedy for gout	-	-	-	-	-	+	-	-	1
Analgesic	-	-	-	-	-	+	-	-	1
Stimulant	-	-	-	-	-	+	-	-	1
Asthmatic aid	-	-	-	+	-	-	-	-	1
Liver aid	-	-	+	-	-	-	-	-	1
Remedy for anemia	-	-	+	-	-	-	-	-	1
Antidiabetic	-	-	+	-	-	-	-	-	1
Veterinary aid	-	-	-	-	-	-	-	-	0

Tab. 5. 40 Central European food and timber plants which were – and still are - medicinal plants used in recent popular medicine at the same time.

The plants were chosen at random because the archeological finds are also composed more or less accidentally.

Plants (N= food plants, H = timber plants)		Indications in popular medicine	Number of Plants
<i>Abies alba</i> , Silver fir	H	<u>Respiratory aid*</u>	24
<i>Allium schoenoprasum</i> , Chive	N	Dermatological aid	19
<i>Alnus incana</i> , Mountain alder	H	Antidiarrheal	16
<i>Anthriscus cerefolium</i> , Garden chervil	N	<u>Urinary aid*</u>	16
<i>Apium graveolens</i> , Celery	N	Gastrointestinal aid	15
<i>Betula pendula</i> , Drooping birch	H	Antirheumatic/Remedy for gout	8
<i>Berberis vulgaris</i> , Barberry	N	Febrifuge	8
<i>Brassica oleracea</i> , Garden cabbage	N	Hemostat/Wound healing	7
<i>Campanula rapunculus</i> , a bellflower species	N	Gynecological aid	6
<i>Carpinus betulus</i> , Hornbeam	H	Laxative	6
<i>Carum carvi</i> , Caraway	N	Anthelmintic	6
<i>Chenopodium bonus-henricus</i> , Good King Henry	N	Diaphoretic	5
<i>Corylus avellana</i> , Hazel	H N	Liver and bile aid	5
<i>Crataegus oxyacantha</i> , May Hawthorn	H N	Tonic	5
<i>Daucus carota</i> , Carrot	N	Stimulant	4
<i>Fagus sylvatica</i> , Beech	H N	Emetic	3
<i>Fraxinus ornus</i> , Manna ash	H N	Disinfectant	3
<i>Juniperus sabina</i> , Savine	H	<u>Veterinary aid</u>	3
<i>Larix decidua</i> , Larch	H	Analgesic	2
<i>Malva neglecta</i> , Common mallow	N	Remedy for nervous problems	2
<i>Malus sylvestris</i> , Crab apple	H N	Antiscorbutic	2
<i>Ostrya carpinifolia</i> , European hop hornbeam	H	Pulmonary aid/TB	2
<i>Picea abies</i> , Spruce	H	Cardiac remedy/Blood pressure remedy	1
<i>Pimpinella saxifraga</i> , Burnet saxifrage	N	Eye medicine	1
<i>Pinus mugo</i> , Dwarf Pine	H	Antispasmodic	1
<i>Polypodium vulgare</i> , Sweet fern or Polypody	N	Remedy for snake bites	1
<i>Populus alba</i> , White poplar	H	<u>Remedy for rabies</u>	1
<i>Prunus mahaleb</i> , Mahaleb	H N		
<i>Pyrus pyraeaster</i> , Wild pear	H N		
<i>Quercus pubescens</i> , Pubescent oak	H		
<i>Ribes uva-crispa</i> , Gooseberry	N		
<i>Rosa canina</i> , Dog rose	N		
<i>Rubus idaeus</i> , Raspberry	N		
<i>Rumex acetosa</i> , Sorrel	N		
<i>Salix viminalis</i> , Willow	H		
<i>Scorzonera hispanica</i> , Black salsify	N		
<i>Sorbus aria</i> , Whitebeam	H N		
<i>Ulmus minor</i> , Rock elm	H		
<i>Vaccinium vitis-idaea</i> , Cranberry	N		
<i>Valerianella locusta</i> , Corn salad	N		

* see tab. 9

Tab. 6. Indications of 107 medicinal plant species in modern phytotherapy. Data according to WEISS-FINTELMANN, 1997.

Indications	Number of plants
<u>Respiratory aid*</u>	32
Pediatric aid	29
Dermatological aid	26
Gynecological aid	16
Gastrointestinal aid	15
Cardiac remedy	14
<u>Urinary aid*</u>	14
Bath essence	14
Antirheumatic/Remedy for gout	12
Liver and bile aid	9
Wound healing, Antihemorrhagic	7
Antidiarrheal	5
Remedy for nervous problems, psychological aid	5
Laxative	3
Anthelmintic	3
Headache remedy	1

* see tab. 9

Tab. 7

Tab. 7. Important medicinal indications of plants in Western Eurasia during the Pleistocene and in recent popular medicine and the Central European phytotherapy of today (for comparison, see Tabs. 1 – 6).

	Number of plants	The most important indications (in parenthesis, the respective number of plants)
Homo erectus in Europe 370,000 to 350,000 years ago	14	Dermatological aid (7), <u>Urinary aid</u>, Febrifuge, Antidiarrheal (6 each), Antirheumatic/Remedy for gout (5), <u>Respiratory aid</u> (4), Gynecological aid, Laxative (3 each). (Veterinary aid 0).
Homo sapiens neanderthalensis in Europe and the Near East 200,000 to 50,000 years ago	17	Antidiarrheal (11), <u>Urinary aid</u> (10), Dermatological aid (9), Gynecological aid, <u>Respiratory aid</u> (7 each), Febrifuge (6), Gastrointestinal aid, Hemostat (5 each), Stimulant/Euphoric (4). (Veterinary aid 0).
Homo sapiens ssp. sapiens in South Europe 12,000 to 10,000 ears ago	8	Antidiarrheal (6), Dermatological aid (5), <u>Urinary aid</u>, Gynecological aid, Febrifuge, Anthelmintic, Venereal aid (3 each), <u>Respiratory aid</u>, Hemostat (2 each). (Veterinary aid 0).
Popular medicine in Central Europe, recent times (Timber and Food plants)	40	<u>Respiratory aid</u> (24), Dermatological aid (19), Antidiarrheal, <u>Urinary aid</u> (16 each), Gastrointestinal aid (15), Antirheumatic/Remedy for gout, Febrifuge (8 each), Hemostat/Wound healing (7). (Veterinary aid 3).
Phytotherapy of today in Central Europe	107	<u>Respiratory aid</u> (32), Pediatric aid (29), Dermatological aid (26), Gynecological aid (16), Gastrointestinal aid (15), Cardiac remedy, <u>Urinary aid</u>, Bath essence (14 each), Antirheumatic/Remedy for gout (12).

Tab. 8

Tab. 8. Medicinal plants common in the circumpolar area used in North American indigenous medicine.

Botanical names	American names
Achillea millefolium	Common Yarrow
Alnus incana	Mountain Alder
Andromeda polifolia	Bog Rosemary, American Moorwort
Androsace septentrionalis	Pygmyflower Rock Jasmine
Arctostaphylos alpina	Alpine Bearberry
Arctostaphylos uva-ursi	Kinnikinnick, Bearberry
Artemisia dracunculus	Wormwood, Dragon Sagewort
Artemisia frigida	Fringed Sagewort, Prairie S.
Asplenium trichomanes*	Maidenhair Spleenwort
Athyrium filix-femina	Common Lady Fern
Betula nana	Dwarf Birch
Botrychium virginianum	Rattlesnake Fern
Calla palustris	Water Arum
Caltha palustris	Yellow Marsh Marigold
Campanula rotundifolia	Bluebell Bellflower
Cerastium arvense	Field Chickweed
Cerastium vulgatum	Common Chickweed
Chimaphila umbellata	Pipsissewa
Comarum palustre	Purple Marsh Locks
Cystopteris fragilis*	Brittle Bladder Fern
Drosera rotundifolia	Roundleaf Sundew
Dryopteris dilatata	Mountain Woodfern
Empetrum nigrum	Black Crowberry
Epilobium angustifolium	Fireweed
Epilobium glandulosum	Northern Willowherb
Equisetum arvense	Field Horsetail
Equisetum hyemale	Scouringrush Horsetail
Equisetum pratense	Meadow Horsetail
Equisetum sylvaticum	Woodland Horsetail

*cosmopolitan

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Equisetum variegatum	Variegated Scouringrush
Eriophorum angustifolium	Tall Cottongrass
Eriophorum callitrix	Hare's Tail, Arctic Cottongrass
Eriophorum scheuchzeri	White Cottongrass
Erysimum cheiranthoides	Wormseed Wallflower
Galium boreale	Northern Bedstraw
Galium triflorum	Fragrant Bedstraw
Geum rivale	Purple (Water) Avens
Goodyera repens	Lesser Rattlesnake Plantain
Hierochloa odorata	Sweet Grass
Juncus bufonius	Toad Rush
Juncus effusus	Common Rush
Juniperus communis	Common Juniper
Koeleria cristata	Prairie Junegrass
Ledum palustre	Marsh Labrador Tea
Linnaea borealis	Twinflower
Lycopodium clavatum	Running Clubmoss
L. (Diphasium) complanatum	Ground Cedar
Mentha arvensis	Wild Mint, Canada Mint (var. canadensis)
Menyanthes trifoliata	Common Buckbean, Pondweed
Myrica gale	Sweet Gale
Myriophyllum verticillatum	Whorleaf Water Milfoil
Orthilia (Pyrola) secunda	Sidebells Wintergreen
Phragmites australis	Common Reed
Polygonum amphibium	Water Knotweed
Polygonum aviculare	Prostrate Knotweed
Polypodium vulgare	Rock Polypody (var. virginianum)
Potentilla (Argentina) anserina	Silver Weed
Potentilla fruticosa	Shrubby Cinquefoil
Potentilla hyparctica	Wild Sweet Potato
Prunella vulgaris	Common Selfheal
Pteridium aquilinum	Western Brackenfern
Pulsatilla (Anemone) patens	American Pasqueflower
Ranunculus cymbalaria	Desert Crowfoot, Alkali Buttercup
Ranunculus sceleratus	Celeryleaf Buttercup
Rubus chamaemorus	Cloudberry, Mountain Raspberry
Rubus idaeus	American Red Raspberry
Sambucus racemosa	Scarlet Elderberry
Scutellaria galericulata	Marsh Scullcap
Sedum rosea	Roseroot Stonecrop
Silene acaulis	Moss Campion
Streptopus amplexifolius	Claspleaf Twisted Stalk

→ Continued on next page

Tab. 8 (continuation)

Tab. 8, continuation

Botanical names	American names
<i>Thelypteris palustris</i>	Eastern Marsh Fern
<i>Typha angustifolia</i>	Narrowleaf Cattail
<i>Typha latifolia</i>	Broadleaf Cattail
<i>Urtica dioica</i>	Stinging Nettle
<i>Vaccinium oxycoccos</i>	Small Cranberry
<i>Veronica serpyllifolia</i>	Thymeleaf Speedwell

Note: This list was composed according to OBERDOFER (1962), PORSILD and CODY (1980), EDITING COLLECTIVE (1983), HITCHCOCK and CRONQUIST (1990), MINAEVA (1991) and DEMITSCH (1889).

For a number of plants, there are different opinions among the authors as to whether they are really common in the circumpolar area or if they have been introduced to North America within the last 500 years. I have mostly followed the respective more recent opinion, which, however, is not necessarily the right one. Changes in the list which might be necessary in the future do not change any essential point in the statistical medicinal dates, however. The essential characteristics of the indication statistics already appeared in a provisional interpretation according to OBERDORFER and PORSILD and CODY only.

An early introduction of individual plant species by Palaeo-Indians should also be considered, possibly for stinging nettle (*Urtica dioica*) or – according to ERICHSEN-BROWN (1979) – for wormwood (*Artemisia dracunculus*).

Tab. 9. Comparison of the main indications of circumpolar medicinal plants with the total of North American indigenous medicine (American Indians + Eskimo). Evaluation of the data by MOERMAN (1986), for the herbal steam bath, by WOLTERS (1999 a).

Main indications	MOERMAN's nomenclature	Number of plants and data in % Circumpolar	Total number and data in %
Dermatological aid	Dermatological aid	29 = 37.7 %	907 = 44.0 %
Analgesic	Analgesic	28 = 36.4 %	589 = 28.5 %
Gastrointestinal aid	Gast-intestinal aid	26 = 33.7 %	551 = 26.7 %
Urinary aid	Urinary aid + Kidney aid + Diuretic	22 = 28.6 %	315 = 15.3 %
Gynecological aid	Gynecological aid	20 = 26.0 %	485 = 23.0 %
Pediatric aid	Pediatric aid	19 = 24.7 %	341 = 16.5 %
Respiratory aid	Cold remedy + Cough medicine + Expectorant + Respiratory aid + Throat aid	18 = 23.4 %	553 = 26.8 %
Orthopedic aid	Orthopedic aid	16 = 20.8 %	272 = 13.2 %
Antidiarrheal	Antidiarrheal	15 = 19.5 %	327 = 15.8 %
Antirheumatic	Antirheumatic int. + ext.	13 = 16.9 %	287 = 13.9 %
Emetic	Emetic	13 = 16.9 %	338 = 16.4 %
Venereal aid	Venereal aid	13 = 16.9 %	273 = 13.2 %
Laxative	Laxative + Cathartic	12 = 15.6 %	275 = 13.3 %
Ceremonial medicine	Ceremonial medicine	12 = 15.6 %	269 = 13.0 %
Tuberculosis remedy (TB)	Tuberculosis remedy	12 = 15.6 %	208 = 10.1 %
Eye medicine	Eye medicine	11 = 14.3 %	261 = 12.7 %
"Blood medicine"	Blood medicine	11 = 14.3 %	223 = 10.8 %
Herbal steam bath	Herbal steam	10 = 13.0 %	164 = 8.0 %
Tonic	Tonic	10 = 13.0 %	230 = 11.1 %
Stimulant	Stimulant	9 = 11.7 %	187 = 9.1 %
Febrifuge	Febrifuge	9 = 11.7 %	306 = 14.8 %
Pulmonary aid (without TB)	Pulmonary aid	9 = 11.7 %	218 = 10.6 %
Disinfectant	Disinfectant	8 = 10.4 %	163 = 7.9 %
Witchcraft medicine	Witchcraft medicine	8 = 10.4 %	113 = 5.4 %
Panacea	Panacea	8 = 10.4 %	129 = 6.3 %
Diaphoretic	Diaphoretic	7 = 9.1 %	127 = 6.2 %
Hemostat	Hemostat	6 = 7.8 %	110 = 5.3 %
Veterinary aid	Veterinary aid	6 = 7.8 %	257 = 12.5 %
Veterinary aid for dogs	Veterinary aid for dogs	0 = 0.0 %	(c. 50 = 2.5 %)
Burn dressing	Burn dressing	5 = 6.5 %	123 = 6.0 %
Toothache remedy	Toothache remedy	5 = 6.5 %	156 = 7.6 %

Tab. 10. Indications of economic plants used in popular medicine by the late Pleistocene American Indians in North America 12,000 – 10,000 years ago.
List of plants according to data by FAGAN, 1991.

Indications	Stroudsberg/Pennsylvania								Number of plants
	Chenopodium sp. Goosefoot	Physalis sp. Groundcherry	Prunus americanus American Plum	Rubus alleghaniensis Alleghany Blackberry	Vaccinium myrtilloides Velvetleaf Huckleberry	Vitis aestivalis Summer grape	Cucurbita pepo Field pumpkin	Sophora secundiflora Mescal Bean	
Dermatological aid	+	+	+	+	-	-	+	-	5
Gastrointestinal aid	+	+	-	+	-	+	+	-	5
Gynecological aid	+	-	-	+	+	+	+	-	5
Urinary aid*	-	-	+	+	-	+	+	-	4
Antidiarrheal	+	-	+	+	-	+	-	-	4
Analgesic	+	+	-	+	-	-	-	-	3
Pediatric aid	+	-	-	+	-	+	-	-	3
Respiratory aid*	+	+	-	+	-	-	-	-	3
Tonic	+	-	-	+	-	+	-	-	3
Pulmonary aid (without TB)	+	-	+	+	-	-	-	-	3
Mouth wash	-	-	+	+	-	+	-	-	3
Febrifuge	+	-	-	-	-	+	-	-	2
Antirheumatic	-	-	-	+	-	-	+	-	2
Emetic	+	+	-	-	-	-	-	-	2
Venereal aid	+	-	-	+	-	-	-	-	2
Ceremonial medicine	-	-	+	-	-	-	+	-	2
Anthelmintic	-	-	+	-	-	-	+	-	2
Eye medicine	+	-	-	+	-	-	-	-	2
Blood medicine	-	-	-	+	-	+	-	-	2
Orthopedic aid	+	-	-	-	-	-	-	-	1
Tuberculosis remedy	-	-	-	+	-	-	-	-	1
Herbal steam bath	+	-	-	-	-	-	-	-	1
Narcotic	-	-	-	-	-	-	-	+	1
Witchcraft medicine	-	-	-	+	-	-	-	-	1
Stimulant	-	-	-	+	-	-	-	-	1
Disinfectant	-	-	+	-	-	-	-	-	1
Abortifacient	+	-	-	-	-	-	-	-	1
Ear medicine	-	-	-	-	-	-	-	+	1
Veterinary medicine for dogs	-	-	-	-	-	-	-	-	0

* see tab. 9

Tab. 11. Indications of economic plants used in North American popular medicine in the early post-Pleistocene period (9,500 – 5,600 B.P.).

List of plants according to FAGAN, 1991, and GREMILLION, 1998.
For American plant names, see Tab. 13.

Indications	<i>Artemisia</i> sp.	<i>Carya illinoensis</i>	<i>Carya laciniata</i>	<i>Castanea dentata</i>	<i>Corylus americana</i>	<i>Cucurbita pepo</i>	<i>Distichlis spicata</i>	<i>Fragaria</i> sp.	<i>Gleditsia triacanthos</i>	<i>Helianthus annuus</i>	<i>Juglans cinerea</i>	<i>Juglans nigra</i>	<i>Opuntia engelmannii</i>	<i>Prosopis juliflora</i>	<i>Prosopis pubescens</i>	<i>Prunus americana</i>	<i>Quercus</i> sp.	<i>Ribes</i> sp.	<i>Rubus</i> sp.	<i>Typha</i> sp.	Number of plants
Dermatological aid	+	+	+	+	+	+	+	-	-	+	+	+	-	+	+	+	+	+	+	+	17
Gastrointestinal aid	+	-	+	+	+	+	-	+	+	+	-	+	-	+	-	-	+	+	+	+	14
Gynecological aid	+	-	-	+	+	+	-	+	-	+	+	-	+	-	+	-	+	+	+	+	13
Analgesic	+	-	+	-	+	-	-	+	-	+	+	+	-	+	-	-	+	+	+	-	11
Pediatric aid	+	-	-	+	+	-	-	+	+	+	-	-	-	+	-	-	+	+	+	+	11
Antidiarrheal	+	-	-	-	+	-	-	+	-	-	+	+	-	+	-	+	+	+	+	+	11
Respiratory aid*	+	-	+	+	+	-	-	-	+	-	+	-	-	-	-	+	+	+	+	-	10
Urinary aid*	+	-	-	-	-	+	-	+	-	-	+	-	-	-	-	+	+	+	+	+	9
Laxative	+	-	-	-	-	-	+	-	-	-	+	+	-	+	-	-	+	+	+	-	8
Anthelmintic	+	-	-	-	-	+	-	-	+	+	+	+	-	-	-	+	-	+	-	-	8
Emetic	-	-	+	-	+	-	-	-	-	-	-	+	-	+	-	-	+	+	+	-	7
Ceremonial medicine	+	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	+	+	-	+	7
Eye medicine	+	-	-	-	-	-	-	+	-	-	-	-	-	+	+	-	+	+	+	-	7
Pulmonary aid (w/o TB)	+	-	-	+	-	-	-	-	+	+	-	-	-	-	-	-	+	-	+	+	7
Mouth wash	-	-	+	-	-	-	-	+	-	-	-	-	-	+	-	+	+	+	+	-	7
Toothache remedy	+	-	-	-	+	-	-	+	-	-	+	+	-	-	-	-	-	+	+	-	7
Febrifuge	+	-	-	-	-	-	-	-	+	+	-	+	-	-	-	-	+	-	+	-	6
Antirheumatic	+	-	-	+	-	+	-	-	-	+	-	-	-	-	-	-	+	-	+	-	6
Orthopedic aid	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	6
Venereal aid	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	+	+	+	+	6
Tuberculosis remedy	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	+	+	-	6
Tonic	+	-	-	-	+	-	-	-	+	-	+	-	-	-	-	-	+	+	+	-	6
Disinfectant	+	-	-	-	-	-	-	-	-	+	-	-	-	+	-	+	+	-	+	-	6
Burn dressing	+	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-	+	+	6
Blood medicine	-	-	-	-	+	-	-	+	+	-	+	+	-	-	-	-	-	-	-	-	5
Abortifacient	+	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	+	+	5
Stimulant	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	4
Painoca	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	4
Hemostat	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	4
Remedy for snake bites	+	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	+	-	-	4
Herbal steam bath	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	3
Witchcraft medicine	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	3
Diaphoretic	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Veterinary aid for dogs	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

* see tab. 9

Tab. 12. Indications of economic plants used in late post-Pleistocene popular medicine (5,000 – 2,000 B.P.) in North America.

List of plants according to data by FAGAN, 1991, and GREMILLION, 1998.

Indications of indigenous medicine mentioned only once are not indicated here. For American plant names, see Tab. 13.

Indications	<i>Aesculus californica</i>	<i>Ambrosia trifida</i>	<i>Amphicarpaea</i> sp.	<i>Andropogon scoparius</i>	<i>Castanea dentata</i>	<i>Cucurbita pepo</i>	<i>Elymus canadensis</i>	<i>Gleditsia triacanthos</i>	<i>Helianthus annuus</i>	<i>Juglans cinerea</i>	<i>Juglans nigra</i>	<i>Liriodendron tulipifera</i>	<i>Opuntia engelmannii</i>	<i>Panicum</i> sp.	<i>Perideridia</i> sp.	<i>Psoralea</i> sp.	<i>Rumex mexicanus</i>	<i>Salvia columbariae</i>	<i>Solanum elaeagnifolium</i>	<i>Yucca baccata</i>	<i>Zea mays</i>	Number of plants
Dermatological aid	-	+	-	-	+	+	-	-	+	+	+	+	-	-	+	+	-	-	-	-	+	10
Gastrointestinal aid	-	-	+	-	+	+	-	+	+	-	+	+	-	-	-	+	+	-	-	+	-	10
Gynecological aid	-	-	-	-	+	+	-	-	+	+	-	-	+	-	-	+	+	-	+	+	+	10
Respiratory aid	-	+	-	-	+	-	-	+	-	+	-	+	-	-	+	+	+	-	+	-	+	10
Febrifuge	-	+	-	-	-	-	-	+	+	-	+	+	-	+	-	+	+	+	-	-	-	9
Ceremonial medicine	-	+	-	-	-	+	-	-	+	-	-	-	-	+	-	+	+	-	-	+	+	8
Analgesic	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	+	-	-	-	-	+	6
Anthelmintic	-	-	-	-	-	+	-	+	+	+	+	+	-	-	-	-	-	-	-	-	-	6
Pediatric aid	-	-	-	-	+	-	-	+	+	-	-	+	-	-	-	-	-	-	-	-	+	5
Antidiarrheal	-	+	+	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	5
Blood medicine	-	+	-	-	-	-	-	+	-	+	+	-	-	-	-	+	-	-	-	-	-	5
Antirheumatic	-	-	-	-	+	+	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	4
Laxative	-	-	+	-	-	-	-	-	-	+	+	-	-	-	-	+	-	-	-	-	-	4
Urinary aid	-	-	-	-	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	4
Disinfectant	-	+	-	-	-	-	-	-	+	-	-	-	-	+	-	+	-	-	-	-	-	4
Toothache remedy	+	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	+	-	-	4
Remedy for snake bites	-	-	+	-	-	-	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-	4
Emetic	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	+	-	3
Venereal aid	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	3
Tonic	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	3
Tuberculosis remedy	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	3
Pulmonary aid	-	-	-	-	+	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	3
Orthopedic aid	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	-	2
Eye medicine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	2
Stimulant	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	2
Abortifacient	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	2
Antiemetic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	2

Tab 13. American plant names for Tabs. 11 and 12.

Botanical name	American name
<i>Aesculus californica</i>	California Buckeye
<i>Ambrosia trifida</i>	Great Ragweed
<i>Amphicarpaea</i> sp.	Hog Peanut
<i>Andropogon scoparius</i> (= <i>Schizachyrium scoparium</i>)	Little Bluestem
<i>Artemisia</i> sp.	Sagebrush, Wormwood
<i>Carya illinoensis</i>	Pecan
<i>Carya laciniosa</i>	Shellbark Hickory
<i>Castanea dentata</i>	American Chestnut
<i>Corylus americana</i>	American Hazelnut
<i>Cucurbita pepo</i>	Field Pumpkin
<i>Distichlis spicata</i>	Inland Saltgrass
<i>Elymus canadensis</i>	Canada Wildrye
<i>Fragaria</i> sp.	Strawberry
<i>Gleditsia triacanthos</i>	Honey Locust
<i>Helianthus annuus</i>	Common Sunflower
<i>Juglans cinerea</i>	Butternut
<i>Juglans nigra</i>	Black Walnut
<i>Liriodendron tulipifera</i>	Tulip tree
<i>Opuntia engelmannii</i>	Cactus Apple, Prickly Pear
<i>Panicum</i> sp.	Panicgrass
<i>Perideridia</i> sp.	Yampah
<i>Prosopis juliflora</i> (= <i>P. glandulosa</i>)	Honey Mesquite
<i>Prosopis pubescens</i>	Screwbean Mesquite
<i>Prunus americana</i>	American Plum
<i>Psoralea</i> sp.	Scurfpea
<i>Quercus</i> sp.	Oak
<i>Ribes</i> sp.	Gooseberry, Currant
<i>Rubus</i> sp.	Raspberry, Blackberry
<i>Rumex mexicanus</i> (= <i>R. salicifolius</i> var. <i>mexicanus</i>)	Mexican Dock
<i>Salvia columbariae</i>	Chia
<i>Solanum elaeagnifolium</i>	Silverleaf Nightshade
<i>Typha</i> sp.	Cattail
<i>Yucca baccata</i>	Banana Yucca
<i>Zea mays</i>	Corn (Maize)

Tab. 14. Main indications of indigenous phytotherapy in North America from the late Pleistocene till today. For comparison, see Tabs. 9 – 12.

	Number of plants	Important indications (in parenthesis, the respective number of plants)
Late Pleistocene 12,000 to 10,000 years ago	8	Dermatological aid, Gastrointestinal aid, Gynecological aid (5 each), <u>Urinary aid</u> , Antidiarrheal (4 each), Analgesic, Pediatric aid, <u>Respiratory aid</u> , Tonic, Pulmonary aid, Mouth Wash (3 each). (Febrifuge, only 2; Veterinary aid, 0)
Medicinal plants common in the circumpolar area included in the current store of medicine but with typically Pleistocene indication characteristics (for comparison, see Chapter 3.3)	77	Dermatological aid (29), Analgesic (28), Gastrointestinal aid (26), <u>Urinary aid</u> (22), Gynecological aid (20), Pediatric aid (19), <u>Respiratory aid</u> (18), Orthopedic aid (16), Antidiarrheal (15). (Febrifuge, only 9; Veterinary aid for dogs, 0).
Early Post-Pleistocene period 9,500 – 5,600 years ago	20	Dermatological aid (17), Gastrointestinal aid (14), Gynecological aid (13), Analgesic, Pediatric aid, Antidiarrheal (11 each), <u>Respiratory aid</u> (10), <u>Urinary aid</u> (9), Laxative, Anthelmintic (8 each). (Febrifuge, only 6; Veterinary aid for dogs, 1).
Late Post-Pleistocene period 5,000 – 2,000 years ago	21	Dermatological aid, Gastrointestinal aid, Gynecological aid, <u>Respiratory aid</u> (10 each), Febrifuge (9), Ceremonial medicine (8), Analgesic, Anthelmintic (6 each), Pediatric aid, Antidiarrheal, Antirheumatic, Laxative, <u>Urinary aid</u> and others (4 each). (Veterinary aid for dogs, 1).
American Indian medicine today	2063	Dermatological aid (907), Analgesic (589), <u>Respiratory aid</u> (553), Gastrointestinal aid (551), Gynecological aid (485), Pediatric aid (341), Emetic (338), Antidiarrheal (327), <u>Urinary aid</u> (315), Febrifuge (306). (Veterinary aid for dogs, about 50).

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Zusammenfassung

Die ethnobotanische Erfahrung, daß der Mensch einen sehr hohen Prozentsatz seiner Nutzpflanzen (Nutzholz- und Nahrungspflanzen vor allem) als Arzneipflanzen verwendet, ist schon für das Pleistozän belegt; und zwar für die Neanderthaler von Shanidar IV im Irak vor 60.000 Jahren wie für die Indianer von Monte Verde II in Chile vor 12.500 Jahren. Der hohe Prozentsatz (50 – 65 %) in der heutigen indianischen wie der mitteleuropäischen Volksmedizin ist ein Relikt aus der Altsteinzeit. Die Nahrungs- und Nutzpflanzen des *Homo erectus* und des

Neanderthalers waren sogar bis zu 100 % zugleich Arzneipflanzen; sie wurden multifunktionell genutzt und waren der Kern der Phytotherapie im Pleistozän.

Die vergleichende Indikationsstatistik für die Medizin der Monte-Verde-Indianer der Späteiszeit und die der heutigen Mapuche in Chile erlaubt einen Einblick in die Phytotherapie und die medizinischen Bedürfnisse im späten Pleistozän (ROSSEN u. DILLEHAY, 1997). Mit dieser Methode werden in der vorliegenden Arbeit die entsprechenden Daten für die Menschen im pleistozänen westlichen Eurasien und für die frühe indigene Medizin Nordamerikas ermittelt.

Dabei ergibt sich, daß – durch die Lebensverhältnisse im Eiszeitalter bedingt – die Therapie von Harnwegserkrankungen einen höheren Stellenwert hatte als in der Nacheiszeit und heute. Andererseits hatten die Atemwegserkrankungen früher einen geringeren Stellenwert – bedingt durch die sehr geringe Bevölkerungsdichte –, bis mit der Nutzung der ersten Kulturpflanzen die Besiedlungsdichte und damit die Häufigkeit von Infektionen anstieg; in Nordamerika gilt das Gleiche auch für die Indikation „Fieber“. Mittel für die Tiermedizin fehlten im Pleistozän mangels Haustieren.

Angesichts der Tatsache, daß schon manche Säugetiere einzelne Heil- und Rauschpflanzen nutzen, ist zu vermuten, daß auch die frühen Hominiden in Afrika einzelne Pflanzen in ähnlicher Weise verwendet haben. Erste Anzeichen für einen Gebrauch von Arzneipflanzen in Europa deutet die Indikationsstatistik für den *Homo erectus* vor 370.000 Jahren an. Bei den Neanderthalern und dem *Homo sapiens ssp. sapiens* sind Schamanismus und Erfahrungsmedizin im Eiszeitalter eindeutig belegt.

Den eiszeitlichen Kern der nordamerikanischen Indianermedizin stellen die zirkumpolar verbreiteten Arzneipflanzen der Nordhalbkugel dar. Das wird deutlich durch Vergleiche mit der russisch-sibirischen Volksmedizin, dem nordasiatischen Schamanismus und mit der Indikationsstatistik der zirkumpolaren Heilpflanzen innerhalb der heutigen indigenen Medizin Nordamerikas. Nach der Einwanderung in Nordamerika haben die Indianer zuerst überwiegend zirkumpolare Nutzpflanzen-Gattungen verwendet (als Nahrung wie als Arznei), im Laufe der Nacheiszeit aber immer mehr spezifisch nordamerikanische, wie eindeutig belegbar ist.

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