A SURVEY OF AFGHAN MEDICINAL PLANTS

O. H. VOLK

Wuzburg, Germany

Afghanistan belongs phytogeographically to the holarctic region and its flora and vegetation contrasts strongly with that of the Palaeotropic region of the Indo-Pakistan subcontinent, from which region very few irradiations reach the foothills of the Hindukush. Biologically there is no reason to regard this country as belonging to the Indo-Pakistan subcontinent. The main stock of its flora is composed of plants of the Irano-Turanian Province, covering the southern Aralo-Caspian lowlands and limitrophe mountains, and the vast highlands of Iran and Afghanistan. Most significant, presented by many species, are the genera *Cousinia*, *Artemisia*, *Astragalus*, *Onobrychis*, *Acantholimum*, *Acanthophyllum*, *Ferula*, *Dorema*, *Nepeta*, *Scutellaria*, *Eremurus*, *Ephedra etc.* The most common grass is *Poa bulbosa*. These together with many perennials and annuals and some small trees or shrubs, (some species of *Amygdalus*, *Pistacia*) form several types of steppes which often are (wrongly) classified as semi-desert. Of a special kind are the steppes of the lowlands of North-East Afghanistan, which comprise mostly annual grasses and ephemerids. It is sometimes thought that the cultivation of cereals had its origins in this part of the country. The dry climate of Afghanistan with precipitations mostly far below 400 mm., falling nearly exclusively during winter (often as snow) and spring, does not allow the growth of forests. Only in the eastern parts of Afghanistan, where the summer monsoon brings additional rains, are true forests seen. They are with *Cedrus deodora*, *Abies Webbiana*, *Pinus Gerardiana*, *Bergenia* etc., an extension of the Western Himalayan flora and vegetation. The driest parts of Afghanistan are in the semi-desert of the 'Garmsir'. Here halophytic shrubs and herbs of the family of Chenopodiaceae (*Salsola*, *Aellenia*, *Haloxylon*), and of *Polygonaceae* (*Oxygonum*), aside of *Stocksia brahuica*, *Citrullus colocynthus* and others are significant and the Saharo-Sindian floral-element is common. The higher altitudes of the mountains are covered with dry and cold steppes of a Pamiro-Alaian or Tibetan type. On wet places small meadows with Cobresia and plants of Euro-Siberian distribution are found.

Most of the country is uncultivated land used periodically as pasture for flocks of sheep or goats. The amount of cultivated lands exceeds scarcely 3-5% of the total area, part of it being irrigated, nourishing a population of about 12 millions. The staple crops are wheat, pulses and dried fruits. Commercial crops are cotton, linseed, nuts and fruits and some medicinal plants. Most of these products go to Pakistan and India and only a few of them reach the world market. In spite of a very old tradition in exchanging products of plants of the Afghan highlands with those of the subtropical and tropical Pakistan and India, very little attention is paid to Afghanistan as a source of medicinal plants[1] and very little work is published regarding their qualities.

The following enumeration gives an inventory of those medicinal plants which are produced in Afghanistan, based mainly on the author's own experience on a three-year stay in this country.

Achillea Santolina L., Compositae. Indigenous herbs of dry borders of fields. Herb=buy-e-maderan.

Alhagi pseudalhagi (MB.) Desc., Leguminosaceae. Camel's thorn.

Alhagi persarum Boiss. et Buhse,

Alhagi sparsiflorum (Shap.) Shap. (syn. *A. kirghisoran* Schrenk *var. sparsifolium* Shap.) These are perennial herbs, common on fields and fallows, serving as fuel. Parts used medicinally are: leaves=barg-e-shuturkhar; flowers and fruits-tokhum-e-kirm and manna=turanjabin. The last derives evidently from *A. persarum* and is probably an exudation of aphids or similar pests, like shrikhesht (see *Salix*) or manna of *Tamarix* -gazanjubin etc. A plant *Alhagi camelorum* Fisch. is non-existent. This is a 'nomen illegitimum', and should not be used.

Althaea rosea (L.) Cav., Malvaceae. Hollyhock, cultivated in gardens. White flower=gul-e-khatmi safed; red flower=gul-e-khatmisurkh.

Althaea officinalis L., Malvaceae. Marsh mallow, perennial weed in overirrigated fields. Not in use.

Amygdalus communis L., Rosaceae. Almond, indigenous tree, extensively cultivated in orchards, many varieties, sweet and bitter. Almonds—badam, mportant export. Kernels of wild almonds=ibadam-e-kohi, often mixed with kernels of apricots. Exported.

Anethum graveolens L., Umbelliferaceae. Dill, annual, cultivated. Fruit=shibet. Export.

Armeniacus vulgaris Lam., Rosaceae. Apricot, extensively grown in big orchards. Fresh and dried apricots=zard-aloo, form an essential part of the diet and also for export. Apricot-kernel=khasta, a substitute of almonds. Apricot-gum=gund-e-zardaloo, exported.

Arnebia spectabilis Rech. f., Boraginaceae. Stony hills, Hezaradjat. Roots, red dye: yella-rang, rang-alaf, ratanjud. Export.

Artemisia Absinthium L., Compositae. Absinthe, Watercourses. Herb=terkh-e-rauna, afsantin.

Artemisia cina Berg., Compositae. Santonica, Wormseed, indigenous shrublet, forming extended associations (Artemisia-steppes) with *Artemisia persica* Boiss. or *A. Aucheri* Boiss. ssp. *kuhistanica Bornm.*, between 2.000 and 3.000 m. The author collected *A. Cina* at Chak-Wardak, Unai-Kotal[2] (2.800 m), Bamian and Duab-e-Mezerin; Rechinger reports collections from Lorinj, North of Bamian (2.600 m) and from North-East Afghanistan. (Pahin Shahr, 3.300 m., Rubat, 2.800 m.) Flowering herb=terkh-e-dawa. These big stands are not yet exploited.

Another santonica, described by Qazilbash[3] as *A. kurramensis*, confined to the Upper Kurram and adjoining Afghanistan, seems to grow abundantly in the district of Khost, exported. *A. maritime* L., is not confirmed by recent collections from Afghanistan. This is an aggregate species and true *A. maritima* L., cannot be expected, either in Pakistan or in Afghanistan.

Artemisia spec., Compositae, indigenous shrublet. Herb of an unidentified Artemisia=mastar, terkh. (Used against 'bad' and as green dye.) Export. There are at least 18 species of Artemisia in Afghanistan.

Astragalus: many woody species, Leguminosaceae. Tragacanth, in spite of finding many woody species in the steppes of Afghanistan,[1] suitable for the production of gum; Rechinger reports 153 indigenous species, herbaceous included, only very small quantities of gum tragacanth=katira, shilm-e-katira, are produced in West-Afghanistan5-6. (Mothe, uphof).

Berberis div. spec., Berberidaceae. Berberry, indigenous, watercourses and slopes of the Hindukush, common. Root, bark, fruit=sirk, zarishk; dried extract=raz.

Bryonia spec., Cucurbitaceae Bryony, indigenous, rare. Root=tomaka, tal-charga.

Boraginaceae div. spec.' are the source of the popular 'gul-e-gaozaban=flowers of Anchusa, Moltkia a.o., but not *Onosma bracteatum.*

Cannabis sativa L., Moraceae. Hemp, cultivated in Afghanistan, north of the Hindukush. Fruit-bhang-dona.

Cannabis sativa L. var. indica auct., Hashish, Marihuana, Indian Hemp, weed on irrigated fields, East Afghanistan, herb=bhang; resin-chars. Abdiction seems to be rare. This plant is different from fibre kemp by its dwarfed, branched habit and by late flowering (short day!).

Capsicum annum L., Solanaceae. Red Pepper, Spanish Pepper, cultivated. Fruit=mirch-e-surkh, filfil-surkh.

Carthamus tinctorius L., Compositae. Safflower, cultivated herb. Fruit=mazwar; flower as a dye, nearly out of use.

Carum carvi L., Umbelliferaceae. Carvay, indigenous herb on wet places and meadows of the mountains. In spite of its occurrence true Carvay is not found in the bazars. 'Zirah' of the trade belongs to Cumin.

Carum (Ammi) copticum (L.) Benth. and Hook., Umbelliferaceae. Ajowan, cultivated. Fruit=joani, jowan. Exported.

Cedrus deodora (Roxb.) Loud., Pinaceae. Deodar, Himalayan-Cedar, indigenous tree of East and South-East Afghanistan forests. Wood of 'archa' is exported. Tar=tel-e-archa.

Centaurea behen L., Compositae. Indigenous (Duab-e-Mezerin) on wet meadows. Root=bah-mansafed.

Cichorium Intybus L., Compositae. Chicory. Indigenous, common along ditches, road sides. Root and fruit=kasni.

Citrullus colocynthis Schrad., Cucurbitaceae. Colocynth, indigenous, perennial herb, common in semi-deserts of South Afghanistan (Margo). Fruit—tarbuz-e-abujel.

Conium maculatum L., Umbelliferaceae. Hemlock, indigenous, waste-places, hedges. Herb, fruit-marigaq-e-zanun, known for being very poisonous.

Coriandrum sativum L., Umbelliferaceae. Coriander, cultivated. Fruit=gashniz. Exported.

Cucumis sativus L., Cucurbitaceae. Cucumber, cultivated for vegetable. Seed=tokhum-e-bad-

rang, khiar.

Cuminum cyminum L., Umbelliferaceae. Cummin, cultivated. Fruitzi=rah. Export.

Cuscuta reflexa Roxb., Cuscutaceae. Dodder, indigenous parasite on trees. Seed=Kasus.

Cydonia oblonga Mill., Rosaceae. Quince, cultivated in orchards. Fruit=behee; seed=behee -dana.

Datura stramonium L., Solanaceae. Thornapple, indigenous, nitrophilous annual herb of waste-places, valleys. Seed=tatura.

Daucus carota L., Umbelliferaceae. Carrot, cultivated vegetable. Fruit=tokhum-e-zardaq.

Ephedra div. spec., Gnetaceae. The genus Ephedra is represented by at least 8 species in Afghanistan, forming at many places extended stands. Qazilbash[7] states that North-West India, Pakistan and Afghanistan easily could statisfy the world demand of ephedra. According to *Flora of Tajikistan*,[8] Parsa,[9] Boissier,[10] these species are:

1. *E. strobilacea Bge.*, akin to *E. alata* Dcne.,
2. *E. tibetica* (Stapf) V. Nik. and
3. *E. persica* (Stapf) V. Nik., akin with *E. intermedia* Schrenk et Mey,
4. *E. pachycalada Boiss.*,
5. *E. valida V.* Nik., which is *E. equisetina* auct. ex parte, related to the aggregate species *E. nebrodensis* Tin.,
6. *E. sarcocarpa* Aitch. & Hemsl.,
7. *E. Gerardiana* Wallich, belonging to *E. distachya* L. senso lato, and
8. *E. Aitchisisonii* (Stapf) V. Nik of the affinity of *E. foliata* Boiss. and Kotschy, s.l.

Most of those species belong to the Irano-Turanian province of semi-arid zones and steppes, which extends to the mountains of the East and South beyond the borders of Afghanistan and some of them should be present too in West Pakistan, and Northern India. Some species are valuable pasture plants, like *E. strobilacea*, containing, according to the *Flora of Tajikistan*,[8] 14—16% of rough proteins, combined with a high content of carbohydrates and fats and of good digestibility, approaching the best pasture grasses, liked by goats (and sheep). Therefore it has the Afghan vernacular name 'booz-bandak'. Probably all readily eaten Ephedras are free from alkaloids (see Qazilbash [7,11] *E. foliata*) and those which are not considered edible by the cattle contain these. Alkaloids are to be expected in the species aggregated in *E. intermedia*, *R. nebrodensis* and *E. distachya*. Assays of Afghan Ephedras did not give any result; unfortunately they were undertaken with unidentified material (Prof. Brunner, formerly of Kabul, orally). With aggregate species, distributed over continents (*E. distachya* and *E. nebrodensis* from Western Europe to Eastern Asia), an exact identification is indispensable. Variable results of assays, which are so often reported with Ephedras (see Golse,[12] Reti) [13] were attributed by many an author to differences in climate and habitat, but it seems to me that improper identifications may be responsible too. Recent experiences have shown that 'infraspecific' valuations have to be considered in assaying medicinal plants (see *Planta Medica*,)·[14]

The highest content of alkaloids is found in the affinity of *E. nebrodensis*, so in the middle-asiatic *E. equisetina* Bge., containing 3.11% and more alkaloids and serving technically in Russia for the production of ephedrine (Massagetov).[18] "*E. nebrodensis*" of Baluchistan and Waziristan, most probably identical with *E. valida* of Afghanistan, is the source of *Indian Ephedra and is* exported in bulk to U.K. and U.S.A., yielding more than 2% of total alkaloids. From this plant ephedrine is extracted by a factory at Quetta, Pakistan, with pseudoephedrine as a by-product (Qazilbash).[7] "*E. nebrodensis*" of North-West India (Lahoul) is reported to have 1.93%. ephedrine (Ghosh Krishna)[16] and from Italy (as *E. major* Host) 1.08% ephedrine and 0.97% pseudoephedrine (Simon).[17] I myself assess *E. valida* to be the most promising of Afghan ephedras.

The main alkaloid from the relationship of *E. intermedia* is pseudoephedrine. *E. intermedia* Schrenk et Mey in the strict sense of Mikitin, [18] not occurring beyond Middle Asia, contains up to 2.2% of alkaloids, mainly pseudoephedrine and is an alternative source for extracting ephedrine in Russia. Ghosh and Krishna [16] report '*E. intermedia* of the Punjab (Chini-Range) to contain 1.8% pseudoephedrine.

E. intermedia from the western border of Pakistan contains alkaloids and is used against colds and cough. Its ashes are mixed with other ingredients, principally tobacco and are made into an intoxicating chewing powder. This plant is also used for curing goat and sheep skins (Qazilbash). This application finds use in Afghanistan where the plant furthermore is a remedy for toothache (Bamian). Afghan species which belong in this relationship are the following: *E. persica*, *E. tibetica*, and probably *E. pachyclada*. They exist in such quantities as to serve as fuel for baking bread and burning bricks at several places. It is to be supposed that assays of Ghosh and Krishna,[16] Qazilbash and other scientists refer to these plants, and we can expect them to be potentially useful, but there is stil confusion (see

Nadkarni).[19]

Alkaloids are also present in *E. distachya* sensu lato, including *E. Gerardiana* Wall. from Afghanistan, Pamiroalai, Tian Shah and Himalayas, (Reti),[13] but these species and *E. sarcocarpa* as well as *E. pachya* as well as *E. pachyclada* seem not to be in use in Afghanistan, in spite of Watt[20] and Parsa[9] who refer "soma or homa" to the last one. There is the question of *Dionysia tapedodes* Bge. (Primulaceae), growing in the shady rocks of the mountains, entering in the preparation of soma. The last mentioned plant could be regarded as a source of the doubtful "ambrosia" of the antiquity.

Eremurus stenophyllus (Boiss. et Buhse) Baker (*E. aurantiacus* Baker) and other spec., Liliaceae, perennial herb, indigenous, common. Root-seech. Export. To find in different types of steppes.

Ferula Asa foetida L., Umbelliferaceae, *Asa fetida*, indigenous, common in the steppes of Afghanistan. Olea-gum-resin-hink (the plant is called "gandalai"). Export. In most of the textbooks of pharmacognosy the description of collecting *Asa foetida* is not quitecorrect. According to author's observations on the spot at Duab-e Mezerin and using partially the text of Wallis[21] the collection takes place like this :

The plant is a large, dioecious, happaxanthic herb, which develops a few, very large compound short living leaves and a massive root. After about 4 to 8 years, when the root stored sufficient reserves and is about 10 to 15 cm., thick at the crown, it throws up a large flowering stem about 10 cm. thick and 1.5 to 2 metres high. People regard flowering plants as female and do not exploit them. About the end of June or the beginning of July, just after the leaves dry off, the upper part of the root is laid bare and its crown cut off with a special knife. The exudation accumulates as a white milk on the surface of the cut and, whilst hardening and getting brownsih, is protected by a dome-like structure of stones. No incisions take place. A few weeks later the hardened but plastic gum-resin is scraped off with a hook on the handle of the knife, then a new slice of the root, 1 to 2 cm., thick is cut off again, and the juice is allowed to exude, this process being repeated several times with intervals of a fortnight or longer. The gum, collected in this way, forms a lesser quality "in massis." It is intentionally mixed with earth and small, carefully selected stones of the same colour. The best qualities 'in lachrymis or in tears, locally called 'angooruq,' are produced in a modified manner by cutting off very thin slices (1 to 2 mm thick) and by scraping in shorter intervals. Kabul, Kandeha and Herat are the centres of the Asa fetida trade, from where it is shipped by trucks. Eventually this drug may be of value in future in geriatrics.

Foeniculum vulgare Mill., Umbelliferaceae, Fennel, cultivated. Fruits=badian. Export.

Fumaria parviflora Lam., Fumariaceae, indgenous annual weed. Herb=shotarra.

Glycyrrhiza glabra L., Papilionaceae. Liquorice, *var. glandulifera* Reg., et Herd., indigenous at wet places, sometimes a noxious weed in irrigated fields (Badakhshan) and sometimes associated with *Gl. uralensis* Fisch. and *Gl.aspera* Pall. Unpeeled root=shirin buya. Export. The quality could be improved by proper drying. With Afghanistan liquorice a high content of glycyrrhizinic acid is to be expected.

Heliotropium of lasiocarpum F. et M. Boraginaceae, indigenous. Herb=gashdun buta.

Hyoscyamus reticulatus L., Solanaceae. Henbane, annual weed of grain-fields. The Afghan plant is separated as *H. leucanthera* Bornm. et Gauba. Seeds=bang-e-deoana, bazarul=bang, sia-o-shan, a narcotic often used as a substitute of hashish.

Hysocyamus cf. muticus L., (*H. insanus* Stocks), Solanaceae, indigenous succulent, evergreen perennial herb of the rocks of East Afghanistan Herb=bang-kohi.

Isatis Koelzii Rech. f., Cruciferaceae. Woad, biennial herb of the lower hills of Central Afghanistant related to *I. tinctoria* L., Dyestuff-nil-kabuli·

Lactuca sativa L., Compositae. Lettuce, cultivated as vegetable. Fruits=tokhum-e-khau.

Lagenaria vulgaris Ser., Cucurbitaceae. Calabash, cultivated as vegetable. Seed-kadu-sorahi.

Lepidium sativum L., Cruciferaceae. Garden-Cress, annual, cultivated as a salad plant, Seeds=tokhum-e-taratesak.

Linum usitatissimum L., Linaceae. Plax-plant, annual herb, cultivated extensively in North Afghanistan, its seeds serving as food. Linen of the fibres of the stem is unknown. Seeds=segher, exported.

Malva rotundifolia L., Malvaceae. Common mallow, perennial herb of roadsides. Herb=barg-e-paniraq.

Mentha longifolia (L) Huds., Labiaceae. Mint, perennial herb of wet places, waterways, Herb-pudina; cultivated herb-nana (*M. viridis* L.).

Merendera aitchisonii Hook f., Liliaceae. Tuberous plant of sandy plains. Corms (Bermodactyli)-suringan, seranjan. (see Wendelbo).[22]

Microrhynchus (*Launea*) *spinosus* Benth., Compositae, perennial herb, stony hills. Latex exuding from incisions near the crown of the root of flowering plants (Kabul). Impure, dark, qualities are called sajik or chirka, the bestone is anzarut. This I refer to *Sarcocolla*, the origin of which was not known. *Penaea mucronata* is a plant of Africa.

Morus alba L., Moraceae. Mulberry, a common, highly valued tree, cultivated in vast orchards in many black or white varieties. Its fruits eaten fresh or dried are an important food often mixed with ground walnuts (talkhan) and so forming an essential part of the diet during wintertime. Dried fruit=tut, exported.

Morus nigra L. is unfit for drying and rarely cultivated.

Myrtus communis L., Myrlaceae. Myrtle, evergreen shrub along watercourses in East Afghanistan Fruits=da-e-morum; leaves=barg-e-morum.

Nepeta podostachys Benth., Labiaceae. shrublet on stony hills. Herb=gurb-e-khorak.

Nigella sativa L., Ranunculaceae. Black Cumin, Black Caraway, cultivated annual. Seeds =siah-dona, exported.

Ocimum basilicum L., Labiaceae. Sweet Basil, locally cultivated annual herb=nasobo; fruit=reihan.

Papaver pavonium F. et M., Papaveraceae. Poppy, common annual of the steppes. Flower =gul-e-dokhteran, gul-e-lala.

Papaver sommniferum L., Papaveraceae. Opium Poppy. Opium was formrely the most important economic product of the very remote parts of North East Afghanistan, its production and trade are now prohibited by law. Afghan opium had been passing for one of the best. Opium teriak, afiun; seeds=kashkash; capsules-ghoza=koknor; fragmented capsule=post-e-koknor.

Peganum harmala L., Zygophyllaceae. Syrian Rue. Common perennial herb on roadsides and derelict fields; poisonous. The smoke of blooming seeds is used against melon flies, its insecticidal action is recently proved experimentally. (Schipper and Volk).[23] Seeds=ispand, armala, exported.

Physalis alkekengi L., Solanaceae. Strawberry tomato, perennial herb, sometimes cultivated as an ornamental plant, fruits=gul-e-passparada.

Pimpinella anisum L., Umbelliferaceae. Anise, an annual herb seems not to be cultivated in Afghanistan. All specimen of badian-anise turned out to be fennel fruits.

Pinus gerardiana Wall., Pinaceae. A small tree of the mountains of East Afghanistan, often in pure stands. Its edible seeds=chilghoza are exported.

Pistacia khinjuk Stocks, Anacardiaceae. A small indigenous tree producing galls and a kind of mastiche=mastaki-kabuli, exported.
Scientific Research P. 11 to 13.

Pistacia vera L., Anacardiaceae. Common pistachio, indigenous small tree of the steppes of Central and North Afghanistan growing wild over large tracts in very loose stands ("orchard-steeppes", "savannahas"), protected by the population as a fruit-tree, sometimes cultivated. Pistachio nuts-pista, important export; oil of pistachio nuts; Bokhara gallsb=uz-ghunj, gul-e-pista, exported.

Plantago lanceolata L. and *P. major* L., Plantaginaceae indigenous perennial herbs in meadows. Seeds=surf; Plantain leaves-barge-e-surf.

Plantago ovata Forsk and other spec., Plantaginaceae. Flea seed, indigenous annual herbs, abundant in certain types of steppes. Ispaghula-seeds—isfarza, exported, One species is cultivated but it is doubtful whether this is *P. Psyllium* L.

Portulaca oleracea L., Portulacaceae. Common purslane, cultivated succulent annual herb. Seed= tokhum-e-khorfa.

Prunus institia L. var. bokhariensis (? P.bokhariensis C.K. Schn.) Rosaceae. Bokhara Plum, small tree, cultivated. The dried, acid fruit=aloo-bokhara; exported.

Prunus verrucosa Franch., Rosaceae. Small shrub of the lower mountains. Fruits=shaka-dona, nunkge, very acidic.

Punica granatum L., Punicacea. Pomegranate, indigenous shrub, commercially grown in orchards for its fruits=anar, important export of fresh fruits. Skin of the fruit (pericarp)=post-e-anar used for tanning and dyeing, exported. Flowers -gul-e-anar; exported. The bark of the roots seems not to be used.

Quercus balout Griff., Fagaceae. Small, evergreen tree, indigenous and dominant in the forests of the lowe parts of the mountains of East Afghanistan, resembling *Q. Ilex* L. with which it is mixed-up by many an *author* but this species is strictly confined to the mediterranean region.

Reptonia (*Monotheca*) *buxifolia* DC., Myrsinaceae. Indig nous shrub of the hills of Eas-Afghanistan Edible fruits=tokhum-e-ghurghur; bark of the roots=post-e-ghurghur.

Rhazia stricta Decne., Apocynaceae. Small evergreen shrub, indigenous in the lowest parts of East Afghanistan poisonous. L aves=barg-e gandalai.

Reheum Ribes L., Polygonaceae. Indigenous, large-leaved perennial herb of the hills of Afghanistan. Fresh leaf-stalks-ruvash, chukri (eaten raw during spring); dry roots (dye and remedy)-bekh--e-ruvash.

Rosa centifolia L., Rosaceae, Rose, cultivated round Herat for the preparation of rose-water-araq-e-gulab, Rose-oil-atre-gulab; Rose-syrup-gul-e-kand; Petals-gul-e-gulab.

Rubia rinctorum L., Rubiaceae, Madder, perrennial herb, cultivated for its roots for a dye-royan, rodan.

Rumex div. spec., Polygonaceae. Indigenous herbs. Fruits used are humaz, kamarband; roots (prob. *R. nepalensis* Spreng. or *Rheum tataricum* L.f.)-chukri-ahu; pith of the stems-hola (of *R. dentatus* L.)

Salix div. spec., Salicaceae. Willow, indigenous trees or shrubs in wet places, planted along water-ways. Medicinal use of leaves-barg-e-yakh-bad and of manna-shir khisht, exported. The origin of this manna, very much used in the Orientus, was unknown for a long time. According to Linschoten[24] it has been introduced in India from the lands of the Usbegs and originates from the dew, falling on the trees, growing stiff and hanging on the plants like icicles. Aitchison [25] and Motte[5] attribute shir khist to an exudation of *Cotoneaster* racemiflora (Desf.) Koch (syn. *C. nummularia* F. et M.), but I myself never saw such an exudation on this plant. On the other hand I observed big stalactites and stalagmites of the excreta of Aphids, generally known as honeydew, on heavily infested stands of willows at the lakes of Band-e-Amir (Hazaradjat, Central Afghanistan and at other places in the month of September, coinciding with the description of Linschoten[24] Possibly such accumulations, favoured by the dry summer cilmate of Afghanistan, may occur on other plants infested with Aphids and similar pests too.

Salvia macrosiphon Boiss. *ssp. cabulica* DC., Labisaceae. Indigenous herb of the steppes and fallows, related to *S. Moorcroftiana* Wall. seeds-karnowcha, exported.

Sesamum indicum L., Pedaliaceae. Sesame, Bene, annual, tropical herb, cultivated for its seeds-konjid.

Sisymbrium irio Crantz and *S. sophia* L., Cruciferaceae. Annual weeds. Seeds-khak-shir, exported.

Solanum nigrum L., Solanaceae. Black Nightshade, annual weed in wet fields, fruits-zag-e-anguraq.

Stachys parviflora Benth., Labiaceae. Perennial herb, densely-haired. Herb—mucharnu.

Trachydium (*Eremodaucus*) *Lehmanni* Benth, & Hook, Umbelliferaceae indigenous, perennial herb of North Afghanistan. Roots-nar-e-alam, shaqanqul.

Tribulus terrestris L., Zygophyllaceae. Noxious annual weed of the semideserts. F uits-kahar-e-magheilan.

Trigonella foenum-graecum L., Papilonaceae. Fenugrec, annual, cultivated for its edible seeds-olba, olfa.

Valeriana wallichi DC., Valerianaceae. Perennial herb of the rocks in the Hindukush. Roots-asarun-e-gurb-e-khorak.

Withania coagulans (Stocks) Dun., Solanaceae. Indian Rennet, evergreen shrublet, indigenous on the lower hills of East Afghanistan. Fruits-panir-band.

Withania sommnifera Dun., Solanaceae. Perennial herb, indigenous in East Afghanistan, poisonous. Not in use.

Ziziphora tenuior L., Labiaceae. Perennial herb of the mountains. Herb=kakuti, pudina-kohi.

Ziziphus sativus Gaertn., Rhamnaceae. Cultivated as fruit-tree. Leaves-barg-e-anab.

References

1. UNESCO: Arid Zone Research: Medicinal

Plants of the Arid Zones. UNESCO, NS. 59/III, 17A., Paris (1960).
2. K.H. Rechinger, (1955) see Symbolae Afghanicae, **2,** Compositae.
3. N.A. Qazilbash, *A study of Artemisia kurramensis Qazilbash*, India Pharmacist, **9,** (1954).
4. K.H. Rechinger, (1957) see Symbolae Afghanicae, **3,** Leguminosae.
5. J. Motte, *La Gomme adraganthe en Afghanistan*, Bulletin. Scientifique de Caboul, Kabul, **1,** (1942).
6. J.C. Th. Uphof, *Dictionary of Economic Plants*. Weinheim (Cramer), (1959).
7. N.A. Qazilbash, *The Story of Indian Ephedra*, Pharm. J. (1947).
8. *Flora of Tajkistan, Flora Tadzhikistana*, Tom. I (Russian), Moscow-Leningrad (Akad. Nauk), 1957).
9. A. Parsa, *Flora de l'Iran*, **1-7,** Tehran, (1951-1959).
10. E. Boissier, *Flora Orientalis*, **1-5**, Suppl., (1867-1888).
11. N.A. Qazilbash, *Some Further Observations on Indian Santonica*, Quart, J. Pharm. Pharmacol., **21,** No. 3, (1948).
12. J. Golse, *Precis de Matiere Medicale*, Paris (Doin), 1955.
13. L. Reti, *Ephedra Bases, in R.E. Manske, & H.L. Holmes,* Alkaloids, **3,** (1953).
14. Plants Medica, Zeitschrift f., Arzneipflanzenforschung (1960), **8,** H. 3, Stuttgart (Hippokrates).
15. P.S. Massagetov, (1938), see *Flora of Tadjikistan*, **1,** Ephedra.
16. T.P. Ghosh, and S. Krishna, (1930), see Berger.
17. I. Simon, (1942), see Reti.
18. V. Nikitin, (1957), *Flora Tadjikistan*, **1,** Ephedra.
19. K.M. Nadkarni, *Indian Materia Medica*, third edition (Popular Book Depot, Bombay,) (1954).
20. G. Watt, *A Dictionary of The Economic Products of India, Calcutta*, (1885f.).
21. T.E. Wallis, *Textbook of Pharmacognosy*, third edition, London (Churchill) 1951, p. 471.
22. Wendelbo, Per (1958), see Symbolae Afghanicae, **4.**
23. A. Schipper, and O.H. Volk, *Beitrage zur Kenntnis der Alkaloide von Peganum harmala, Deut. A*potheker Ztg., **100,** No. 10, (1960).
24. Linschoten (1598), see Watt.
25. J.E.T. Aitchison, *Note to assist a further knowledge of the products of W. Afghanistan and N. Persia*, Transact. Proc. Botan. Soc. dinburgh, **18,** (1891).