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## Botanical Medicine Monographs and Sundry

### **SOME PLANTS OF AFGHANISTAN, AND THEIR MEDICINAL PRODUCTS.**

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Read at an Evening Meeting of the Pharmaceutical Society of Great Britain,  
Wednesday, December 8, 1886.

During the month of August, 1884, I was appointed by his Excellency the Viceroy and Governor-General of India, the Marquis of Ripon, Naturalist with the Afghan Delimitation Commission. The British Commissioner, Sir Peter Lumsden, G.C.B., coming direct from England, joined the Indian portion of the mission in the vicinity of the proposed boundary. The party from India, commanded by Colonel—now Sir West—Ridgeway, left India in the end of August, Quetta on September 22, 1884, marched through northern Beluchistan to the Helmand, thence through Afghanistan to Khúsan, which was reached on November 18. During 1885 I travelled over a great extent of country in northern Afghanistan and Persia, finally left the mission on August 16, 1885, proceeding through Khorasán. viá Meshad and Astrabad to the Caspian, thence viá Baku, Batoum and Constantinople to England.

In making my collections it was one of my principal aims to obtain those plants which yielded products of commercial value, and personally to collect from the living plant the product it yields, taking nothing for granted or on heresay only, hoping thus to assist materially in elucidating the many diverse opinions held relative to the substances themselves, as well as to the plants that yield them. I also considered it of great importance to obtain good specimens for botanical identification, with seeds for cultivation, and when possible, the local names of the plant, and product were noted. I need hardly tell you that this was but a fragment of my work, having brought to England some eight hundred species of dried plants, amounting in all probability to ten thousand specimens, in addition to my numerous zoological collections. Although the work was intensely interesting it was of necessity laborious, and the difficulties to be overcome were numerous but now that I have begun to discover the value of the material amassed, these troubles and labors are well nigh forgotten.

The class of plants with their products, upon which I propose speaking to you first this evening, and in which I feel sure you will be most interested, is the *Umbelliferae* which form the characteristic vegetation of the region under consideration. The country in which these *Umbelliferae* flourish consists of the great shingle and conglomerate plains lying between the hills and the beds of the rivers, which are broken up by numerous ravines and traversed by what are usually dry water courses, which once in every two or three years, on the occurrence of heavy falls of

snow on the hills above, or local showers of rain, suddenly become roaring torrents. The altitude of these plains above the sea level ranges from 2,000 to 4,000 feet. These plains during winter are perfectly treeless, arid, and bare, the only signs of a past vegetation being the gnarled remains, scarcely over a foot in height, of a few shrubs. As one gazes on this desert-like country, extending on all sides, one wonders whether it could possibly produce even a blade of grass in summer. To make things worse, there is little or no water, which to the traveller is a matter of risk and difficulty, owing to the distances between the springs and the uncertainty of the supply. As summer advances a complete change comes over the scene; these bare plains become rapidly covered with a mass of splendid verdure produced chiefly by the presence of the following umbellifers, viz., *Ferula foetida*, Regel, *Dorema Ammoniacum*, Don, and *Ferula galbaniflua*, Boissier and Buhse. The two former usually occur associated together, whereas the latter is generally found alone. The habit of growth of these three species, is much the same; they all produce a great show of foliage thrown out from their perennial root stocks. This foliage spreads out on the ground to nearly three feet, forming a circle round the base of the flowering stems, little under six feet in diameter, and it is the close approximation of the foliage of adjacent plants that gives to the country in which they grow its wonderful appearance, of a never-ending pasturage. Upon each species throwing up its own peculiar form of inflorescence, the landscape becomes much altered, more especially with regard to the appearance presented by *Ferula galbaniflua*. When this is in full flower, with its golden-colored paniced inflorescence from three to four feet in height, representing a miniature forest, the sight is one to be dreamed of rather than believed in or described. This wonderful verdure lasts from the end of April to the beginning of July, by the end of that month it has as suddenly disappeared as it originated, even to the fruit-bearing stems. The hot sun dries the plants to a cinder, and the prevailing winds finish the work of destruction so thoroughly, that by August not a trace of the past season's vegetation is left.

***Ferula foetida***, Regel, syn. *Ferula Scorodosma*, Bent. and Trim.; *Scorodosma foetida*, Bunge.—The plate in Bentley and Trimen's 'Medicinal Plants' is a most excellent one of the plant in fruit. The native name for the asafœtida plant near Herat is *Angúza-kéma*, *Kúrné-kéma*, *Khora-kéma*. Kema may be considered the generic term for all the *Ferulas* and *Doremas*. *Anguza* is the term for the product asafœtida, and is what in India is called "hing." This last name is also applied to it by traders in these parts.

In early spring great cabbage-like heads are to be seen distributed at intervals amongst the asafœtida, plants. Their peculiar forms represent the primary stage of the flower heads, enclosed and completely covered up by the large sheathing stipules of its leaves. In a few days these heads become transformed into the semblance of a cauliflower; from this period the stem bearing the inflorescence rapidly shoots upwards to a height of from four to five feet, its proportions being singularly massive and pillar-like. From a general calculation I found that only one out of a hundred plants bore a flowering stem. If you ask a native what plant this is, pointing to a, flower-bearing one, he will tell you that it is "*kurné-kéma*," and that it has nothing to do with the plants that yield asafœtida. He will take out his knife, remove the head, cut the stem from its base, strip off the few sheathing stipules that are still adherent to the stem, and in his hand you see what looks like a very large cucumber; from this he will remove the dark-green cuticle, and then slice way at the deliciously cool, soft,

crisp, copiously milky stem, and eat slice after slice with the greatest gusto, and then say, "Did I not tell you it was the edible *kéma*, and not asafœtida?" "Yes," says an onlooker. "You will stink like a camel for the next three months!"

The method, of collecting the drug, as far as I could learn, was as follows: A few men employed for the purpose by some capitalist at Herat, are sent to these asafœtida-bearing plains during June. These take with them provisions, consisting of flour, and several donkey-loads of watermelons, the latter in lieu of water, which is not only scarce there, but usually saline. The men begin their work by laying bare the root stock to a depth of a couple of inches of those plants only which have not as yet reached their flower-bearing stage. They then cut off a slice from the top of the root stock, from which at once a quantity of milky juice exudes, which my informant told me was not collected then. They next proceeded to cover over the root by means of a domed structure, of from six to eight inches in height, called a *khora*, formed of twigs and covered with clay, leaving an opening towards the north, thus protecting the exposed roots from the rays of the sun. The drug collectors return in about five or six weeks' time, and it was at this stage that the process of collecting came under my personal observation. A thick gummy, not milky, reddish substance now appeared in more or less irregular lumps upon the exposed surface of the roots, which looked to me exactly like the ordinary asafœtida of commerce, as employed in medicine. This was scraped off with a piece of iron hoop, or removed along with a slice of the root, and at once placed in a leather bag, the tanned skin of a kid or goat. My guide informed me that occasionally the plant was operated upon in this manner more than once in the season. The asafœtida was then conveyed to Herat, where it usually underwent the process of adulteration with a red clay *tawah*, and where it was sold to certain export traders, called *Kákrilog*, who convey it to India. On August 17, when I crossed the great asafœtida plains where this drug is chiefly collected, except for the small domes over each root, there was not a leaf or a stem or anything left to point to the fact that any such plant had ever existed there, the heat and winds of July and August having removed every trace.

In northern Beluchistan, after much difficulty and searching, I came across one root of asafœtida, which I believe belonged to a different species; but I did not see a single stem, or even the remains of one, although we traversed immense plains upon which these fragments of leaves still existed, and where, I believe, during summer the plant must have grown in abundance.

***Dorema Ammoniacum***, Don.—This is the *Kandal-kéma* of Afghanistan, or, in other words, the *kéma* that yields the product *Kandal*, and which appears to me to be ammoniacum. As already stated, this grows along with asafœtida, *Ferula foetida*, Regel. It is equally abundant with the latter, and occupies similar localities, having much the same habit. When these two plants have produced their base leaves only, it is almost impossible for anyone to distinguish between them, and both, on injury, yield a milky juice. On the flowering stem beginning to shoot, the *Dorema* is readily recognized, as the immature flower head shoots forth uncovered by any sheathing stipules, and in the form of a panicle, with the peduncles not spreading from the main stem. As the stem becomes fully matured, one-sided nodes form on at irregular distances, which give to it an undulating appearance characteristic of the plant. The plate of this plant in the 'Memoirs of the Imperial Academy of Science at St.

Petersberg,' by Borszczoff, is excellent, though the peculiar enlargements on the stem are not sufficiently indicated. When it has reached its fruiting condition it is very liable to be attacked by a boring insect, especially in the fruiting heads, the result of which is the rapid escape of a large amount of a milky fluid, which, upon exposure, soon becomes tenacious and gummy, forming into solid concrete lumps of a grayish opalescent color. This substance in these parts is the *Kandal* or *Ushak* of commerce. It is collected simply by removing the lumps from the surface of the plant, or, if later in the season, from the ground. No means are taken to increase the flow of fluid from the stem artificially. Between Bezd and Shér-i-nao a large quantity of *Kandal* grows, and it is there gathered for exportation.

I may mention here that *Dorema glabrum*, which attains a height of from ten to twelve feet, grows in great abundance, along with tamarisk, in the Nehal shéni portion of the Badghis territory, forming thickets in the stream beds. It yields a gum-resin. I also collected a very distinct new species of a *Dorema* with foliage resembling *Ferula foetida*

***Ferula galbaniflua***, Boissier and Buhse.—The plate of this in Bentley and Trimen is not sufficient, owing to the imperfect material they had to work with. Our plant differs from Boissier's description, in having a perfectly hollow stem and woolly petals; but this woolliness so entirely disappears in the herbarium, that unless seen originally one would doubt its having ever existed. Notwithstanding these discrepancies, we have no doubt that it is *F. galbaniflua*, Boiss. et Buhse. The native name for this plant is *Brada-kéma*. In habit it differs from the two already described species, in growing gregariously, and in its being found in greatest luxuriance in moister localities, as in the Badghis near Gulran, where it grows in the sandy loam of that district. Its early root leaves spring from the ground like a fountain of soft green moss, and in this state it is greedily devoured by camels. The stem, which grows very rapidly, is of a semi-opalescent orange color when young and perfectly glabrous. When in full blossom the flower is of a brilliant orange-yellow; as the fruit forms and ripens the color changes from the base of the plant upwards, showing various autumnal tints. The stem is thick at the base but tapers suddenly upwards, terminating in an elegant tall, loose, paniced inflorescence, reaching a height of about four feet. The stem, on injury, from its earliest stage of growth, yields an orange-yellow gummy fluid, which very slowly consolidates, usually forming on the stem, like the grease on a guttering candle, and possessing in common with the whole plant when crushed a strong odor resembling that of celery. The gum is commonly found adhering to the lower portions of the stem, and is so tenacious that, when subsequently examined pieces of the plant are frequently found attached to it. This substance, is called by the natives *Shilibadra-kéma*, *Shilm-i-barzat*, *Birzand-Jao-shír*. No artificial means are employed to my knowledge in the collection of this drug. It is stated to be an article of export through Persia viá the Gulf to Arabia and India. In Persia and Afghanistan it is said to be administered to parturient women, and the entire shrub is hung round the house to keep off evil spirits whilst parturition is actually taking place.

***Ferula suaveolens***, Aitch. and Hemsley, *sp. nov.* This is a new species of *Ferula*, that comes under the division *Euryangium*. It is a plant from three to four feet in height, and grows, at an altitude above 5,000 feet in the hills -to the south of Bèzd. The root of the plant, called *Sambal*, is scented and is collected and exported from

Turbat-i-Haidri, through Persia, to the coast. The shrub itself is called *Kéma*, but so are all these large Umbelliferae. It has a solid stem, with nodes on it much resembling those of *Dorema Ammoniacum*, and also yields some form of gum-resin, which, however, I was unable to collect.

***Trachydium Lehmanii***, Bth. and Hooker, syn., *Eremodaucus Lehmanii*, Bunge, and *Albertia margaritifera*, Regel and Schmalh.—The roots of this species are not thicker than a goose quill, and from three to four inches long, tapering off to a point. They are collected as a drug under the name *Shákh-akhal*, and exported from Herat. It is curious to note that generally on the central flower of the umbel there is a piece of gummy rose-red exudation, the result of injury by an insect.

***Psammogeton setifolium***, Boiss.—The fruit of this plant is largely collected and employed as an aromatic stomachic in Persia; it is a very common annual, generally met with over the whole country.

I would now proceed to draw your attention to the several kinds of **manna** and their sources, which are produced in this country. There are three kinds which are usually met with and which form articles of export. The first, and that most largely exported, is an exudation that occurs in certain seasons and years upon ***Cotoneaster nummularia***, Fisch. et Mey. The plant is called *Siah-chob* (black stick) and the manna *Shir-kisht*, meaning hardened milk. This cotoneaster is a tall stout shrub, growing occasionally to twelve or fourteen feet in height. It is met with throughout the Paropamisus range and in Khorasán, at an altitude of about 5,000 feet. Although common, everywhere in these hills it is found in greater abundance on the Siah-koh and Saféd-koh and the Ar-dewán pass, forming regular thickets; these are also the noted localities for obtaining the manna. During July, as the corn ripens, the smaller branches of the cotoneaster become covered with the exudation, and this is collected by merely shaking the branches over a cloth. It is eaten largely by the people as a sweetmeat, and exported in quantity to Persia and India.

The second kind of manna is that yielded by the camel-thorn, ***Alhagi Camelorum***, Fisch. This is a thorny shrub of from two to three feet in height, growing generally over the country at an altitude of two thousand feet, very frequently gregarious, forming a dense shrub. In certain years, during the months of July and August, this manna is developed on the branches of the camel-thorn (*Shutar-khár*), or goat's-thorn (*Khár-i-búzi*). The manna is called *Thranjabin*, which means the honey from the green (bush), this name probably originating from the shrub remaining vividly green over the country long after all other plants have dried up and disappeared. The country round Rui-khauf, in Persia, is celebrated for this product, whence it is exported in all directions.

The third kind of manna is that yielded by ***Tamarix gallica***, Linn., var. ***mannifera***. I collected specimens of this plant in the Badghis, where it was pointed out to me by a Persian as being the shrub that in Khairan Persia yielded *Gaz-shakar*. The plant in Afghanistan is called *Gaz*, and the manna it yields *Gaz-anjabin*; the latter I did not find.

At Sha-Ishmael, on October 8, 1884, I collected a quantity of manna in the form of milk drops from the foliage of *Salsola foetida*, Del. It was pleasant to the taste, with a slightly aromatic flavor. This, I regret to say, has been lost.

*Glycyrrhiza glabra*, Linn., and its variety *glandulifera*, Reg. et Herd.—This shrub in one form or other is very common all over the Badghis, and throughout the Hari-rúd and Khorasán districts, near water. Its annual stems grow to great coarse shoots of from four to five feet in height from enormous underground root stocks. The Turkomans prepare from its roots the extract liquorice, which as well as the shrub they call *Mahk*. The Persians call the plant *Sús*, the root *Behk-sús*, and the extract *Rob-i-sus*. Liquorice is not manufactured at Meshad, but I was told that it was imported from Yezd and Fars in Persia, as well as from Turkistan. I obtained a preparation of it made by boiling the extract down in whey, which gives it a saline flavor, making the liquorice more palatable. This preparation is called by Turkomans *Ao-karút*, the same term as they apply to whey.

*Astragalus heratensis*, Bunge, and *Astragalus sp.* near *A. strobiliferus*, Royle.—These two species of *Astragalus* are very common in stony soil in the Hari-rúd valley and Khorasán, at an altitude of three thousand feet. The native names for either of these were *Khon*, *Kon* and *Gabina*, and for a gum that exudes from them *Katíra*. This gum was found attached to the stem in the peculiar form of tragacanth, wherever it had been able to make its way out through fissures in the bark, and on cutting the stem across the gum was seen to protrude from the medullary space. It is collected in large quantities in the neighborhood of a village called *Kalla-roving*, near Bezd, in Khorasán, for exportation to India *via* Herat, and to the sea coast of Persia.

*Rheum sp.* near *R. songaricum*, Schrenk.—I found a very handsome species of rhubarb on the great plains in the Hari-rúd valley, near Tomanagha, at an altitude of two thousand feet; this the natives call *Rewash-i-déwana*, viz., fool's rhubarb, *Rewand-i-méghan*, *Ishkin*. It is very peculiar in its growth, producing three enormous basal leaves, which spread out flat on the ground, each being about four feet long by five feet across, and the flowering stem with a loose spreading panicle of flowers reaches a height of about three feet; the fruit is large and winged, ripening to a ruby red. The ripe fruit is collected and employed as a purgative, and when not procurable, the root is substituted. I am glad to say that I have been able to obtain a large quantity of the seed, which has been distributed to several gardens; some plants have already sprung tip, and are doing well in the gardens at Kew.

*Orchis laxiflora*, Linn., and *Orchis latifolia*, Linn.—I obtained the two species of orchis in a few localities in the Badghis, the Hari-rúd valley, and Khorasán, and near Meshad I came across people digging for the tubers of these orchids, which they called “*sálab*” and “*sálap*.”

In several places where I had purchased the dry tubers I was told by the vendor that they were not procurable in Afghanistan, but only near Meshad. There can now be no doubt from my identifications on the spot that the tubers generally exported from Meshad into India through Afghanistan are those of the above species. In Meshad I was informed that these were *Sálap*, but not *Sálap-misri*; that the latter was an import article from Egypt, specimens of which, I regret to say, I was unable to

procure.

***Microrhynchus spinosus***, Benth.—Native name *Chir-kar*.—This is a small shrub from one to two feet in height, with numerous intricately twisted branches, interlaced so as to give the shrub the form of a ball. It is apparently leafless, and very much resembles *Lactuca orientalis*, but has thicker and more fleshy branches without spines; both grow in the same stony gravel, especially on limestone débris. This plant yields a milky juice which exudes from injury, and dries in small grayish-black pieces, irregular in form, the largest the size of pea. This is collected and sold under the name of false *Anzérút*, or *Anzrúd*, and has the most nauseous and offensive odor of any substance that I have ever come across. The native who showed me this product said he knew the true *Anzérút*, or Sarcocolla drug, quite well; that it was collected from somewhat similar bushes by shaking them over a cloth, and that these bushes were common near Koin, Birjand, and Yezd, in Persia, and were called *Chir-kah* and *Shai-kah*.

A true pine resin, also called *Anzérút*, is imported into Meshad from India.

***Delphinium Zalil***, Aitch. and Hemsley, *nov. sp.*—This plant is found in great luxuriance at an altitude of 3,000 feet in the moister localities of the Badghis and Khorasán, and is called by the natives *Zalil*, also *Isparak*, *Isburg*, *Awarg*. The flowers, which, when fresh, are of a brilliant yellow, are employed in native medicine as a tonic and alterative, but are usually exported from Persia and Afghanistan as a dyestuff.

***Papaver somniferum***, Linn.—The opium poppy is cultivated in Khorasán, where the inhabitants both eat and smoke it. The quantity produced is chiefly consumed in the country itself, a little being exported westwards through Persia, and some towards Turkistan. In Afghanistan it is but little cultivated, and scarcely used.

***Merendera persica***, Boiss.—This spring flower is extremely common throughout Afghanistan and Persia. The corms of this species, with covering their external coverings removed, were sold at Meshad as *Shambalit*, one of the kinds of *Hermodactylus*, and which may be occasionally mixed with the corms of *Colchicum speciosum*, Stev., also a common plant in those parts. This is exported from Persia to India by the Persian Gulf to Bombay, rarely through Afghanistan.

The *Surinján* of the Punjab, which may also be another form of the *Hermodactylus* of the ancients, and which is imported into the Punjab from Kashmir, is without doubt the corms of ***Colchicum luteum***, Baker. This is very common on the passes in Kashmir, extending as far west as the Murree Hills to Abbotabad, and has even been collected at as low an altitude as Lawrencepur. The corms of *Colchicum luteum* may be occasionally adulterated with those of *Merendera Aitchisonii*, Hook. fil., which I now believe is a variety of *M. persica*, and which is very common throughout the salt range extending to Kashmir.—*Phar. Jour. and Trans.*, Dec. 11, 1886, p. 465.

## NOTES ON A SAMPLE OF GALBANUM FROM *FERULA GALBANIFLUA*

By E. G. BAKER

Read at an Evening Meeting of the Pharmaceutical Society, Wednesday, December 8 1886.

The following are a few notes on a sample of galbanum collected by Dr. Aitchison, Surgeon-Major, in Afghanistan, and brought back by him, together with the plant from which it was collected. The plant has been identified by Mr. Hemsley, of the Kew Herbarium, as *Ferula galbaniflua*, Boiss. et Buhse.

The gum-resin consisted of agglutinated team of a white or reddish-brown color, usually compact and hard, but softening if held in the hand.

When broken it presents a dull white waxy fracture resembling ordinary ammoniacum, in fact, judging from external appearances, it might easily be mistaken for a sample of that drug.

Its odor is peculiar, but not unpleasant. Mixed with the gum-resin, portion, of the stem from which it was obtained were found.

From the sample handed over to me for examination, a portion was selected fairly representative of the whole; this was powdered and sifted through muslin, and then treated with the following solvents:

*Petroleum Ether.*— Of the sifted gum-resin I took 5 grams, and treated it with 50 cc. of petroleum ether-allowing the mixture to remain in a suitable vessel for several days, during which time it was frequently agitated. I then decanted the fluid portion into a tared dish, rinsed the vessel out with more petroleum ether, and evaporated the whole of it as recommended by Dragendorff, in a current of dry air, the air being dried by passing through sulphuric acid and over chloride of calcium.

The petroleum ether extracted .1254 gram; adding to this .03 as the loss during evaporation would give .1554 gram or 3.1080 per cent.

*Ether.*— The portion of the 5 grams remaining from the petroleum ether extraction was next treated with ether and allowed to remain as before. This was decanted and evaporated over a water-bath. It was only after several days that the weight was found to be constant, at the latter stages of the operation the evaporation taking place slowly. The matter extracted by ether was found to weigh 3.060, grams. This was then treated with alcohol, in which it was almost wholly soluble, .226 gram of the 3.060 grams remaining undissolved.

The alcoholic extractive was evaporated, and consisted of a brittle -resin, the melting point of which, when taken over mercury, was found to be 57° C. The resin was soluble in soda, from which it was reprecipitated by an acid.

*Alcohol.*— The portion of the gum-resin remaining from the ether extraction was next

treated with alcohol. The resulting fluid was evaporated over a water-bath. The residue weighed .3788 gram.

*Water.*— The portion of the gum-resin remaining from the alcohol extraction was next treated with distilled water. The filtrate evaporated over a water-bath yielded .8514 gram of residue.

The latter was again treated with water, and various reagents applied. With ammonium oxalate and subacetate of lead the solution of gum gave copious precipitates, but none with acetate of lead or borax.

*Insoluble Matter.*— The portion of the gum-resin insoluble in petroleum ether, ether, alcohol and water, was found to weigh .5280 gram.

*Volatile Oil and Moisture.*— .7876 gram of the powdered gum-resin above referred to was next taken; this, after several days' evaporation, lost .042 gram, which would represent 5.332 per cent., and would be the volatile oil and moisture.

*Ash.*— In order to determine the ash 1.5792 gram of the gum-resin was taken and burnt in a furnace, The ash, which was white, weighed .039 gram; this would represent 2.463 per cent.

Upon examination the ash was found to consist of carbonates of calcium and sodium, sulphates and phosphates being absent.

When examined by the spectroscope the sodium and calcium bands were plainly visible. There was also a band in the red to the right of the calcium bands, which might possibly be strontium. The quantity present was not sufficient for a determination of its position.

*Action of Gum-Resin with various Reagents.*— Sulphuric acid turned the gum-resin dark brown. Hydrochloric acid gave no well-marked action in the cold, but when a portion of the gum-resin was boiled with this acid a dirty red color was obtained, which underwent no change on the addition of alcohol.

A small portion of the gum-resin was boiled with water, and when cold, ammonia added; a very slight blue fluorescence was visible, which indicates the presence of umbelliferon  $C_9H_6O_3$ . To confirm the result a portion of the gum resin was heated for some time with hydrochloric acid at  $100^{\circ} C.$ ; this, when cold, was put into a glass separator with some chloroform, and after agitation, the chloroformic layer drawn and evaporated. No crystals were visible, but when the evaporated chloroformic layer was extracted with water and ammonia added, a decided blue fluorescence was seen.

I then fused a portion of the gum resin with nitre, extracted the mass with water, and added barium chloride; this gave a precipitate wholly soluble in acid, indicating the absence of sulphur in the drug.

The analysis is then as follows:

	Grams	Percent
Volatile oil	.1554	3.108
Ether extractive (resin)	3.0600	61.200
Alcohol extractive (resin)	.3788	7.576
Water extractive, gum	.8514	17.028
Insoluble matter	.5280	10.560
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	4.9736	

The foregoing experiments were made in the Pharmaceutical Society's Laboratory, by permission of Professor Attfield.—*Phar. Jour. and Trans.*, Dec. 11, 1886, p. 146

### **THE OTTO OF ROSE INDUSTRY.**

Mr. Ernst Schmalfluss, a German horticulturist, has been spending a considerable time in Bulgaria to investigate the conditions of the otto of rose industry in that country. Mr. Schmalfluss went to Bulgaria as the agent of a German firm of essential oil distillers who have lately been endeavoring to create an otto of rose industry in Germany, and who desired to have an expert's opinion on the question whether it is feasible to grow the Thracian rose in Western Europe.

The information which has been collected belongs of course to the firm who bore the expense of the journey, but Mr. Schmalfluss has obtained their permission to publish certain details on the subject of his investigations. Mr. Schmalfluss went to Bulgaria with an open mind, and returned thence a firm believer in the future of an otto industry in Western Europe.

There are two principal- rose-growing districts in Bulgaria, the one extending from Yeni-Sagra to Carlowa on the southerly slopes of the Balkans, and the other situated near Chirpan, south of the Karadsha-Dagh. The most widely-different estimates prevail regarding the total area under cultivation, and no reliable figures are obtainable. There is much variation in the soil of the rose-districts, the prevailing formation being a light loam, rich in lime (1.26 per cent.) but almost devoid of phosphoric acid, of which only traces were found in a sample sent to Germany for analysis.

The proportion of nitrogen is moderate, being 0.14 per cent., but the soil is remarkable for its richness in potassium, of which 0.64 per cent. was present in the specimen analyzed. It is not known whether the presence of potassium exercises a special influence on the growth of the flowers; if so, the application of potash-manure would be advisable. In Bulgaria the rose-fields are sheltered fro. the north wind by the mountain ranges against which they are situated, but it is thought that it would be rather an advantage than otherwise if they were from time to time exposed to a cool wind, the plants being singularly hardy and able to withstand without injury a temperature of -4° Fahr. On the other hand, scarcely a season passes in which the plants do not suffer from excessive heat, the high temperature prevailing during certain months being, in fact, the greatest enemy of the shrubs during the flowering and gathering time.

The variety which is used for distilling purposes in Bulgaria is the so-called Thracian rose, a plant of exceedingly rapid growth, flowering sparingly in the first year, and yielding a full crop on the third, When it attains maturity. It is said that, under certain conditions, the plants attain an age of fifty years. The plant bears red or white flowers, the former being about five times as numerous as the latter. Both varieties of flowers are of a very powerful and agreeable odor, but the oil distilled from the white flowers is the finest, although the red roses are richer in essential oil. The Thracian rose exceeds all other varieties in flowering property, weak specimens bearing as many as 500 flowers, while fine plants, if properly cultivated are able to produce nearly double that number. The rose, are small and light , about 220 fresh flowers going to the lb., or about twice the number of ordinary centifolia flowers which are required to make up that weight.

The flowers of the Thracian rose are rather thin, and their richness in essential oils lies in the ovary and the stamens (of which there are an extraordinary number), rather than in the petals. For distilling purposes the entire flower of the Thracian rose is taken, while of the other varieties the corolla leaves alone are employed. Almost every small Bulgarian farmer distils his own oil, the stills used being of the most elementary description, and it is thought that if a Western firm were to undertake the distilling a larger percentage and better quality of oil might easily be obtained. The roses are grown in fields, where they are placed in rows about 2 yards apart, and alternating with rows of grape vines or kitchen vegetables. To a practical man it would appear that in the Bulgarian fields the plants are grown too closely together and have no room left to expand properly. As hints to intending experimenters in Western Europe, Mr. Schmalfuss recommends that the soil should be well manured with old, partly-decomposed manure, the application of which should be repeated every third year. The plant should be placed in rows, about 8,000 trees to the acre, and during the first two years the rows of rose-plants may alternate with rows of kitchen vegetables. It may be found to pay to cut the shrubs in the second year close to the ground. The yield of that year is of course lost by this proceeding, but the luxuriance of the plant for the future is thereby much increased. After the third year the planting of vegetables must be discontinued. The soil must be kept free from weeds and rendered loose twice a year by hoeing. The fields might, experimentally, be protected at the north side by hedges. The flowers must be gathered early in the morning and placed loosely in open baskets, which should be kept in the shade.

Of the roses common in Western Europe the light and dark red varieties of moss, Bourbon, and Remontant roses are richest in essential oil, and might be employed advantageously, Mr. Schmalfuss thinks, so long as the Thracian roses are not obtainable in quantities. Unfortunately, it would appear that, for the present, at least, there is no prospect of a supply of Thracian roses sufficient to admit of a proper experiment. When Mr. Schmalfuss commenced his investigations in Bulgaria he did not meet with any considerable opposition on the part of the native otto merchants, who, at that time, appear to have been perfectly skeptical regarding the possibility of the remunerative distillation of otto outside their own country. But when Mr. Schmalfuss, encouraged by his success, endeavored to obtain a first wagon-load of plants for export to Germany, the Bulgarian otto trade suddenly raised an outcry and prevailed upon the Government to issue an order strictly prohibiting the export of

plants. Efforts will be made to obtain the repeal of this order, and Mr. Schmalfuss' friends are sanguine that at any rate they will ultimately succeed in obtaining a sufficient number of plants; but for the moment their plans, so far as the wholesale import of Thracian roses into Germany is concerned, are frustrated.-*The Chemist and Druggist*, December, 1886, p. 809.