
CITRULLUS COLOCYNTHIS

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BOTANICAL DESCRIPTION, HABITAT AND CULTIVATION.

Persons familiar with the common watermelon vine need no description of the plant which produces colocynth apples. Indeed, if you will imagine a watermelon vine bearing a small, hard fruit with a bitter pulp, you will have a very close idea of the colocynth plant. Naudin, a French botanist, succeeded in crossing the colocynth vine and the watermelon, producing fertile seed, thus demonstrating that they are essentially the same species. Remarkable is the botanical relationship that exists between not only this plant and the watermelon but other garden melons belonging to the allied genus cucumis, as the pumpkin, the muskmelon, and the cucumber. In the latter plant we also find a similar cathartic principle. The difference between these two genera, *citrullus* and *cucumis*, are very slight. The former has solitary sterile flowers and branched tendrils, the latter clustered sterile flowers and simple tendrils.

The colocynth plant is a native of arid soils. It has a large, fleshy perennial root, which sends out slender, tough, angular, scabrid vine-like stems. These usually lie on the ground for want of something to climb over, but which, if opportunity present, climb over shrubs and herbs by means of axillary branching tendrils.

The leaves are angular, lobed and, as already stated, almost the exact duplicate of watermelon leaves.

The flowers are yellow, long-peduncled, solitary in the axils of the leaves. They are monocious, the sta-

*The thanks of the writer are extended to Mr. C. G. Lloyd for botanical notes, and to Dr. Sigmond Waldbott, librarian of the Lloyd Library, for valuable assistance.

mens and pistils being borne in different flowers on the same plant. Each has a yellow campanulate, five-lobed corolla and a five-parted calyx. The female flowers are readily distinguished by a globose, hairy, inferior ovary.

The fruit is globular, smooth, with a hard but thin rind, something like a gourd. It is filled with a soft, white pulp, in which are imbedded numerous seed. This pulp is the article used in medicine,

The colocynth plant occupies the vast area extending from the west coast of northern Africa (Senegambia, Morocco and the Cape Verde islands), eastward through the Sahara, Egypt, Arabia, Persia, Beluchistan and through India, as far as the Coromandel coast and Ceylon, touching northward the Mediterranean and Caspian seas. At the Red sea, near Kosseir, it occurs in immense quantities.¹⁴ It is also found here and there in southern European countries, e. g., Spain and the islands of the Grecian archipelago. Isolated specimens occur in the cape of Good Hope, Japan, Sicily,⁹ and it is suggested⁷ that birds of passage have much to do with the distribution of the seed. Even from our hemisphere we have recent reports of its successful cultivation on a small scale.

In the island of Cyprus the raising of colocynth has been a source of revenue since the fourteenth century, and still forms an article of export at the present time.

Colocynth, as already stated, is distinctly a desert plant, giving evidence of the dominion of life even in such arid regions (Grisebach⁷). Hooker and Ball⁸ met with it in the oasis of Sheshuaua in Morocco, and state that this characteristic plant of the desert region in north Africa rarely approaches the littoral zone. The fruit is used in Morocco for the purpose of protecting woolen clothing from moths; but according to the testimony of these observers the purgative qualities of colocynth do not seem to be known to the native doctors.

Volken¹² enumerates *citrullus colocynthis* (L.) Schrader, among the plants growing in the Egypto-Arabian

deserts, pointing to its exceedingly rapid development, especially the fruit, which attains a diameter of 10 centimeters. After the vine has withered away the fruits may be seen lying in the sand of the desert, ten to fifteen in number, about each plant. Volkens saw the plant in bloom in May as well as in December, and reports that when the plant is torn from the ground it withers in a short time, owing, he thinks, to the delicacy of the microscopical structure of the leaves.

A brief account of the growth of colocynth in Palestine has more recently appeared in the United States consular reports (1895) from which we abstract the following points of interest :¹⁹ The fruit grows abundantly between the mountains of Palestine and the eastern shore of the Mediterranean, from the city of Gaza northward to Mount Carmel. The plant thrives without any attention whatever on the part of the husbandman, since the climate and soil are all-sufficient for its perfect growth—the natural requirements being merely a sandy soil, warm climate and little moisture. The fruit which is known in commerce as the Turkish colocynth is collected by the native peasants (fellaheens) in July and August, before it is quite ripe, and is sold to Jaffa dealers, who peel it and dry the pulp in the sun. It is then molded into irregular small balls, packed in boxes and exported, mostly via England. The average annual shipments is stated in the consular reports to be 10,000 pounds, but it must have fallen off considerably during recent years. (See statistics below.) The reason for this, as we learn from another source,¹⁶ lies undoubtedly in the export tax. The report suggests that probably colocynth may be profitably cultivated in certain parts of the United States.

In this connection we may point to Prof. L. E. Sayre's paper¹⁸ on American colocynth (1894), and the cultivation of colocynth in Montreal as reported in 1895 by Prof. T. D. Reed.²¹

The drug is imported from Spain; Triest, Smyrna, Mogador, and elsewhere.⁵

Some distinguish between the Egyptian (the largest fruit, being 10 centimeters in diameter), the Cyprus, and Syrian colocynth¹⁰ (the latter varieties having a diameter of 5 to 6 centimeters),¹⁰ others between the Turkish (peeled) and the Mogador (unpeeled) varieties.⁹ In 1885 Mr. Umney called attention to a commercial specimen named "Persian colocynth," that much resembled the Turkish variety. It had evidently been compressed in the fresh state, probably in order to lessen the freight rate when reckoned by volume instead of by weight.¹¹

STATISTICS.

In 1839 the imports of colocynth into England amounted to 10,417 pounds.⁵

The export from Jaffa, in Syria, and its monetary value in recent years were as follows :¹⁶

1892, 88,700 pounds.	£. 2,580=\$12,900.
1893, 42,000 pounds.	£ .950=\$ 4,750.
1894, 10,000 pounds. ¹⁹	
1895, 6,000 pounds.	

The export from Cyprus¹⁵ in the middle ages (under Venetian rule) was 2,500 okes a year=6,750 pounds. In 1889 it was 4,616 okes a year=12,650 pounds. **£.461=\$2,305.** In 1890 it was 7,108 okes a year=19,480 pounds. **£.739=\$3,695.**

HISTORY, CONSTITUENTS AND USES.

Colocynth is an exceedingly ancient medicine. It is believed to be the wild gourd (pakuoth) of the Old Testament, regarding which Hieronymus Bock (1556) facetiously remarks² that colocynth serves only the physician but not the cook, unless he has learned the art from the Prophet Heliseo, who prepared for the children a sweet dish from the fruit. The Biblical paragraph to which Hieronymus refers is to be found in the Second Book of Kings, chapter IV, 38.

38. And Elisha came to Gilgal, and there was a dearth in the land; and the sons of the prophets were sitting before him: and he said unto his servant, set on the great pot and seethe pottage for the sons of the prophets.

39. And one went out in the fields to gather herbs, and found a wild vine, and gathered thereof wild gourds his lap full, and came and shred them into the pot of pottage; for they knew them not.

40. So they poured out for the men to eat; and it came to pass, as they were eating of the pottage that they cried out, "O thou man of God, there is death in the pot," and they could not eat thereof.

Its exceedingly bitter tastes and its violent purgative properties were well known to the ancient Greek and Roman physicians.

Dioscorides,¹ who uses the name "kolokynthis,"* gives the synonyms cucumis amara, cucurbita silvatica, cucurbita alexandrina, and cucurbita caprina; also the foreign terms, thymbre, autogenes, and tutastra. The Arabs called it "alhandal," and by Mesue it was called "fel terrae," or earth-gall, in reference to its exceeding bitterness; a very appropriate, almost poetic term.

The dangerous character of the drug was pointed out by the medieval physicians who observed that bloody ulcerations are liable to occur in the intestines where some of the pulp would imbed itself in its lining membrane. H. Bock (Tragus) speaks of two varieties of colocynth,² one of the foreign origin and powerfully active, the other cultivated in Germany, much milder in action. From the foreign colocynth, he states, the ancient electuary, called "hieras picras," was originally made, and advises people to beware of traveling quacks who administer the foreign colocynth, boiled in wine, as a purgative, adding, that with such art nearly all the Jews are acquainted.

*Many derive this word from *Kolon*, Greek for bowels, and *Kineo*, move, hence, a cathartic; while Hehn(6) perceives rather a connection with *Kolossus* owing to the size of some of its relations. The name kolokyntha, used by Dioscorides in another chapter refers to an edible species of cucumis.

Colocynth entered into the composition of numerous preparations of more or less ancient date, such as confectio hamech, trochisci alhandal, Stahl's pills, Morison's pills, Barclay's anti-bilious pills, etc., and is still a valued medicine.

The colocynth, or bitter-apple, of commerce (also called *pomoquinta* by O. Berg), when deprived of its rind, as is mostly the case, presents a white, light and spongy pulp that readily breaks into three wedge-shaped pieces, each holding imbedded near its outer rounded surface a number of flat, ovate seeds. The proportion between pulp and seed varies according to different authors, from 23 to 33 per cent of pulp and 67 to 77 per cent of seed. The intensely bitter taste of colocynth resides in the pulp only, while the seeds at best contain only traces of it; hence the advisability of removing the inert seeds before making pharmaceutical preparations of colocynth. The bitter taste and the powerful medicinal virtues of the pulp are due to the presence of a probably amorphous glucosid *colocynthin*, first identified and named by Meissner and by Vauquelin (1818), and later investigated and obtained more pure by Walz, Henke and others.¹⁴ It is soluble in water and alcohol, but insoluble in benzol, benzin, carbon disulfid and ether. Dilute acids resolve it into dextrose and tasteless *colocynthein*, acetic acid being likewise formed (Speidel, Dissertation¹³). Walz obtained from an alcoholic extract of colocynth an ether-soluble crystalline and tasteless substance insoluble in water, which he called *colocynthin*. The ash of the pulp varies from 8.6 to 14 per cent (Squire¹⁷) while that of the seeds amounts to about 2.5 per cent.¹⁴

At one time it was believed that the seeds exert a slight physiological action, being a mild and safe purgative.⁴ Bergius,³ however, as early as 1778, explicitly states that the pulp is the sole carrier of the bitterness, and that the traces found in the seed may be removed by washing in tepid water. When the absence of bitter-

ness is indicated by the taste, the seeds no longer purge. He adds that the seeds should be removed in order to avoid the contamination of the extract of colocynth with the fatty oil of the seed.

Proof of the innocuousness of the seeds is established by the fact that they afford an important food material to African tribes of the desert.

In this connection we quote from Flueckiger's report⁶ of an interesting account given of the mode of preparation of colocynth seeds as observed by the celebrated German Sahara traveler, Doctor Nachtigal, who visited the poor tribe of the Tibboo Resade in 1870. This is one of the tribes inhabiting the mountainous country of Tibesti in the central part of Sahara. They settle the upper valleys of the rivers where the land is somewhat fertile. Their sole food resources are the milk of goats and a few miserable products from vegetable life, chief among which, strangely enough, are the seeds of colocynth, called "aber," which they collect on special nomadic expeditions. The scantiness of their resources compels these people to be very economical in searching out and preparing this strange food. After the bulk of the pulp is removed the seeds are enclosed in strong sacks and tramped upon in order to facilitate the removal of the last traces of the bitter pulp. The seeds remain whole and are cleaned by winnowing. They are then mixed with ashes from camel's dung, placed upon a smooth stone and rubbed with a rounded stone, which has the effect of crushing the testa. The kernels are then sifted and are thus obtained rather pure. Other Tibboo tribes (Duveyrier) attain the same end by roasting the seeds. Doctor Nachtigal further relates that the seeds are then boiled in water for a short time, the fresh leaves of the ethel bush (?) being added. The last trace of bitterness is afterwards removed by cold water. The seeds are then dried in the sun, powdered, and mixed with dried and powdered dates, and the food thus labori-

ously obtained, is said to be exceedingly palatable and nutritive.

Flueckiger, commenting upon the latter feature of the process, points out that the kernels form about one-third of the whole seed, which he found to contain 16.94 per cent of fatty oil, 5.93 per cent of albumen, 2.48-2.7 per cent ash, and 7.17 per cent of water; hence the painstaking process adopted by these African tribes results in a product containing 48 per cent of fatty oil and 18 per cent of albuminous matter, properly diluted by the addition of the sweet powder of dates. Too high a tribute cannot be bestowed upon these half-civilized people whose necessities and instincts led to the preparation of such an exceedingly rational nourishing food by extricating it from its poisonous enclosure.

PHARMACOPEIAL RECORD.

The Pharmacopoea Augustana of 1581 gives directions for the preparation of *trochisi alhandal* and *electuarium majus hamech*, both of which, devised by Mesue, the Arab medical writer, contain colocynth as their basis. The term *trochisci alhandal* was applied as a synonym for *colocynthis praeparata* as late as 1861 by the pharmacopeia of Hanover.

An official price list appended to the Pharmacopoea Augustana of 1684 quotes one-half ounce of colocynth pulp with seeds at 5 kreuzer, pulp alone at 12 kreuzer, and the seeds are quoted at 1 kreuzer, which tends to show that some medicinal importance was at that time attached to the seeds.

In this connection it is worthy of notice that the German pharmacopeia of 1890 explicitly directs the use of colocynth pulp containing the seeds, but in 1872 the pulp only was to be used, and again, in 1882, no special directions were given.

Hirsch and Schneider, commenting at length on the advisability of including the seeds in the making of pharmaceutical preparations,²⁰ state that this practice is

at variance with the direction of all other pharmacopeias, excepting the French codex and the latest Pharmacopoea Fennica.

Colocynth occupied a place in the Pharmacopoeia of the Massachusetts Medical Society, Boston, 1808, and has been official in every issue of the Pharmacopoeia of the United States.

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