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THE ORIGIN OF FALSE SENEGA ROOT.

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When in 1876 Mr. Wm. Saunders called attention to a suspicious senega root (*Proceed. Am. Phar. Assoc.*, 1876, p. 661), which afterwards became known as *white* and *false* senega, I stated my belief, that it came from a species of *Polygala*, though not from *Pol. Senega*. It disappeared from our market shortly afterwards (*Proc.* 1877, p. 525); but through the aid of the late W. H. Crawford, (*Ibid.* 1881, p. 522), I had been enabled to trace it to the neighborhood of Springfield, Mo., where it was said to have been collected. All subsequent efforts to ascertain the locality of collection, or to procure a living plant with root attached proved of no avail, though from time to time the same root was met with in commerce. In 1881 (*Amer. Jour. Phar.*, 1881, p. 388), on receiving from Dr. J. R. Gunn, of Alabama, a specimen of *Polygala Boykinii*, Nuttall, I regarded it as the parent plant of the false senega, notwithstanding most of the latter roots were larger in dimensions than the root of the plant received.

The white senega, examined microscopically by Thos. Greenish, (*Phar. Jour. and Tr.*, Sept. 7, 1873; *Am. Jour. Phar.*, 1873, p. 523) was believed by him to be a true senega; but Geo. Goebel (*A. Jour. Ph.*, 1881, p. 322) pointed out some striking structural and chemical differences.

That this white keelless root is derived from *Polygala Senega* has been maintained by many dealers; and this belief has doubtless been strengthened by papers on commercial senega by J. U. and C. G. Lloyd, who have made a special study of the indigenous medicinal plants. In *Proc. Am. Phar. A.*, 1881, p. 453, and in *Phar. Rundschau*, New York, 1889, p. 86, they describe the different commercial varieties of (southern or western, and northern) senega, all of which are stated to come from the typical form and several varieties of *Pol. Senega*. In one of these papers (1881) it is stated that "*Polygala Boykinii* is the only native species that, to our knowledge, approaches in size the *Pol. Senega*;" and in the other (1889) that "continued inquiries regarding the root of *Pol. Boykinii* have led to completely negative results; not a single commercial lot of senega from the southern states contained that root." Prof. Chas. Mohr of Mobile, who is well acquainted with the flora of the southern states, has shown (*Phar. Rundschau*, 1889, p. 191) that the distribution of the two species is such, that an accidental intermixture of the two roots is impossible, and that the root of *P. Boykinii* cannot be collected in such a quantity and at a price as to become an article of commerce. (*Ibid.* p. 89).

While it is possible that white or false senega may occasionally be found as an

admixture of officinal senega, I cannot make such a statement from personal observation; but have not doubted the difference in the botanical origin of the two roots, as I had occasion to state quite recently (AM. JOUR. PHAR., 1889, p. 381). The papers just quoted seem to render untenable my belief in the origin of the false root from *P. Boykinii*; but I am pleased to be able now to definitely identify the species yielding it.

Quite recently Messrs. Peek & Velsor, of New York City, sent me a plant, which on examination seemed to be *Polygala alba*, Nuttall; the root to which the numerous stems are attached is fully four inches in length and, beneath the crown, one-fourth inch in diameter. On comparing it with a number of specimens in several herbaria, the roots of the latter, when present, were found to be considerably smaller, more slender and less branched. The resemblance of the specimen with senega root, notwithstanding the absence of the keel, suggested the plant possibly to be a variety of the latter species with linear leaves; but the narrow-leaved specimens of true senega were observed to differ essentially in the root, leaves and flowers. Not having the means to remove every doubt, it was deemed advisable to consult some of the best judges of the flora of the western states.

In one of the letters Messrs. Peek & Velsor wrote as follows: "The shipper informs us that it is gathered in Kansas and that a few bales every year have passed through his hands to dealers and manufacturers, and that there had never before been any question as to its being *Polygala Senega* until we refused it."

In regard to the specimen plant, Professor Sereno Watson writes: "The *Polygala* sent must be *P. alba*, the root of which varies considerably in its character." Professor Thos. C. Porter writes: "The Kansas *Polygala* has all the characters of *P. alba*, Nuttall. In the specimens of our herbarium, from a number of widely different stations, some have roots fully as large as that of yours. The species is somewhat variable and includes *P. Beyrichii*, T. & G."

The original description of the plant as given by Nuttall in 1818 (*Genera of the North American Plants*, II, p. 87), is as follows: *P. alba*. Perennial; flowers cristate; stem simple; leaves alternate, linear, revolute on the margin; flowers racemosely spiked; spike long pedunculate, bracts deciduous; wings of the calyx rounded, about the length of the corolla. Hab.: On the plains of the Missouri, common, and the only species of the genus in the upper part of Louisiana. Obs.: A small plant scarcely more than six inches high, considerably allied to *P. Senega*, but more than a variety, as it has been considered by Mr. Pursh; leaves smooth and narrow; flowers and calyx white, nearly sessile; bracts lanceolate.

Some additional characters, giving also some of the variations of the plant, are copied from other works, namely:

Stems several from a somewhat woody root, erect or ascending, angular, at length branched above; leaves linear, narrowed towards the base, acute, or the lower ones obtuse. Stems $\frac{1}{2}$ to 1 foot high. Spikes 1 to 3 inches long.—Chapman, *Flora of the Southern United States*. Leaves linear to oblanceolate, sessile or barely petioled, margins slightly revolute; stem leafy half way to the summit; flowers deciduous,

leaving the rachis roughened after their fall.—Rothrock, *Geographical survey west of the 100th meridian; VI, Botany.*

The lower leaves are often distinctly verticillate.—Serenio Watson, *Procs. Amer. Acad. of Arts and Sciences*, XVII (1882), p. 325.

It will be observed that Pursh regarded the plant merely as a variety of *P. Senega*, and that Nuttall, in 1818, pointed out its near relation to the latter species. Twenty years later, Torrey and Gray stated (*Flora of North America*, I, 131): “We have not seen this plant, but we suspect that it is a variety of *P. Senega*.” Since the resemblance extends also to the root, the latter was most likely originally collected in good faith and sold as senega; and after the difference between the two roots had been pointed out, the opinion as to identity was probably adhered to without showing the plant to a botanist.

I append here the diagnostical characters of *P. Beyrichii* as given by Torrey and Gray (*loc. cit.*), and which are in part included in some of the quotations above: Spike dense, acute, flowers on very short pedicels; wings orbicular-obovate, concave, rather longer than the, broadly obovate lateral petals; capsule oblong; seed very villous with appressed hairs; lobes of the caruncle distant, about half as long as the seed; stems numerous, somewhat branched ; leaves linear or linear-spatulate, somewhat glandular.

Regarding the distribution of this species, Nuttall states that it is common “on the plains of the Missouri” and “in the upper part of Louisiana.” Nuttall had explored the country along the Missouri river in 1810, when the territory of Louisiana extended northward to the British possessions. From these northern plains the species extends southward to Texas and into Mexico. Rothrock's specimens were collected in Arizona at an altitude of over 7,000 feet; and Watson's remarks quoted above refer to plants coming from several Mexican states.

It is but natural to expect considerable variation in a plant indigenous to such a large portion of the North American continent, and that these variations should apply not only to the size and shape of the stem and leaves, but likewise to the underground portion. Many of the Mexican plants in herbaria agree very well (root excepted) with the Kansas plant in my possession which has occasioned the present investigation; still other Mexican plants have been observed as *Pol. alba*, in which the inflorescence was decidedly thicker, more conical and less acute than in the other forms from Texas and farther north.

For a sample of this false senega root from Kansas I am indebted to Messrs. Peek & Velsor; it is of the same handsome light color as the false senega of 1876, and agrees in all essential characters with the false senega root seen since then, except that some of these samples are somewhat darker in color; but I have never seen it as deep brown in shade as the much larger northern senega, which has been in commerce for about ten years or more. The following description of the sample before me applies, therefore, with the variation mentioned, to all the samples seen during the past thirteen years.

Commercial false senega consists of but little broken roots, the total length of which varies between four and six inches. The head has a close resemblance to that found in senega root, is about five-eighths inch, sometimes an inch, in thickness, and bears above a large number of stem remnants. Beneath the head the root is suddenly contracted to the thickness of about one-fourth inch; a few small roots may usually be picked out, scarcely one-eighth inch in thickness, while some larger roots are three-eighths, or rarely one-half, inch thick. The color is pale brownish-yellow, much lighter than commercial senega is usually seen, and lighter than all other officinal roots, the white ones excepted; since the interior of the root, both bark and medullium, is of a nearly white color, it is obvious that in bulk the color of false senega root must have a still lighter tint, approaching to white, in proportion to the abrasion of the outer layer. Older roots, particularly near the bead, have a thin layer of cork of about the same shade of brown as gentian. The main root is nearly straight, and the six or eight thinner branches are descending or curved downwards, while true senega very frequently divides into almost horizontally spreading branches. The keel is absent; slight indications of it are very rarely observed, and only in the thickest roots, near the head; but even here the transverse section of the wood has a circular outline, the same as in every other part of the root and its branches. A similar regularity, regarding the cylindrical shape of the medullium, has not been observed by me in the much thicker roots of northern senega; and that the typical form of senega has a cylindrical wood only in the part immediately below the bead is well known. I may also mention that I have found the medullium of the false senega, after freeing it completely from the bark, to be entirely tasteless, while the same portion of the northern senega has a gradually developed decidedly acrid taste.

The small roots in the sample agree well with *P. Boykinii*; but this species not growing in Kansas cannot be present in the sample under consideration. A histological investigation of the material on hand is contemplated, and it is hoped may reveal differences in addition to the microscopical characters pointed out. Not having seen the Southern senega, of which Prof. Lloyd has handled some bales, and which was of excellent quality, but without any observable keel (*loc. cit.*, p. 88), I cannot say whether or not it was identical with false senega; but it should be noted that thus far the latter is not known to come from a southern state; the only two localities, as yet ascertained, have been pointed out by me, viz., southwestern Missouri and Kansas.

PHARMACEUTICAL NOTES

Abstracts from a Thesis.

Tinctura Gentianae composita, U. S. P., is recommended by Oliver B. Jacobs, Ph. G., to be prepared with a menstruum of alcohol 3 parts and water 1 part, when it will remain permanently clear. Using alcohol 2 parts to water 1 part, the tincture showed a slight precipitate in two weeks. Made with strong alcohol, the tincture was less bitter in taste and contained about 3.12 per cent. of solid matter, while the tincture made with the menstruum suggested yielded 5 per cent. of extract.

Blackberry brandy, as met with in commerce, varies considerably in appearance and composition. John P. Kelly, Ph. G., procured from manufacturers four formulas

for the preparation of blackberry brandy, which are as follows:

1. Fluid extract of blackberry bark, 2 parts; syrup, 2 parts; whiskey, 4 parts.
2. Blackberry juice and brandy, equal parts.
3. Blackberry root, cinnamon, cloves, glycerin and brandy; no proportions given.
4. Blackberry juice, syrup, spices, New England rum; no proportions given.

Four samples, procured respectively from the states of New York, New Jersey, Kentucky and Pennsylvania were examined, with the following results:

1. 1.022 specific gravity; 15 per cent. (weight) alcohol; 19 residue.
2. 1.013 specific gravity; 29 per cent. (weight) alcohol; 17 residue.
3. 1.103 specific gravity; 25 per cent. (weight) alcohol; 25 residue.
4. 1.033 specific gravity; 13 per cent. (weight) alcohol; 20 residue.

The "residue" was obtained by evaporation on a water-bath (temperature not given) until it ceased to lose weight; it appeared to contain considerable glucose and glycerin. The four samples produced dark blue precipitates with lead acetate, due to the presence of tannin and coloring matter; they possessed more of the characters of fruit wines than of brandy.

STAR-ANISE OIL.

A star-anise tree, when at its full strength and in a favorable crop year, bears about $2\frac{1}{4}$ cwt. of fruit, which yield about 4 per cent. of essential oil, though it is said that if a less primitive still were employed than that used by the Annamites of Indo-China, the percentage might be sensibly increased. The tree yields a full and a small crop every alternate year. The Annamites distinguish three varieties of oil—white, red-brown and yellow. The first is obtained from green or badly-kept fruit, the second is the usual variety, and the yellow oil is the best; but there is very little of it to be had, as the natives rarely dry the fruit in the sun, that being a slow process and said to decrease the outturn. The natives never use star-anise oil themselves.

Until the French occupation of Indo-China the distilling was done exclusively by the Chinese merchants, who bought up the seeds from the natives, and paid a tax to the Annamite Government for the use of the stills, but since the French conquest the natives do all the distilling, hiring the stills from the Chinese. In 1887 the monopoly of purchasing star-anise oil from the natives during the seasons 1887 and 1888 was let by contract for the first time for the sum of 26,050 francs—a little more than 1,000*l.* The four principal distilling Centres. are Ha-Lung, Lang-Son, Ky-Lua and Dong-Dong—names which have become familiar of late as the scenes of several battles fought by the Annamites against the French. In the village of Ha-Lung alone, there

are twelve stills, and about sixty stills altogether in the district. The contractor has the right to levy a tax of four francs on every picul of seed sold to anyone else, but, as a matter of fact, he is now practically the only wholesale dealer in the market. In 1887 about fifty tons of oil were sold to him, for which he paid an average price of about 7.20 francs per kilo., or, say, 3s. 4d. per pound for the oil.

The cost of carrying the oil from Lang-Son, the central market, to Hanoi, the shipping port, is about 4¹/₂d. per pound, and it is believed that to the Hanoi importers and the Havre merchants engaged in the article there has been a profit on this trade (taking the average price of the two seasons) of about £10,000, or fully 30 per cent. of the entire amount.

It is thought that the lease of the oil-farming rights for the season 1889 will give rise to considerable competition, and that a much higher price will be paid for it than on the previous occasion, the more so as since then large tracts of land where the star-anise tree is grown, and which formerly were altogether outside the French jurisdiction, have been occupied by the French troops. The oil and the seed from those districts came formerly into commerce by way of China, but will now pass through the French port of Hanoi. Outside the French dominions in Tonquin the star-anise tree is said to be very scarce, and the territory at present in the hands of the French will, they believe, give them a virtual monopoly of the trade. For about fifteen years the French have been trying, at great cost, to acclimatize the trees in their African colonies on the Senegal, but without result. If we may rely upon the figures given above, the production of oil of star-anise in 1887 in French Indo-China alone equalled about 112,000 pounds, against an annual production of 94,000 pounds of oil of *Pimpinella Anisum*, according to Messrs. Schimmel & Co.'s calculation.—*The Chemist and Druggist*, June 8, p. 795.