

AMERICAN JOURNAL OF PHARMACY

Volume 59, #3, March, 1887

Botanical Medicine Monographs and Sundry

ANALYSIS OF HYDRANGEA ARBORESCENS.

By C. S. BONDURANT.

Read at the Pharmaceutical Meeting, February 22.

This indigenous plant grows abundantly in a large section of the United States. Considerable quantities are furnished to the market from Ohio and Indiana. Hydrangea is well known by its vernacular name "Seven Barks," and is said to have been used by the Cherokee Indians and subsequently by more scientific practitioners, some of whom regarded it as a specific in treatment of urinary calculi.

As far as I am able to learn hydrangea has received but little attention as to its proximate constituents.

The first analysis was probably that of Mr. Jos. Laidley, of Richmond, Va., in 1850. He mentions having found only gum, starch and resin.

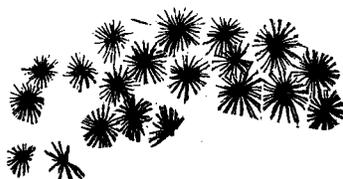
The AMER. JOUR. OF PHAR., of April, 1881, p. 157, contains an essay by Mr. Jacob Baur, Ph. G., who claims to have found in addition to gum, starch, resin and sugar, an alkaloid in small quantity and tannin, also a crystallizable body, but was unable to separate a sufficient amount to determine its character.

In following the scheme outlined by Dragendorff, for plant analysis) I found a distinctly crystalline body in both alcoholic and ethereal extracts, the latter containing the largest, quantity. Its extraction and purification was attended with much difficulty, owing to the fact of its readily undergoing decomposition, which was accompanied by a resin-like body, possessing an odor entirely different from that characteristic of the drug.

A portion of the body, distinctly crystalline and freed from decomposition products, by solution and recrystallization from ether, was examined as to its chemical relations. The alkaloidal reagents were applied, none of which gave any evidence of alkaloidal character. After boiling an aqueous solution of the body with dilute hydrochloric acid and neutralizing with potassium hydrate, Fehling's solution was promptly reduced. Its behavior to Fehling's solution and the proneness to decomposition into the resin-like body and glucose, are sufficient evidence of its being a glucoside.

In order to obtain a larger quantity 500 grains of the drug were prepared and percolated to exhaustion with 95 per cent. alcohol. The greater portion of the alcohol being recovered by distillation, the concentrated extract was allowed to evaporate spontaneously, which left a viscid brownish red mass. After shaking with petroleum spirit to remove a fixed and volatile oil, the residue was treated with a slightly

acidulated water and chloroform to remove the red coloring matter. The acidulated solution was shaken with ether several times, the ethereal washings on evaporation deposited the body in stellate clusters in fair state of purity.



CRYSTALS OF HYDRANGIN (Natural Size).

After confirming its glucosidal character, the name hydrangin is proposed for it. On addition of an alkali to the aqueous solution a very distinct and strong opal blue fluorescence is observed, which is destroyed in acidifying. This characteristic fluorescent property was noticed in all the solvents used in exhausting the drug except the petroleum spirit and dilute hydrochloric acid.

From its fluorescent property it was thought to be similar to or identical with æsculin, a glucoside prepared from horse chestnut, but on comparison they were found to be distinct bodies. The fluorescence of hydrangin is opal blue, while that of æsculin is sky blue. Hydrangin also differs from æsculin by its ready solubility in ether its insolubility in strong hydrochloric acid and by its not being precipitated by argentic nitrate, mercuric chloride, nor neutral lead acetate. Hydrangin is not charred by concentrated sulphuric acid, but dissolves without color; also with nitric acid. A characteristic reaction for hydrangin is obtained on dissolving it in sulphuric acid and adding a small crystal of potassium bichromate when a dark purple color is produced which, after some minutes, fades to violet; and on addition of a few drops of water an olive green is produced which gradually fades.

Hydrangin melts at 235° C. and on increasing the temperature slightly, sublimes without decomposition, forming in stellate clusters, without color. It was desired to make an ultimate analysis of hydrangin, but owing to lack of time it will be reserved for future investigation.

In exhausting the drug with the usual solvents, there was found in the petroleum spirit extract, a fixed oil, turning dark reddish brown with concentrated sulphuric acid, saponifiable with potassa; and a volatile oil possessing the characteristic odor of the drug and evolving an alliaceous odor when treated with caustic potash and sulphuric acid. The presence of sulphur was indicated by the blackening of paper moistened with solution of lead acetate.

The ethereal extract contained in addition to the glucoside, a resin insoluble in water, sparingly soluble in chloroform, completely soluble in absolute alcohol and alkaline solutions.

Absolute alcohol extracted the glucoside, a resin insoluble in ether and a reddish coloring matter soluble in chloroform.

Water extracted vegetable mucilage, saponin and sugar.

The dilute soda solution contained mucilaginous substances and albuminoids.

Dilute hydrochloric acid extracted calcium oxalate in small quantities.

The residue boiled with dilute hydrochloric acid for some hours extracted starch by conversion into glucose.

Lignin was extracted by chlorine water with agitation.

The ash was found to be composed of sulphates, chlorides, carbonates, phosphates and silicates combined with calcium, iron, aluminium, magnesium and potassium.

SUMMARY:

Petroleum spirit (fixed and vol. oil) .	2.28 per cent
Stronger ether (glucoside and resin)	1.57
Absolute alcohol (glucoside and two resins)	2.31
Distilled water (mucilage, saponin and sugar)	9.52
Dilute soda (mucilage and albuminoids)	8.37
Dilute hydrochloric acid (calcium oxalate)	1.40
Starch	7.28
Lignin	4.83
Ash	3.41
Cellulose moisture, etc., undetermined	59.03
Total,	100.00

No tannin was found to be present in the drug contradictory to statement made by Mr. Baur. The work above was done in the laboratory of the Philadelphia College of Pharmacy, under direction of Prof. Henry Trimble.

GLEANINGS IN MATERIA MEDICA.

Aesculus Hippocastanum, Lin.—In medical works, including those on medical botany, in which the horse chestnut tree is mentioned, the discussion of the medical properties is usually confined to the use of the bark as an antiperiodic, and of the fixed oil as a topical remedy in rheumatic complaints. Occasionally the sternutatory properties of the powdered seeds are mentioned, and in works from the beginning of the present century we find it stated that a paste made from the seeds is useful in chilblains, and a decoction of the roasted seeds has been recommended in atonic uterine hemorrhages. A still older work (Murray appar. IV. p. 62), which is stated to give the uses of the horse chestnut in former times, could not be consulted by us. In only one of the modern works consulted (National Dispensatory, 3rd and 4th edit., p. 765) has been observed a reference to the popular use of the leaves in whooping cough, and of the seeds in hemorrhoids.

That this popular use has not been forgotten, we learned from Mr. Geo. W. Stoeckel, of Reading, Pa., at the meeting of the Pennsylvania Pharmaceutical Association in 1886. More recently Mr. Stoeckel has informed us that the use of the leaves and

seeds in the manner indicated below is not uncommon in the southeastern counties of Pennsylvania. A decoction of the leaves is regarded as a remedy in whooping cough and is given in small doses frequently repeated, while the bruised fresh leaves, sometimes mixed with lard, are at the same time employed externally. The entire seed is carried in the pocket as a kind of charm against piles, and the powdered white kernel is thoroughly triturated with lard into an ointment, which is said to be successfully applied against piles.

Poisoning by the bark of *Robinia Pseudacacia*, L.—Dr. Z. T. Emery reports (*N. Y. Med. Jour.*, Jan. 22, 1887) on the poisoning of thirty-two boys at the Brooklyn Orphan Asylum from chewing the inner bark of the locust-tree, which they had obtained from the yard where fence-posts had been stripped. In the mildest cases vomiting of ropy mucus was observed, together with flushed face, dryness of throat and dilated pupils. In the severest cases large quantities of ropy mucus, mixed with blood were vomited; the other symptoms were retching, pain in the epigastrium, debility, stupor, extremities cold and pulseless, heart's action feeble and intermittent, pupils dilated, faces of a dusky pallor. These patients were given bismuth subcarbonate and brandy by the mouth, and morphine hypodermically; sinapisms were applied over the stomach and bottles with hot water along the extremities. The patients were discharged from the hospital in two days.

The stem bark has never been examined chemically. Asparagin has been found in the root, and the flowers contain the glucoside robinin, which yields quercetin. The bark deserves investigation in view of the fact that a number of woody leguminous plants are known to contain poisonous alkaloids and other more or less active principles.

The diuretic effects of caffeine, which have been previously observed by Zwenger, Gubler, Shapter and others, have recently again been the subject of investigation. The result of von Schroeder's experiments (*Arch. f. Path. u. Pharmak.*, Oct., 1886) point to two opposite effects of caffeine, 1, in stimulating the nervous system, similar to strychnine, and tending to decrease the flow of urine through the contraction of the renal vessels; and 2, in stimulating the kidney itself and thus greatly increasing the amount of urine. That the diuretic action varies considerably in intensity, was observed by Bronne (*Dissertation*, Strassburg, 1886). He administered the alkaloid in divided doses every two hours, 0.5 to 1.5 gm. being the total amount given in the morning only, so as to prevent it from causing sleeplessness; and if its employment must be prolonged, he advises its occasional discontinuance for a few days, when the remedy will act as promptly as before.

Eupatorium Ayapana, Ventenat, is at present met with in European commerce (*Phar. Zts. Russl.*, 1886, p. 707). The drug consists of dried leaves, about 8 cm. long and 15 mm. (2/3 inch) broad, brown, smooth, oblong-lanceolate, the margin somewhat revolute. Two prominent lateral veins branch off from the midrib near the base, and extend parallel with the margin to the apex. The odor is slight coumarin-like, and the taste mildly astringent and aromatic. The leaves are recommended against indigestion, pectoral complaints and in cholera, and were used for similar purposes in Europe in the early part of the present century.

The shrub is indigenous to Brazil, but is now found throughout tropical America and in

India. L'Heritier and Martius reported also its efficient use in Brazil against snake bites, the leaves being employed externally and internally.

Eupatorium villosum, Swartz, is indigenous to Jamaica and the Bahamas where it is largely used as a tonic, also as a substitute for hops in beer. *Eupatorium amarissimum* is mentioned as being employed in a similar way; the Mexican Pharmacopoeia mentions *Eupatorium collinum*, De C. (See Am. Jour. PHAR., 1886, p. 169.)

Adulterations of saffron with foreign floral organs or with meat fibres have never been observed by Dr. Niederstadt (*Arch. Phar.*, Jan., 1887, p.73). A sample of the finest quality of French saffron contained 14 per cent. of moisture and 5.84 per cent. of ash, of which 1.546 per cent. (= 0.058 per cent. of the saffron) was sodium chloride. Four samples of Spanish saffron obtained from Barcelona as pure, contained

Moisture	16.70	15.80	19.80	17.60	per cent.
Ash	10.30 (incl. 1.546 NaCl)	14.65	13.80	14.90	“

Glycerin, which has also been used for increasing the weight, renders the saffron sticky and adhesive to blotting paper. An adulteration with honey is difficult to prove, since saffron contains about 15-30 per cent. of sugar, Dr. Niederstadt having found 13 per cent. On agitating adulterated saffron repeatedly with water, fine needle-shaped fragments of red saunders are separated and may be readily identified from the structure under the microscope. Inferior saffron will give with strong sulphuric acid only a slight blue color, in proportion to the amount of pure saffron present. (For a paper on Spanish saffron see AM. JOUR. PHAR., 1885, p. 487.)

Cazeneuve and Linossier (*Jour. Phar. Chim.*, 1886,) direct attention to the fraudulent sale of exhausted saffron dyed with various artificial coloring matters, some of which are difficult to detect, while others yield with water a red or orange red infusion, which after acidulation with tartaric acid, is a red dye for wool.