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AN INVESTIGATION OF THE PROPERTIES OF THE SANGUINARIA CANADENSIS; OR PUCCOON.

BY WILLIAM DOWNEY,

OF MARYLAND.—MEMBER OF THE AMERICAN LINNEAN AND PHILADELPHIA MEDICAL SOCIETIES.

"Let no presuming impious railer tax
Creative wisdom, as if aught was form'd
In vain, or nought for admirable ends."

THOMPSON.

PRINTED, FOR THE AUTHOR, BY
EAKEN & MECUM.

AN

INAUGURAL

EXPERIMENTAL INQUIRY,

FOR THE DEGREE OF

DOCTOR OF MEDICINE.

SUBMITTED TO THE EXAMINATION

OF THE

REVEREND JOHN ANDREWS, D. D.
(PROVOST PRO TEMPORE),

THE

TRUSTEES AND MEDICAL PROFESSORS

OF THE

UNIVERSITY OF PENNSYLVANIA,

ON THE

EIGHTH DAY OF JUNE, 1803.

Philip S. Physick M.D.
with the Compliments of
The Author

TO DOCTOR RICHARD PINDELL,

OF MARYLAND.

SIR,

IN the dedication of this, the inaugural fruits of my medical education, commenced under your direction, I shall not consider, that any of my numerous obligations to you, which I with pleasure, thus publicly acknowledge, will be obliterated. Was my dissertation more worthy your notice, your virtues as a citizen, and your merits as a professional character, would alone claim this of me. The friendly instruction which you were ever ready to communicate, and the polite attention which I received from you and your amiable family, during my residence in it, shall always be recollected with gratitude. And that you may long enjoy that happiness, which it is your constant endeavour to communicate to others, is the sincere wish of

Your much obliged Friend,
and Grateful Pupil,
THE AUTHOR.

TO

BENJAMIN SMITH BARTON, M. D.

PROFESSOR OF

MATERIA MEDICA, NATURAL HISTORY AND BOTANY,

IN THE

UNIVERSITY OF PENNSYLVANIA,

THIS

DISSERTATION

IS INSCRIBED, AS A TRIBUTE OF RESPECT AND GRATITUDE FOR NUMEROUS FAVOURS CONFERRED UPON

HIS FRIEND, AND

HUMBLE SERVANT,

THE AUTHOR.

ALSO, TO

DOCTOR FREDERIC DORSEY,

OF

MARYLAND,

THIS IS INSCRIBED, AS A MARK OF

HIGH ESTIMATION,

AND AS AN ACKNOWLEDGMENT OF THE MANY

ACTS OF KINDNESS

SHEWN DURING THE PUPILAGE OF HIS

SINCERE FRIEND,

THE AUTHOR.

EXPLANATION OF THE PLATE.

A. THE tuberous, premorse root.

B. A young involved leaf as it appears with the flower.

C. An expanded leaf after the flower.

D. An opening corolla, shewing

d. the calyx, which is a two-leaved perianth, and falls off as soon as the flower begins to expand itself.

E. The scape supporting the corolla fully expanded.

F. The pericarpium, which is oblong, ventricose, and bivalved; crowned, with its sulcated stigma.

INTRODUCTION.

WHEN we take a view of the vast number of vegetables with which our country is adorned, we must candidly acknowledge, that our acquaintance with their medical properties, is extremely limited indeed. The investigation of their uses in the arts and as medicines, is an object of some importance to society. There is, perhaps, no portion of the globe that has been more highly favoured by nature in esculent and medicinal vegetables. The zea (maize) and potatoes, as articles of diet, stand unequalled; the podophyllum peltatum, nicotiana, spigelia and what has been emphatically called the vegetable antimony, the eupatorium perfoliatum, are medicines not inferior to any yet discovered. An infinite number yet remain to be investigated. To increase the list of articles in the Materia Medica, is not, however, a desirable object; but to expunge those which are nearly inert, and increase the number of active ones is certainly of the first importance. This taken into consideration, and with a view to the more easy procurement of our medicines, is of sufficient consequence to stimulate to an examination of our indigenous vegetables.

I have made a feeble attempt to investigate the properties and uses of the Sanguinaria Canadensis, a plant peculiar to our country. Most of the expe-

riments have been repeatedly made, and are related with as much precision as I was capable of. Any errors which may have been committed, were through my inexperience in the business of experimenting. Circumstanced as I have been, little more has been done by me than the simple introduction of the subject. It is well worthy further investigation, both as it respects the science of medicine and the arts.

BOTANICAL ARRANGEMENT.

THE genus Sanguinaria belongs to Linnæus's twenty-seventh natural order, Rhœdeæ. In his sexual system he places it in the class polyandria and order monogynia. The characters which he gives of the fructification are as follows : *

CAL. Petals eight,† oblong, obtuse, most expanding; the alternate ones interior, narrower.

STAM. Filaments very numerous, simple, shorter than the coral. Anthers simple.

PIST. Germ oblong, compressed. Style none. Stigma thickish, two furrowed with a stria the heighth of the stamens, permanent.

PER. Capsule oblong, bellied, acute at both ends, two valved, seeds very numerous, round and pointed.

* Translation by the Litchfield society.

† From eight to fourteen.

DESCRIPTION OF THE PLANT.

1st. Root. Is of a very indefinite size, varying in thickness from one fourth to half an inch in diameter, and in length from three to four inches. It is sometimes pretty straight, with a curvature at each end; that from which the stalk proceeds is always to be found, but the other is frequently a wanting, having the appearance of being broken. Numerous stringy fibres of two or three inches in length are observed to originate from the body of the root. A coloured liquor, that stains paper of a beautiful orange colour, is thrown out when a root is broken, from a great number of very minute veins.

2d. The petiole or foot-stalk of the leaf is round, generally from six to eight inches in length and thickness of a quill.

3d. The scapus or stalk which supports the flower, is of a like length with the petiole, but is not quite so thick. Both of them when broken or squeezed, emit a coloured liquor, which stains of a very pale yellow. Near their origin from the root they are of a reddish colour, which becomes much more faint near the leaf.

4th. The leaves are cordate and lobate. The number of lobes are mostly five or seven, and their edges have a number of small indentations of unequal depths. There is but one leaf to a stalk, which stands nearly in a horizontal direction from the top of the

stalk. On each lobe, one large fibre of a very light yellow colour, may be seen running from the stalk, and many smaller ones branching from it in all directions.

OF ITS NATURAL HISTORY.

The plant which is the subject of the present enquiry, is known by different appellations, in America, as the puccoon, bloodwort, red root, Indian paint, turmeric, &c.

Perhaps it is one of the most abundant vegetables of our country. In the Florida's it is found to grow plentifully, and Professor Barton informs me, he has seen it as far north as latitude 43°, and imagines it extremely probable, that it extends much farther. We find it generally inhabiting a rich loose soil, and the declivities of hills. It is seldom or never found to grow in lands, which have been cleared of their timber, or in a state of cultivation. Its flowers generally appear about the first of April, and before its leaves put out.

ANALYSIS OF THE ROOT.

EXPERIMENT I.

Having obtained a quantity of the root dried, and reduced to a gross powder, six ounces of water were poured on two ounces of it; after standing twelve hours, the whole was subjected to a low degree of heat in a glass retort, to which a receiver was properly adapted. At the expiration of three hours, the liquor which had passed into the receiver, was examined, and found to be

perfectly colourless and insipid. On increasing the heat, a fluid slightly coloured, came over, which had the peculiar smell of the recent root, and was considerably acrid in the fauces. Neither the first nor the last portion was altered by the addition of a solution of the oxy-sulphate of iron. Paper stained with litmus underwent no change.

EXPERIMENT II.

Six ounces of alkohol were digested in the sun, and one ounce and a half of the root, dried and reduced to a coarse powder, for the space of seven days; it was then decanted, and a fresh quantity added; after standing also the same length of time, it was put with the first portion in a glass vessel, and exposed to evaporation, in a gentle heat. Ninety-eight grains of resin, and extractive matter of a beautiful crimson colour, were obtained, of a warm agreeable bitter taste. One dram of this was triturated in a glass vessel, with some warm water, which was afterwards passed through a filter, and evaporated. On drying, and collecting that which was insoluble, in water, it was found to weigh sixteen grains; the saponaceous or extractive matter, which was soluble in alkohol, as well as water, weighed thirty-eight grains. In the course of the experiment six grains were lost.

Having dried the roots on which the alkohol had been digested, a quantity of boilng water was poured on them, which, after standing a short time, was passed through a filter, and evaporated. One dram two scruples of gummous matter were obtained, of a dark colour, and an acrid bitter taste: a small quantity dis-

solved in the saliva, and swallowed, produced considerable irritation in the fauces, which continued for several hours.

To ascertain what action the different principles of the root, had on the human body, in a state of combination, and when separated, the following experiments were made :

EXPERIMENT III.

Having breakfasted at eight o'clock, I took twenty grains of the recent root two hours after, my pulse beating seventy-six strokes in a minute.

Min	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	78	80	84	86	86	87	84	82	85	80	77	74	75

M.	75	80	85	90
P.	73	72	73	74

In ten minutes I had a burning sensation at my stomach, pulse full and strong; twenty-five, a considerable nausea came on, my pulse very irregular, and not so full; forty, I had a slight head-ach, my face very pale; fifty, the nausea returning at intervals, rendered my pulse extremely irregular, in fullness and force. About three hours from the time of taking it, it purged me gently two or three times.

EXPERIMENT IV.

To my friend and fellow graduate Mr. Young, four hours after dining lightly, I gave twenty-three grains of the pulverized root, made into pills, with honey. In fifteen minutes he

complained of a burning at his stomach, his pulse very quick, without much fullness ; thirty, he had a great nausea ; and in thirty-five, it operated most violently as an emetic, producing six or seven full vomitings. He drank a considerable quantity of warm tea, with the view of assisting the operation, and to allay the violent irritation which was produced in his throat. All the contents of his stomach, as well as the tea, on being discharged, were of a colour similar to the decoction of the root.

EXPERIMENT V.

THREE hours after dining lightly on veal and potatoes, my friend Mr. Rees, took eight grains of the extract obtained by alkohol from the dried root, his pulse beating eighty strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65
Puls.	80	82	82	80	82	84	86	84	84	85	86	88	89

IN fifteen minutes he had a warmth at his stomach, which he compared to that produced by camphor, his pulse a little fuller ; twenty-five, his pulse was strong and full ; thirty-five, a slight nausea commenced ; forty-five, he had eructations of wind from his stomach ; sixty-five, he had one gentle motion to vomit.

EXPERIMENT VI.

TO my friend, Mr. Young, I gave eight grains of the extract, obtained by decoction, with water, and evaporation, his pulse performing only fifty-eight strokes in a minute : in

twenty minutes, his pulse was increased to sixty-two, and had a warmth at his stomach: when forty minutes had elapsed, he became much affected with nausea, and was shortly after relieved from every disagreeable sensation, by discharging the contents of his stomach. It produced only two motions and those very gentle. He observed to me, that in this, as also in the former experiment, he experienced some difficulty in discharging his urine, having somewhat of an ardor urinæ.

EXPERIMENT VII.

HAVING breakfasted at eight o'clock. I took eight grains of the saponaceous or extractive matter, at half past ten, my friend Mr. Walker, attending to my pulse which was at its standard seventy-six.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	77	77	79	78	79	78	78	80	81	79	78	77	75

M.	75	80	85	90
P.	76	76	75	76

IN twenty minutes I had a slight nausea, my pulse diminished in fullness and force; thirty, my pulse very small and quick; forty, I had a disposition to puke, which, however, continued but for a very short time; fifty, the nausea had nearly disappeared, and my pulse became considerably fuller; seventy, my pulse was nearly natural in fullness and force, only being a little irregular.

EXPERIMENT VIII.

To my friend Mr. Bartram, four hours after taking breakfast, I gave eight grains of the gummous matter, his pulse beating seventy-eight strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60
Puls.	78	78	80	81	80	83	83	82	80	80	78	82

In fifteen minutes a slight nausea came on with a burning at his stomach; forty, he complained of a head-ach, the nausea, at intervals, much more violent; sixty, he was vomited twice, the motions were pretty strong.

EXPERIMENT IX.

Two hours after breakfasting, my pulse at seventy-four, I took eight grains of the resin, my friend Mr. Walker attending to my pulse.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	75	75	76	77	77	76	75	77	75	74	74	73	74	74

In twenty minutes my pulse was a little fuller, with an agreeable sensation at my stomach; from this time, through the whole course of the experiment, there was no perceptible change in my pulse, or my feelings, except what might be occasioned by continuing in the same posture for such a length of time.

ANALYSIS OF THE LEAVES.

EXPERIMENT X.

One half ounce of the leaves was boiled for half an hour, with a pint of water, which was then poured through a filter, and evaporated. Fifty-eight grains of a dark coloured extract were obtained, of a pleasant sub-acid taste. To the same leaves which were previously dried in the sun was added a portion of alkohol, which after digesting in a gentle heat for three days, was decanted and evaporated in a glass vessel. Twelve grains of resinous matter were obtained, which was nearly of an insipid taste.

To the fifty-eight grains of extract were then added, two ounces of alkohol, which after standing four days in the sun, was poured off and evaporated. Eighteen grains of saponaceous or extractive matter, were obtained.

EXPERIMENT XI.

My friend and fellow graduate Mr. Pendergrast, two hours after breakfasting, took four grains of the leaves powdered and made into pills, his pulse at seventy-six strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	78	79	80	80	82	80	82	78	77	74	72	74	76

M.	75	80
P.	76	75

In fifteen minutes his pulse became fuller, and he had a sensation of warmth at his stomach ; twenty-five he had a fullness in his head

with vertigo; forty, he complained of great debility and head-ach; sixty, he was affected with slight tremors, and very frequent yawning; eighty, his sensations were natural in every respect, but for a slight sickness at his stomach, which continued for several hours after.

EXPERIMENT XII.

Two hours after taking a light breakfast, I took eight grains of the leaves made into pills, my friend Mr. Walmsley attending to my pulse, which was at its standard seventy-six.

Min	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	76	76	76	78	80	82	83	84	80	78	76	75	74	74

M.	75	80	85
P.	73	77	76

In fifteen minutes I had a warmth at my stomach; twenty-five, my face was flushed, and had a fullness in my head with a slight vertigo; thirty, my wrists were cold, and a profuse sweat on my forehead; forty, a slight nausea came on, my pulse small and quick; fifty-five, my pulse was somewhat fuller, the affection of my head still continued, with slight involuntary motions of my muscles; eighty, my pulse was nearly natural, but I felt extremely languid, with a dull head-ach, which did not leave me for several hours.

EXPERIMENT XIII.

My pulse at its standard seventy-six, I took four grains of the extract obtained by decoction with water and evaporation.

Min.	0	5	10	15	20	25	30	35	40	45	50	55	60	65
Puls.	76	76	76	78	80	82	84	86	84	82	82	80	78	76

M.	70	75	80	85	90	95	100
P.	75	74	72	73	74	73	76

In twenty-five minutes I had a pleasant warmth at my stomach, my pulse full; thirty-five, my pulse was rather small and quick, with considerable tension; forty-five I was affected with tremors, as in the preceding experiment; seventy-five, I had a dull pain directly over my eyes, and felt extremely languid; ninety-five, my pulse was smaller than usual, and I had a disagreeable sensation at my stomach, that continued for the remainder of the day.

OF THE PERICARPIUM, OR SEED VESSEL AND SEEDS.

EXPERIMENT XIV.

Having procured two drams of the seed vessels and seeds not arrived at maturity, six ounce measures of water were boiled on them, until evaporated to two. Of this I took two dram measures, my friend Mr. Walmsley attending to my pulse.

Min.	0	5	10	15	20	25	30	35	40	45	50	55	60	65
Puls.	76	76	78	82	82	80	83	83	81	82	79	77	79	81

M.	70	75	80	85	90
P.	76	75	75	77	76

In twenty minutes not perceiving that any other effect was produced than increasing my pulse a little in frequency, I took two drams

more; thirty-five, I had a glow of warmth over my body; forty-five, I took three drams more; fifty, I perspired freely, my pulse tense and quick, though not full; seventy, my pulse was extremely irregular; a torpor of my whole system came on, with very frequent yawning; ninety, my pulse nearly as full as usual, though not so strong, and fluctuating. I was not entirely free from the effects of it, in the space of two hours.

EXPERIMENT XV.

My friend Mr. Wootton, two hours after dining, took five dram measures of the decoction, his pulse at eighty strokes in a minute.

Min.	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Puls.	80	83	84	87	88	86	84	85	83	81	79	77	78	80

M.	75	80	85	90
P.	81	79	78	78

In fifteen minutes his pulse was very strong and full; twenty it became smaller and tense; forty, his pulse was remarkably small and quick; fifty-five, he complained of great languor, with an irresistible propensity to yawn; his countenance pale: he mentioned that his vision was somewhat affected; the pupils of his eyes were evidently dilated more than usual; ninety, his pulse was nearly of its natural fulness, though very irregular, the languor still continuing, as also the propensity to yawn for some time afterwards.

REMARKS ON THE PRECEDING EXPERIMENTS.

From the result of the two first experiments, it appears that there is a gum, a resin, and a saponaceous or extractive matter in the root, but that the former preponderates considerably. In the leaves a still larger proportion is found to exist, and a much smaller quantity of saponaceous or extractive matter.

By experiment fourth, it is shewn, that the root of our plant is endowed with powerful emetic qualities, when taken in the dose of fifteen or twenty grains. But in consequence of the irritation which is produced in the fauces, it is probable, that in the form of a powder, it will never come into general use. This inconvenience may, however, be obviated, by giving it in form of a decoction or extract. Eight grains acted as a very gentle emetic in experiment sixth, without having any such effect. It is but little inferior to the ipecacuanha, either in the certainty or speediness of its operation.

The principle of activity resides chiefly in the gum and saponaceous or extractive matter, but more especially in the former. The resin possesses little or no activity. Perhaps the most certain preparation as an emetic, would be the gum; though combined with the saponaceous matter, as I have already said, it operates pretty certainly.

The primary and most prominent effects induced by it, were a warmth at the stomach, an increase in the frequency and force of the pulse;

and if in a considerable dose, nausea and vomiting, in a smaller one, it increased in a remarkable manner the appetite. In all the experiments it had a tendency to produce costiveness, except in the third, when it acted gently cathartic.

The powder of the root may be given as an emetic for an adult, in the dose of fifteen or twenty grains, made into pills; otherwise a considerable irritation will be produced in the fauces on taking it. As a stimulating tonic, two or four grains may be taken, if nausea be produced, the dose must be diminished. I have repeatedly experienced very sensible effects from taking one single grain.

The experiments xii, xiii and xiv, evince a difference in the properties of the leaves and root.* Not only in these cases which are related, but also in several others not mentioned, they evidently induced tremors, head-ach, and a great torpor of the system. Such effects are only induced by substances, deleterious to the human constitution.

The few experiments which I made with the unripe seeds, convinced me that they possessed a very considerable influence over the pulse, and a stupifying or narcotic quality.† Not

* That different parts of the same vegetable should possess powers extremely dissimilar, is a circumstance which frequently occurs, thus, in the Podophyllum Peltatum (or May apple,) a plant nearly allied in its botanical affinities to the Sanguinaria; we find the fruit esculent, the leaves deleterious, and the root cathartic. This, like many of the mysterious operations of nature, claims our admiration, though incapable of explanation.

† Professor Barton, in his Essay towards a Materia Medica of the United States, mentions, "that the seeds appear to possess nearly the "same quality as the seeds of the Datura Stramonium," which are powerfully narcotic.

being able to procure any of the ripe seeds, which, in all probability, are more powerful, I was prevented from entering so fully into this part of my subject as I could have wished.

AS A COLOURING MATTER.

The juice of the root making a very fine dye of an orange colour, has frequently been used by country people, for the purpose of staining flannels and woollen cloths.* But it unfortunately is one of those colours, which require an intermediate substance to give it fixity. For frequent washing, and exposure to the sun, destroy it entirely. Considering it of some importance, to discover a substance which would give it this permanency, by rendering it insoluble in water, I made several experiments—But previously, to ascertain what effects those substances commonly made use of as mordants, would have upon the colouring matter, I made the following:

A small quantity of the *nitric acid* was added to some of the decoction of the root, which was nearly of a brown colour; a precipitate instantly took place, and the liquor changed to a muddy yellow colour.

On adding the *muriatic acid*, the colour was rendered much more vivid, without any precipitation occurring.

* Professor Barton informs me, that the Indians also make use of it, as a dye for their baskets and articles of ornament.

THE *sulphuric* was attended with the same resultsas the *marine*.

Sulphate of alumine (or allum,) produced very little change in the colour.

Acetate (or sugar of lead,) destroyed the colour almost entirely, and after standing some time, a copious precipitate of a whitish appearance, fell to the bottom.

Tartrite of pot-ash (or cream of tartar) produced no perceptible change.

Murio-sulphate of tin, produced a beautiful mixed colour, between an orange and a red, without any precipitation taking place.

AN infusion, as also the alkohol of galls, produced a colour nearly similar to that of the *murio-sulphate of tin*, but after standing some time, a precipitate took place.

ON adding the *prussiate of pot-ash*, a dark coloured precipitate took place, after standing a short time, and the super-natant liquor was perfectly colourless; but on pouring in a very small quantity of *sulphuric acid*, the precipitate was redissolved, and the original colour restored.

HAVING premised these experiments, I shall proceed to relate the results of several which were made on pieces of flannel, silk, cotton and linen, with a view to discover a proper mordant for them.

EXPERIMENT I.

TWO ounces of *sulphate of alumine* (or al-

lum,) were dissolved in a pint of water; in the solution the strips of flannel, silk, &c. were boiled for fifteen minutes; when they were taken out, and thrown into a decoction, made by boiling a quart of water on two ounces of the dried root; after stirring them about for a few minutes, they were taken out and placed in the sun to dry. They had all acquired a deep orange colour; but on boiling them in some water, that of the cotton and linen faded considerably, the flannel and silk were but little changed.

EXPERIMENT II.

EQUAL quantities of the *sulphate of alumine* (or allum,) and *tartrite of pot-ash* (or cream of tartar, were dissolved in some water, and pieces of flannel, &c. boiled in this solution. On taking them out and dyeing them, they acquired a colour nearly similar to that in the first experiment; but on treating them in the same manner, great part of the colouring matter was washed out, more particularly in the linen and cotton.

EXPERIMENT III.

A STRONG solution of the *acetate* (or sugar of lead,) was made with rain water, and the same process performed as in the other experiments. The result was, that the flannel and silk acquired a colour approaching to a pale red; but was considerably changed by boiling; the linen and cotton were at first but slightly tinged, and which was entirely washed out.

EXPERIMENT IV.

HAVING dissolved about two ounces of the *sulphate of alumine* in some boiling water, the different pieces of cloths were immersed in it, and as much caustic pot-ash was added as was sufficient to precipitate the *alumine*, by uniting to the *sulphuric acid*, and forming *sulphate of pot-ash*. After boiling them for some time, they were taken out and dyed; the flannel and silk exhibited a very fine orange colour; the linen and cotton retained much less of the colouring matter. Boiling in water rendered the colour more bright in the flannel and silk, but in the others nearly washed it out.

THIS experiment I varied a little, but not with exactly the same result. Having immersed the bits of flannel, &c. in the solution of allum, they were taken out, and a portion of *caustic ammoniac* poured on them, which uniting to the acid deposited the *alumine* on the bits of cloth. They were then dyed, but did not retain the colouring matter as well as in the other experiment.

EXPERIMENT V.

THE *murio sulphate of tin* made use of as a mordant, produced an orange colour tinged with red. Washing in water rendered it somewhat more faint, but both the linen and cotton, as well as the other bits of cloth, remained of a very bright orange.

EXPERIMENT VI.

DILUTED *sulphuric acid* was tried, as a mordant. All the pieces of cloth exhibited a vivid orange colour, but boiling water washed a considerable portion of it out.

EXPERIMENT VII.

A PIECE of white broad cloth was boiled with a solution of the *sulphate of iron*, and then dyed. A colour approaching to a drab was produced after washing.

OBSERVATIONS ON THE FOREGOING EXPERIMENTS.

BY the first experiments, it appeared, that the colour was entirely destroyed by some articles, and by others, it acquired different shades, which might be varied at pleasure.

IN all the experiments made with a view to find a mordant, the flannel and silk acquired a deeper or lighter colour, which could never be entirely washed out. But in none was the orange colour retained so completely as in experiment fourth, when the alumine was used as the mordant. The murio-sulphate of tin produced a very handsome colour, which was sufficiently permanent; and was the only mordant that fixed it on the cotton and linen.

UPON the whole, by the foregoing experiments, I think it is ascertained that the sulphate

of alumine, or the alumine alone, and the muriosulphate of tin, are tolerable good mordants for flannel, cotton, silk and linen.

The colours produced by the puccoon are rich, and might undoubtedly, if taken in hands by one conversant in the business of dyeing, become one of their most valuable articles.

OF THE PROPERTIES OF THE PUCCOON AS A MEDICINE.

We have seen that it is a powerful stimulant, and that when taken in certain doses, it excites vomiting. And that in small doses it acts as a general stimulating tonic, as is shewn by its increasing the appetite, and its action on the arterial system.

It has been placed in the class of emetics by Professor Barton,* which is certainly its proper arrangement. Its most prominent effect being to induce vomiting even in moderate doses.

The leaves and seeds ought to be classed with the incitants, for they evidently are powerful and diffusible stimulants.

In common with other articles belonging to that class, they sometimes act as diaphoretics† and diuretics.

* See his collections for an essay towards a Materia Medica of the United States.

† My much esteemed friend Dr. F. Dorsey, of Maryland, informed me in a letter, that the root was frequently given by farriers to horses, with a view to induce sweating, and to promote the shedding of their old coats of hair.

As an errhine, the root finely pulverized, is perhaps inferior to none ; a small quantity snuffed up the nose, induces an immense discharge and violent irritation.

OF ITS USE IN PARTICULAR DISEASES.

1. Intermitting fever. I have been informed by a very intelligent gentleman,* that a spirituous tincture of the roots, is very generally used by the inhabitants of low marshy grounds, in the southern states, as a preventive to the intermitting fever ; and in what is called inward fevers, which is but an inferior grade, and is cured by the same remedies. From its general properties, very probably it might be a very useful medicine in this disease, in some particular states.

2. Dysentery. This being a disease, in the primary states, requiring depletion, and the careful abstinence from stimulating and tonic medicines, would render the use of the puccoon very precarious, but after sufficient evacuations have been made or in chronic cases, it will be found a medicine of great value.

In the western parts of this state, I have been told, a decoction of it has been used with great advantage, and from the very commencement of the complaint. Probably it was given in such quantities as to prove emetic, or produce a determi-

* Mr. William Bartram.

nation to the surface of the body, and thereby induce sweating, which is the practice of some physicians in this disease.

3. JAUNDICE. The roots dried and reduced to a powder, was recommended by Colden, in this disorder. The dose, however, which he tells us may be taken, is certainly too large ; few systems would bear more than half the quantity. It is more than probable that our medicine was first introduced as a remedy for this disease, under the influence of the absurd doctrine of signatures. A similarity subsisting between the colour of the juice, and the jaundiced eye, was proof sufficiently strong of the propriety of administering it. Acting as an emetic, no doubt it eventually proved effectual in some cases. Biliary concretions, obstructing the ducts, are not unfrequently forced into the duodenum by the violent agitation induced by an emetic. So far we believe it might, in some instances, be of use in this complaint.

4. ULCEROUS SORE THROATS. I would infer, from its effects generally, that it will be found a valuable medicine, where there is a tendency to slough, or an accumulation of sordes in the throat, as frequently occurs in what is called the putrid sore throat; if given in sufficient quantities to induce vomiting, it would be useful, both by removing this collection, and stimulating to a healthy action.

5. AMMENORRHEA. It is very uncertain whether our medicine possesses any other quality than that of a powerful stimulus, and that its action is upon the system generally. One case,

however, related to me,* seems to shew, that it manifestly exerts an influence, sometimes over the uterine system. A young woman who was pregnant, by taking a small quantity of it, with a view to excite a sweat, produced thereby an abortion. Perhaps, when other remedies fail, in obstructions of the menses, it might be worth while to try it.

Gonnorrhea. Doctor Schoepf makes mention of a decoction being useful in this complaint, though he does not say in what manner it is used. In the first stages no preparation of it can be proper: but in chronic gonnorrheas or gleets, it will be found a very effectual remedy. From one to two drams of the dried root, may be infused in ten ounces of water, and about two tea-spoonfuls of this injected into the urethra three or four times a day. By this treatment, a young gentleman who had been affected with a gonnorrhea for near four months, and had used the common remedies for this complaint without effect, was completely cured.

OF ITS EXTERNAL APPLICATION.

My amiable and ingenious friend Mr. Grimes, at my request, made a few experiments with the root, in ill-conditioned ulcers of long standing. In one or two of the cases, the edges of the ulcers were callous, and a thin ichorous matter was discharged. No dressings had been applied to them for some time previously, except a plaister of the common unguent. præ. Rub. A portion of the powdered root was sprin-

* By Mr. E. Griffiths, one of the Physicians to the Alms'-house.

kled over the ulcers, and then covered with a little common cerate, in which some of the powder was also incorporated. The discharge, by this treatment, was muoh amended ; the callous edges were rendered much softer, and the ulcers in general acquired a healthy appearance. It may be proper to observe, that these changes were effected by only a few applications of it : possibly, if the use of it had been continued for some length of time, a cicatrization might have taken place.

The juice of the root has been mentioned as a cure for warts, and against the bite of some particular kinds of snakes, Whether it is entitled to any notice as such, I will not pretend to say.

With this I conclude my essay, conscious of its many imperfections, and that little has been done by me, though a subject of great importance, and claiming the attention of physicians, as also artists. I cannot, however, take leave of this University, without returning my sincere acknowledgments to the different Professors, for the much useful information I have received from them ; bnt in a more particular manner to Professors Barton and Wistar, for their friendly attention and kindness to me.

THE END.