AMERICAN JOURNAL OF PHARMACY
Volume 61, #1, January, 1889

Botanical Medicine Monographs and Sundry

THE HUNGARIAN DAISY AS AN ADULTERANT OF INSECT POWDER.

BY G. M. BERINGER A. M., PH.G.

Read at the Pharmaceutical Meeting, December 18th.

A short time ago, there was received in New York a consignment, consisting of a number of bales of these Hungarian Daisies. They were entered at the Custom House as insect flowers and were evidently intended as a sophistication of the Dalmatian Insect Powder. In the course of business, a sample of these flowers was submitted to the writer.

The similarity in size and general appearance to the flowers of the Dalmatian powder, would easily deceive the careless or unguarded observer. On close inspection, however, with a microscope of ordinary powers, the differences in the botanical structure are such as to render the distinction between the whole flowers comparatively easy. But as they will, probably, in future importations, be mixed with the genuine, which, usually, as imported in bales, are very much broken up, they will prove a dangerous adulterant, one difficult to determine, and if in the powdered article most likely beyond detection.

The Dalmatian Insect Powder has proven so superior to the Persian powder, that it has driven the latter almost entirely out of the market. It is said to be the most valuable product of Dalmatia and is now imported in very large quantities. As imported, it is usually adulterated with the ground stems and leaves of the plant. The latter being cut down at the end of the season, dried, ground and mixed with the ground flowers in the proportion of one to three or four of the flowers. This accounts for the fact, that the whole flowers are usually quoted at the same price and frequently at an advance on the price of the powder. The adulteration of this product with Hungarian Daisy, is deemed of such importance as to be worthy of record and prompt exposure.

The present editions of the Dispensatories contain but indifferent descriptions of this drug. The following descriptions are offered with the hope that they may serve to distinguish the two.

Hungarian Daisy.—Stems angled, the dried flower heads averaging about half inch in diameter, the rays florets being twisted and folded. When soaked in water to their natural size, the flower heads average 1 $^1/_4$ inch in diameter from tip to tip of the ray florets. The involucre broadly campanulate imbricate, the scaly margins chaff-like,

the stem being deeply inserted makes it distinctly depressed or concave; greenish-grey in color, glabrous. (Fig. 1 represents the involucre, the dried flower enlarged two diameters.)

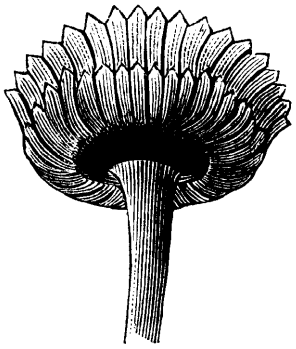

FIG. 1.

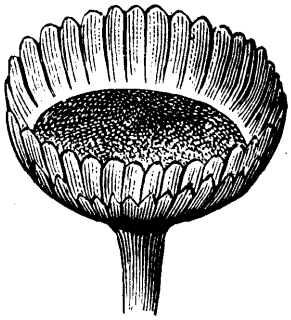

FIG. 2.

Receptacle prominent, subglobular, convex, dark colored. (Fig. 2. represents the receptacle, (the florets being removed) enlarged two diameters.

The ray florets, (about 18), white ligulate, nerved, three toothed pistillate; the appendages of the style extending beyond the tube. The achenia angled without pappus, but crowned with a faint margin. (Fig. 3 A represents the ray floret enlarged about three diameters.) The disk florets numerous, bright orange yellow, tubular, five toothed, the stamens included; achenia, without pappus. (Fig. 3 B represents the disk floret enlarged about seven diameters.)

The botanical characteristics of this flower would indicate that it most probably belongs to the sub-genus *Leucanthemum*; but, with only the flowers for examination, the naming of the species would be but a guess of little or no value.

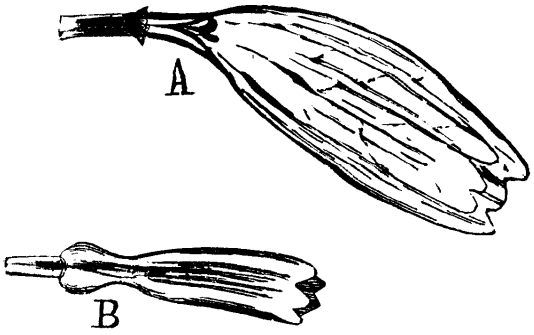

FIG. 3.

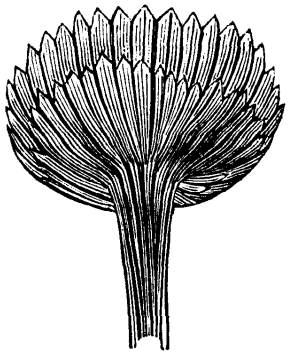

FIG. 4.

Chrysanthemum cinerariaefolium, Bocc. (*Pyrethrum cinerariaefolium,* Treviranus)-**Dalmatian Insect Flower**. Stem angled, the whole flower head ashy gray in color and quite pubescent. When dried the flower heads are from $1/4$ to $3/8$ inch in diameter, the ray florets being twisted and folded and frequently broken off. When soaked to the natural size, about $1\,1/4$ inch in diameter, including the ray florets. The involucre imbricate, the scaly margins membranous, campanulate and convex without

depression at place of attachment to stem. Fig. 4 represents the dried involucre enlarged two diameters. The receptacle small, conical, naked and solid and light greenish-gray in color. (Fig. 5 represents the receptacle of the dried flower, the florets being removed, enlarged two diameters.) The ray florets, (about 18) white, ligulate, nerved, three toothed, the tube pubescent, pistillate; the appendages of the style

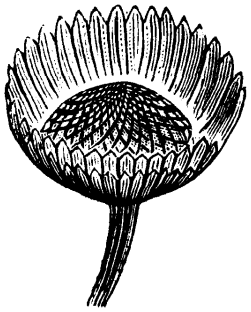

FIG. 5.

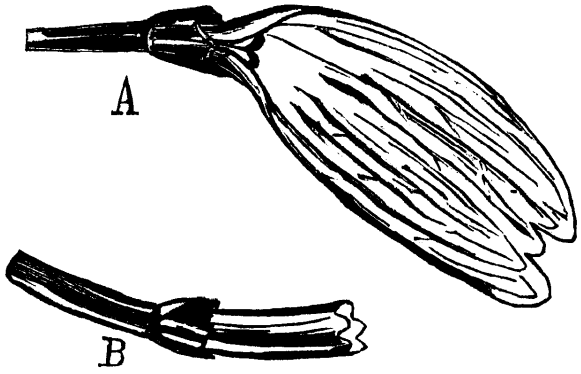

FIG. 6.

protruding beyond the short tube. The achenia crowned with a membranous, notched (eroded) pappus. (Fig. 6 A represents the ray floret enlarged about 3 diameters). The disk florets, numerous gray tending towards light yellow in color, tubular, five toothed, the stamens included. The achenia, angled, nearly as long as the tube and also crowned with a notched pappus. (Fig. 6 B represents the disk floret enlarged about four diameters.) The florets of the true insect powder are somewhat larger than those of the Hungarian Daisy.

The Hungarian Daisy is distinguished from the true Pyrethrum by the orange yellow disk florets, by the depression of the involucre, by its prominent dark receptacle and the absence of pubescence and pappus. The odor is less pungent than that of the true insect flower being more like that of matricaria. The difference in odor is more pronounced on infusing in warm water. The Hungarian Daisy yields a powder, somewhat darker in color. This powder used upon flies and cockroaches appeared to have no value as an insecticide. Microscopically no difference could be detected between the two powders.

Time and the amount of material at my command would not permit of a thorough chemical examination, but it was hoped that the percentage of extractive matter obtained with various solvents might furnish a useful comparison. The following statement exhibits the results obtained.

	Chrysanthemum cinerariaefolium.	Hungarian Daisy.
Petroleum Ether,	2.49 per cent.	3.37 per cent.
Ether,	2.85 per cent.	2.68 per cent.
Alcohol,	6.57 per cent.	9.45 per cent.
Water,	16.70 per cent.	13.43 per cent.
Ash,	6.50 per cent.	9.30 per cent.

SOME INDIAN FOOD PLANTS.

II. LEWISIA. REDIVIVA, Pursh.

By HENRY TRIMBLE.
A Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.

Read at the Pharmaceutical Meeting, December 18th.

The following description of the above plant, together with the material for analysis, has been furnished by Dr. V. Havard, U. S. Army Surgeon, at Fort Abraham Lincoln, Dakota:

"*Lewisia rediviva*, called "Spathum" by the natives of Northern California and South Oregon, and "Chita" by those of Northern Oregon. The "bitter root" of the whites in the Rocky Mountain region.

"This interesting member of the Purslane family (Portulacaceae) named after the great explorer, Capt. Lewis, who, with Capt. Clarke, first crossed the Rocky Mountains in 1805, owes its specific designation to its wonderful vitality; prepared specimens have been found, after months and years, sprouting in herbariums, and have, even then, been planted successfully.

"It is a small stemless herb with linear leaves, smooth and fleshy, densely imbricated on the short, thick caudex. From the cluster of leaves spring one or more jointed scapes, one or two inches long, each bearing a showy flower. Sepals 6-8, light pink, broadly ovate, membranous, persistent. Petals 8-10, rose colored, oblong, often an inch long at length twisting around the stamens and pistil. Stamens numerous. Capsule globose, 1-celled, separating transversely at the base, containing many campylotropous shining seeds borne on long funiculi which spring from a central placenta.

"This plant blossoms early in May and through June and part of July. After the middle of July (according to Dr. C. C. Parry) the scape breaks off at the joint and the flower is blown away, leaving no trace of the plant exposed to view until the following spring develops the cluster of leaves by which the Indians are guided in procuring their supplies of this palatable and nutritious root.

"It is common, often abundant in the Rocky mountains and westward to the Pacific, on dry prairies and in mountain valleys. Its vast habitat comprises the southern part of Washington territory, Oregon, Idaho, Western Montana (where it gives its name to the Bitter Root Mountains), Northern California, Nevada, Utah, Western Wyoming and Northern Arizona.

"The natives use the roots as an article of food. These roots, 3 or 4, or more, curled and twisted, spread out laterally and are generally superficial. As they spring from the caudex they are rarely half an inch in diameter and are seldom thicker than a goose quill ; they taper gradually to a length of two to four inches when they branch

off into small radicles. The bark is brownish externally, bright red within and very bitter, it is quite possible that it might possess useful tonic and astringent properties. The inner part of the root is white and farinaceous, containing in the centre the yellowish pith. This white part is quite palatable and said to be very nutritious, a single ounce of the dried article (according to Dr. E. Palmer) being sufficient for a meal. Eaten raw it has a slight bitterish flavor. According to Nuttall, it almost dissolves into starch by maceration in cold water. If boiled in water, it forms a substance similar to boiled arrow-root. The Indians, generally, boil it with other esculents into a soup.

"As a very pretty ornamental plant, the Bitter Root would prove quite an acquisition to our gardens."

The roots of the above plant as received by me were free from bark, of a white color, and ready for use as food. No evidence of sugar as glucose or saccharose could be obtained. Tests for tannin likewise gave negative results. The most important constituents are starch gum and mucilage, the last two are not readily precipitated by alcohol The following summary gives the amount of the most important food constituents.

Fat, resin and wax	4.98
Gum and mucilage	14.80
Albumenoids	3.58
Starch	8.57
Moisture	12.17
Ash	2.53
Woody fibre and undetermined	53.37
	100.00

The amount of starch found may appear small when we consider the uses of the root, but the large amount of gum and mucilage make up for this deficiency.

THE LEAVES OF MAGNOLIA GLAUCA, LINNE.

BY WILBUR FISK RAWLINS, PH. G.

Abstract from a Thesis.

The leaves are three to six inches long, one and a half to two inches in width, have a prominent mid-rib, are pinnately veined, elliptical, petiolate, coriaceous, deep green upon the upper side and of a beautiful glaucous color underneath. Twenty pounds were collected in the early part of September. After drying they weighed eight pounds, the loss being sixty per cent. They were then reduced to a number eighty powder.

Two grams of the drug heated in an air-bath at a temperature of 110˚C. lost ten per cent., and when incinerated left 10 per cent. of ash.

Fifty grams of the powdered leaves were placed in a flask, covered with petroleum spirit and, after maceration, exhausted; five per cent. of the drug was soluble in petroleum. This residue when heated to 110°C. lost four-tenths per cent. Absolute alcohol left four-tenths of one per cent. of insoluble waxy matter melting at 64°C.

The drug was then treated with stronger ether, which dissolved four per cent. The dry extract was treated with boiling distilled water and lost three-tenths of one per cent. It gave a bitter taste to the water, but yielded no precipitate to tests for alkaloids. On evaporating the ether there were formed some fine needle-shaped crystals. The extract was dissolved in alcohol, the chlorophyll removed by animal charcoal, and several attempts were made to obtain the crystals in a purer state, but without success. There was, however, a resin present that had a tendency to crystallize.

Absolute alcohol was the next menstruum used, and the extract obtained was five per cent. of the drug. About one and a half per cent. was soluble in water. The portion that did not dissolve in water was a greenish-yellow powder and had a lasting unpleasant taste. Tannin was found in the soluble portion, but the percentage was not determined. The aqueous solution was made acid and agitated successively with petroleum, benzol and chloroform. It was then made alkaline and the same treatment repeated. The resulting liquids were evaporated, but nothing found in the petroleum or benzol. There was a deposit of crystals, however, from both the acid and alkaline liquid with chloroform. Nothing else of importance was found in the alcoholic extract.

The residue, after exhaustion with alcohol, was macerated with water, which dissolved thirteen per cent. of the drug, containing mucilage, coloring matter and ash, but no sugar, nor anything else of special importance.

The residue insoluble in water yielded to solution of caustic soda mucilaginous substances and albuminoids amounting to four per cent.

Diluted hydrochloric acid dissolved two per cent. of the drug, and of this six-tenths of one per cent. was oxalate of calcium. No starch was found.

On treatment with chlorine water the loss was six per cent. lignin and with chlorate of potassium and nitric acid the loss was two per cent.

Three pounds of the fresh drug were distilled with water. From the distillate, by shaking with ether, was obtained a volatile oil of a bright green color with a penetrating odor, resembling that of fennel or anise, but more pleasant. The yield was very small, about one drachm being obtained from the three pounds. While the solution of oil in the ether was filtering the rapid evaporation of the ether caused crystals to form on the edge of the filter but they soon volatilized and no examination was made of them.

In order to determine the nature of the crystals formed by the use of chloroform from the aqueous solution of the alcoholic extract, one pound of the original drug was packed in a percolator and exhausted with wood alcohol; the alcohol was recovered by distillation and distilled water added to the residue; the solution was filtered and agitated with chloroform, but crystals were not obtained. These extracts had a bitter

taste, imparted fluorescence to the chloroform solution and after boiling with acid, reduced Fehling's solution. The principle seems to differ from the magnolin of Mr. Procter.

NOTE BY THE EDITOR.—It does not appear to be generally known that the fresh leaves of Magnolia glauca may be used in the place of indelible ink for the marking of linen and other fabrics, by placing upon the latter the lower surface of a leaf, and tracing upon the upper surface with a blunt peg, using some pressure, the desired characters. The writing appears upon the fabric at first of a grayish green color, which gradually becomes darker, and does not disappear on washing.

ABSTRACTS FROM THE FRENCH JOURNALS.

Translated for the AMERICAN JOURNAL OF PHARMACY.

RHAMNUS FRANGULA IN ODONTALGIA.—Dr. Gretchinsky writes to the *Revista de Med. y Farm*., that he makes a decoction by boiling 15 to 30 gm. of the bark in 2 tumblers of water. Patients are directed to rinse the mouth with this every five minutes until the pain ceases; and then every two hours. Cavities may be filled with cotton dipped in the tincture.—*Répert. de Ph*., November.

ESCHSCHOLTZIA CALIFORNICA.—According to a recent examination of this plant by M. Bardet, *(J. de Ph. et de Ch*., Dec. 1), its narcotic power is weak; doses of 10 to 12 gm. of the extract were necessary to kill a rabbit. In seeking the active principle, the author took up the extract with acidulated water and treated it with ammonia, which gave a viscous product capable of reducing iodic acid, a violet precipitate with molybdate of sodium, and an orange color with nitric acid; briefly, it offered the reactions of morphine. This is the first time, so be believes, that morphine has been obtained from plants other than papaver[1] . After extracting the morphine, another substance remained which gave a yellow precipitate with phospho-molybdate. It appeared to be a glucoside. M. Bardet is now studying it.

MASSOI BARK.

By E. M. HOLMS, F. L. S., Curator of the Museum of the
Pharmaceutical Society of Great Britain.

Some specimens of the barks known in the East under this name, and which were recently presented to the Museum of the Society by Professor Van Eeden, of Haarlem, may possibly serve to throw some light upon a product concerning which some little confusion still exists in commerce.

The name of Massoi appears to be given to three distinct barks, which are identified by Dr. F. Hekmeyer as the products respectively of *Cinnamomum xanthoneuron*, Bl.,

[1] That Walz found in Eschscholtzia in 1844 sanguinarine and two other alkaloids was mentioned in *Amer. Journ. Phar*., 1887, p. 296. Charbonnier obtained a little morphine from the leaves and capsules of *Argemone mexicana* in 1868; see *Tour. de Phar. et de Chim*., 4 ser., vii, p. 348-358.—EDITOR OF AMER. JOUR. PHAR.

Cinnamomum Kiamis, Nees, and *Sassafras Goesianum*, T. and B. The second is also called by the Malays "Kayu manis sabrang."[2]

The first of these, as received from the Haarlem Museum, occurs in pieces about 3 to 4 lines thick, with a thin, uneven, outer dark layer, which is seen under a lens to be composed of stratified cells; the layer beneath this is granular, the white sclerenchymatous bundles being irregularly arranged in a direction parallel to the surface, except near the inner surface, where they form two nearly regular lines. The portion next the inner surface is darker in color, forming rather more than one-third of the thickness of the whole bark, and shows numerous thin medullary rays. It is this portion of the bark that appears to be most oily and aromatic. The odor, when observed at a distance, resembles that of cocoanut milk. The taste is pungent, the flavor somewhat resembling the odor, but also recalling that of a mixture of cinnamon and rue.

The second bark is in quills like cinnamon, but as thick as cassia, somewhat wrinkled externally, extremely hard and woody, and is almost horny in consistence. It has very little odor, but a pungent taste, and a slight flavor between that of cinnamon and cassia. The inner surface is finely striated, and the transverse fracture is dark internally and paler towards the outer surface.

The third bark is thinner than the first, but resembles it in odor. The taste also is very similar, but more pungent and faintly bitter, causing a sensation of heat in the mouth for some time and an augmented flow of saliva. The bark is, however, only half the thickness, barely attaining two lines. It is paler in color in transverse section, is marked externally with faint longitudinal cracks, and is more markedly striated internally. In transverse section it presents a short granular fracture, the selerenchymatous bundles being arranged at right angles to the surface, but the middle layer, corresponding to that of *C. xanthoneuron* in which these bundles are horizontally placed, is scarcely developed. *Cinnamomum xanthoneuron* and *Sassafras Goesianum* are both natives of New Guinea, and *C. Kiamis* of Java, Sumatra, and apparently also of Borneo.

All these barks are met with in the bazaars in Java, and are used in cases of colic and diarrhoea and in spasmodic affections.

According to Teysmann and Binnendyk *Sassafras Goesianum* yields the true massoi bark.

In the Hanbury Collection there is also a bark labelled massoi bark, corresponding exactly in structure, taste, and odor with the bark of *S. Goesianum*. It is labelled on the bark, apparently in the writing of Mr. Thos. Hanbury: "This bark I bought at a Kling shop; they could tell me nothing about it, except that it was used to scent or flavor medicines."

On the outside of the box it is labelled, in Daniel Hanbury's writing, "CORTEX

[2] The name "sabrang" distinguishes it from the bark Kayu manis (*Cinnamomum Parthenoxylon*), which is also used by the Malays in colic and diarrhea. Kayu manis, as represented in the late Colonial Exhibition in London, differs from all the above-named barks in having a somewhat camphoraceous taste.

MASSOI (of) Blume's 'Rumphia' (Laurineous?) bark, smelling like the Brazilian *Casca pretiosa.*[3] Bought at Singapore by Thos. Hanbury, 1853. Found this bark identical with that procured by Guibourt at the *Musée Japonais*, vide *Hist. des Drogues*, ed. iv., torn. ii., p. 383; compared the two at Paris, April 22, 1854."

On the inside of the cover of the same box is the following note :—Professor C. L. Blume, in reply to my inquiry respecting this, a specimen of which I sent him, writes thus under date January 5, 1857.

"2. Écorce ayant l'odeur de la *Casca pretiosa* du Brésil (Singapore). C'est Cortex Massoi figuré dans la *Rumphia*, quoique la face interne de votre échantillon soit un peu plus claire, ce qui parait résulter de l'age de l'arbre. Son odeur pénétrant, balsamique, tirant sur l'essence de citron, est très charactéristique.[4] Je possède de cet arbre de la Nouvelle Guinée seulement les branches avec les feuilles, ce qui me met en état de dire que c'est bien une Laurinée mais n'appartenant pas au genre de Cinnamomum."

It may be here remarked that it is very difficult to describe an odor, and although Hanbury has identified it with Guibourt's bark, Écorce de massoy de la Nouvelle Guinée,' Guibourt gives quite a different description of its odor. When the odor, as in the case of Massoi bark, resembles a mixture of odors, it is naturally likened to different products by different observers. Guibourt, in the following description of the bark, likens it to cummin.

Telle que je me la suis procurée à une exposition qui a en lieu il y a quelques années à Paris, sous le nom de Musée japonais, cette écorce est cintrée, épaisse de 7-8 millimetres, couverte d'un épiderme gris, rougeâtre legèrement tuberculeux et formée d'un libre gris rosé dur et compacte à structure un peu radiée sur sa coupe transversale. Elle possède une odeur très forte, analogue à celle du cumin, et une saveur très-âcre avec le même goût de cumin."

I have, however, not depended upon my own opinion alone, but have obtained from more than one observer a corroboration of the opinion that the odor resembles that of cocoanut milk. Leaving, however, odor out of the question, Guibourt's description of the structure of bark corresponds exactly to the bark of *Sassafras Goesianum* of the Haarlem Museum, and as the Hanbury specimen has been identified by himself with Guibourt's, and by Professor Blume, with the bark of the tree described in "Rumphia," there can be no doubt that to this tree the true Massoi bark must be ascribed.

Whether or no this be the massoy bark from New Guinea from which Messrs. Schimmel also have distilled an oil having an odor resembling that of nutmegs and cloves, cannot be ascertained in the absence of specimens for comparison, but if their description of the odor be correct it is more likely to be the *Cortex Culilabani Papuanus* of Martiny's *Encyclopaedia,* 1, p. 436.

The specimen of this bark in the Hannbury collection has a flavor which might be likened to that of cloves and nutmegs. The bark is, however, quite different in

[3] The bark of *Mespilodaphne* (*Ocotea*) *pretiosa*, Nees.

[4] The lemon odor is not very perceptible; in the specimen it resembles more nearly rue or the fruits of *Xanthoxylum alatum*.

appearance and odor from the true massoi bark,[5] being much thicker, softer, somewhat laminated, and not at all radiate in structure.—*Phar. Jour. and Trans.*, Dec. 15, p. 465.

THE ROOT OF VERNONIA NIGRITIANA.[6]

By E. HECKEL AND FR. SCHLAGDENHAUFFEN.

Under the name of batiatior or batjitjor a root is sold in different parts of Senegambia, which is supposed to have febrifuge, emetic, anti-hemorrhagic, and antidysenteric properties. It has been described as a substitute for ipecacuanha, and is alluded to as such by Dorvault. It has recently been definitely recognized as the root of *Vernonia nigritiana*, a composite plant growing to the height of a foot or two and bears a faint external resemblance to ipecacuanha, which, when fresh, it is said to resemble in smell.

Heckel and Sehlagdenbauffen find in this root no trace of any true alkaloid, but they have obtained from it a whitish, slightly hygroscopic glucoside, having the formula $C_{10}H_{24}O_7$, which they have called vernonin.

On injecting a solution of the alcoholic extract under the skin of the frog's thigh, paralysis of the limb thus injected followed, the respiratory movements were interfered with, and the heart's action was arrested in the same manner as after digitalis, convallaria, and strophanthus. On further examination of the heart movements by placing it between the cups of a Marcy's cardiograph, it was found that after injecting $^3/_{10}$ths of a grain of vernonin the amplitude of the heart's movements was first slightly decreased and then increased, but in three-quarters of an hour they fell below normal and became slower; eventually the influence of the drug passed off. A larger dose ($^9/_{20}$ ths grain) reduced the number of beats by one-third, the ventricles evidently filling slowly. A still larger dose ($^7/_{10}$ ths grain) almost arrested the heart in systole, diastole only taking place imperfectly and at long intervals; eventually the heart stopped completely in systole. A pigeon was not influenced by $^3/_4$ ths of a grain, but 2 $^1/_4$ grains killed it, the heart being arrested in systole.

The action of vernonin on the heart thus resembles that of digitalis. Heckel and Schlagdenhauffen, however, consider that it is twentyfour times weaker than the soluble principle of digitalis (digitalein).

They have studied the action of the drug on the skéletal nerves and muscles, and have come to the conclusion that it paralyzes locally nerves to which it is applied, but does not markedly influence the muscles. If the drug be injected under the skin of the

[5] The name Kulit laban means clove bark, the word Laban or Lawang being probably the Malay pronunciation of the Sanskrit “Lavanga,” and of the vernacular Hindostanee “Laung,” which is applied to the clove, *vide* “Pharmacographia,” p. 281.

[6] “Sur la racine de Batjitjor de I'Afrique tropicale, nouveau poison du coeur,” in *Archiv. de physiologie normale et physiologigue*, August, 1888; abstract reprinted from *The Medical Chronicle*, Dec. See also AMER. JOUR. PHAR 1888, p. 347.

thigh it soon comes to pass that galvanizing the sciatic on this side ceases to contract the muscles supplied by it, whilst muscles respond equally to the current on the two sides when directly stimulated.

Further experiments are adduced to show that the drug directly destroys the conducting power of the sciatic nerve in the frog, and that in warm-blooded animals it paralyzes the limb into which it is injected. The experimenters, however, have by no means fully shown the influence of vernonin on the nerve and muscle tissues, and some serious sources of fallacy seem to have been overlooked. It may be presumed that a drug which so powerfully influences the nerves must also affect the nerve endings, but no experiments on this point seem to have been made. No means seem to have been employed to prevent the circulation of poisoned blood from the injected to the non-injected leg; indeed, the investigations would lead to the conclusion that the drug is not thus carried, for it is stated that when the poison is injected under the skin of the back, stimulation of the sciatic nerves continues to cause contraction of the muscles. From this it would follow that either the poison does not reach the nerve endings of the leg muscles when injected under the skin of the back, or that it does not paralyze them. Further investigations must be made before the conclusions of Messrs. Heckel and Schlagdenhauffen can be accepted, but they have introduced us to a substance which manifestly has most interesting pharmacological properties and may have important therapeutic uses.

D. J. LEECH.