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DISPENSING BY DROPS.

BY ALBERT HENRY KINSEY, PH.G.
Abstract from an Inaugural Essay.

The size of a drop generally depends upon and is influeuced by at least four conditions.[1]

First: the self-attraction that the particles of liquids have for each other.
Second: its adhesion to the matter on which it is formed.
Third: the shape of this matter.

Fourth : the physical relations existing between the matter on wliich it is formed, the liquid constituting the drop itself, and the medium through which it passes.

In my experiments I have found that the greatest variance is caused by the third condition, viz.: the shape of the matter, to which may be added the amount of surface, as it is obvious that the more surface the greater will be the adhesion, and therefore will require more liquid to overcome tills force, and consequently will produce a larger drop. This is practically illustrated below, when, in dropping from a glass stopper the surface from which the liquid has been dropped has a U-shape and is formed on the convex side, while from a minim measure it is dropped from the concave side of a V-shaped surface, giving.the drop only a very small point to form on, and therefore must be much smaller. This is further illustrated in dropping from a glass stopper held at different angles. When held horizontally the drop is about twice the size of one dropped at an angle of 45 degrees. The difference is still greater when a common cork is taken, as it has a more acute angle. In the case of tincture of opium, the drop from a common cork, when held in a horizontal position, was more than twice as large as when held at an angle of 45 degrees.

Another very important feature in the matter of dropping is the rapidity

1 See also paper by Prof. C. F. Himes, in "*Amer. Jour, Pharm.*," p. 394, 1883.—EDITOR.

with which it is done. It is a well-known fact that the less the interval between successive drops, the larger they will be. This interval has been called the growing time, and it follows that if this growing time is constant in the same liquid, the size of the drop will be the same.

It has been shown by actual experiments, that when the growing time is decreased below 0.333 second (coconut oil was used in this instance) a continuous stream was the result, but of course the density of the liquid regulates this to a certain extent. It is also a curious fact that a stream so produced, delivers less in a given time than a series of large drops.

This rapidity of dropping is one of the greatest obstacles to overcome, for very few pharmacists will drop the same liquid in the same time, and if laws are to be laid down, governing dropping, the time certainly claims a large share of attention, for the same mistake is just as likely if not more so, to happen in this instance than in the previous one, for a pharmacist who dispenses 100 drops of a liquid at the rate of three drops a second, will give one half as much again as another who measures the same liquid at the rate of a drop every second and one half.

Prof. Guthrie has shown the effect of gradually decreasing the strength of saline solutions. Dropping, at the rate of two seconds, he found that decrease of solid constituents produced precisely the same effect upon the size of the drops, as a decrease in the growth rate in the drops of homogenous liquids. I find that these facts, however, have their greatest importance from a theoretical point of view, practically there is very little, if any, difference, although in some instances it does seem as though the matter in solution might be the cause of the decrease in size by increasing its specific gravity. The following table gives the result of my experiments, having chosen the glass stopper, minim measure and lip of the bottle in which the liquids are ordinarily kept, to drop from.

By comparing my table with those of Prof. Procter or Mr. Durand, it will be noticed, in a number of instances, that they vary very widely, about the only way I can account for this is, that the lip of the minim measure, which I used, must have been much smaller than theirs, but even when the same vessels are used, there is such a variety of results, that to get a medium size an average is required to be taken. This I have done in all of the unimportant liquids. How greatly they vary may be seen in the case of Acetum opii; in the first trial the result was 120 drops to a

drachm, the second 85, and the third 103.

There are still other conditions which yield more or less influence on the size, and one which deserves mention, is the angle at which the vessel is held. I have already shown that a cork may be held so a drop can be obtained twice as large as another where the cork has been held at a different angle, the same is true with a bottle, but not quite in so great a degree.

The fulness of the bottle also exerts some influence, as tincture of aconite, when dropped from an ounce vial full, yielded 110 drops to the drachm, but when only one-fourth full gave 116 drops, also liquor potassii arsenitis, from a full ounce vial, gave 66 drops, and when one-third full, only 57. In the one case, decrease in the amount of liquid decreased the size, while in the other it was increased. The drop from an ounce vial was in most instances the same as from the shop bottle.

By a careful perusal of the above we can readily notice that the different classes of preparations can be grouped together, as for instance, the tinctures or alcoholic preparations may be classed as a group, whose drops are about one half the size of the aqueous liquids, while the oils and acids form an intermediate group between the two. Durand must have taken notice of this fact, when he laid down his two general rules concerning drops as follows:

First: that liquids, with a small proportion of water, afford a small drop, and vice versa.

Second: that amongst liquids containing a large proportion of water, those not charged with remedial substances, give a larger drop than those same liquids having extraneous bodies in solution.

In summing up my labors on this subject, there is only one general conclusion that I will mention, as it covers all of the others, and if properly heeded may be the means of saving considerable trouble, and I might say is also in harmony with those who before me have given the subject a still more thorough investigation. Having shown that the same liquid under different and even the same circumstances, varies in dropping so much, that no reliance whatever can be placed in this method of dispensing medicines, therefore their administration in this form is always attended with more or less danger.

Preparation.	Shop bottle.	Glass stopper.	Minim measure.
Acetum Lobeliæ	51	48	64
" Opii	66	57	65
" Sanguinariæ	102	92	92
Acid. Acetic	82	49	101
" " Dilute	94	55	99
" Carbolic	82	66	110
" Hydrobromic	57	65	70
" Hydrochloric	60	57	96
" " Dilute	70	51	62
" Nitric	82	66	124
" " Dilute	63	60	81
" Nitrohydrochloric	87	74	92
" " Dilute	58	54	62
" Phosphoric., "	54	43	62
" Sulphuric	160	152	172
" " Dilute.	57	47	60
" Sulph. Arom	97	94	144
Aqua Ammoniæ	45	41	54
" Destillata	64	.....	61
Liquor Potass. Arsen	58	61	77
Oleum Anisi	76	73	112
" Amygdalæ Am	102	77	125
" Cari	108	84	133
" Chenopodii	94	75	129
" Caryophylli	98	75	133
" Cinnamomi	77	73	112
" Crotonis	84	62	104
" Cubebæ	86	80	120
" Gaultheriæ	93	93	136
" Hedeomæ	95	83	130
" Lavandulæ	105	78	133
" Monardæ	82	76	125
" Menthæ Pip	88	73	132
" " Viridis	95	81	132
" Myristicæ	98	83	128
" Origani	91	83	133
" Pimentæ	102	86	133
" Rosmarini	92	88	133
" Sassafras	83	77	142
" Tanaceti	110	91	136
" Terebinthinæ	103	90	142
Spiritus Ammon. Ar	108	87	139
" Camphoræ	98	79	140
" Æther. Comp	120	88	140
" " Nit	88	86	144
" Menthæ Pip	98	86	143
Syrupus Sciliæ Comp	106	87	122
Tinctura Aconiti	120	102	164
" Asafœtidæ	102	85	145
" Belladonnæ	94	81	128
" Benzoini Co	98	81	146
" Cannabis Ind	124	120	98
" Cantharidis	118	97	136
" Capsici	116	88	143
" Colchici	86	80	124
" Digitalis	114	79	145
" Ferri Chlor	108	.....	139
" Hyoscyami	114	91	147
" Ignatiæ	112	83	140
" Iodi	112	97	144
" Kino	116	100	148
" Krameriæ	117	96	150
" Lavand. Co	97	86	141
" Lobeliæ	110	79	138
" Myrrhæ	100	95	145
" Nucis Vomicæ	112	105	148
" Opii	98	92	143
" " Camph	94	86	135
" " Deodor	109	89	141
" Rhei	98	82	144
" Sanguinariæ	110	88	134
" Serpentariæ	98	89	146
" Stramonii	100	93	120
" Tolutana	120	97	156
" Veratri Virid	108	98	152
Vinum Aloes	71	54	94
" Colchici Rad	92	72	95
" " Sem	86	71	105
" Ergotæ	148	99	122
" Opii	96	72	102

ON THE PRESENCE OF PIPITZAHOIC ACID

IN THE PEREZIAS FOUND IN THE TERRITORY OF THE UNITED STATES, AND ON THE GEOGRAPHICAL DISTRIBUTION OF THE NORTH AMERICAN SPECIES OF THAT GENUS.

By CHARLES MOHR, Mobile, Ala.

Translated by the Author from Pharmaceutische Rundshau.

The remarks on pipitzaholc acid which appeared in the "Rundschau" of November has directed the attention of the writer anew to a subject in which he felt himself greatly interested during his stay in Mexico in 1857, where he got acquainted with tlie publication of the researches of Rio de la Lozas, announcing his discovery of this peculiar organic acid, made a short time before. The inquiries after its source, the "*Raiz del Pipitzahuac*," made in consequence at the time in the leading drug houses of the city of Vera Cruz and at Orizava were leading to no results. Amongst the varied stock of the numerous drugs derived from Mexican plants no root was found of that name, and only a single species of *Perezia* was encountered during the frequent botanical excursions made in these parts of the Mexican republic, also the only one found amongst the large collection made by the botanist Bolteri, of Orizava. After a lapse of many years the determination of this plant was only made possible a few weeks ago, since the review of the North American Perezias by Prof. Gray has come to hand, where it is described under the name of *Perezia Dugesii*.[2]

These plants seem to shun the damp clime of the eastern declivity of the Mexican Andes; they are rather plants of the desert regions, finding their proper home, with the widest distribution, in the rainless, arid plains (mesas), and on the rocky hills of the highlands of northern Mexico and the adjoining parts of the United States.

The genus *Perezia*, Lag., as defined by Gray,[3] embraces bilabiate compositæ of the sub-order Labiatifloræ and the tribe Mutisiaceæ, with perfect and throughout homogeneous flowers, united to a greater or lesser number in heads with a naked receptacle, surrounded by a campanulate or top-shaped involucrum of stiff elongated more or less lanceolate scales, imbricated in two or more rows. Corolla with a slender tube, distinctly two-lipped, with the three-toothed exterior lip longer

2 Gray, "Proceed. Am. Acad. Arts and Sciences," vol. xix, Oct., 1883.

3 Gray, *loc. cit.*, and Botany of California, vol. 1.

than the interior, with two teeth; the anthers are long caudate, with a more or less prominent lanceolate tip or crest-like appendage. The akenes are elongated cylindrical or slightly angled, often somewhat spindle-shaped, with a discoid, apex, bearing a pappus of copious capillary, somewhat scabrous bristles. All the species are perennials with more or less rigid leaves, with the simple stem bearing the white or purplish flowers in solitary heads or in corymbs. They are exclusively confined to the warmer parts of the American continent, and the 40 or 50 species known are equally divided between its southern and northern divisions. Those occurring in the latter are found in the highlands of Mexico and the adjacent parts of Central America, extending beyond the Mexican border into the territory of the United States as far north as the 34° of north latitude.

The North American species belong all to a group distinguished by the similarity of all the florets within one head, the three-toothed exterior lip of the corolla being even in the marginal flowers, scarcely if at all longer than the interior, forming the well-marked natural section *Acourtia*, established first as a proper genus by De Candolle. In the group embracing the South American species, the *Perezias* proper, found mostly south of the Equator, the interior lip of the corolla is considerably shorter than the ligulate exterior. For the establishment of the characters of the species belonging to the first of these groups, and for the determination of the limits of their distribution, we are indebted to Prof. Gray, who has particularly given many years of his arduous labors to the elucidation of the most prominent feature of the North American flora, the difficult order of Compositae, with such eminent and distinguished success. The characters of these plants were before but vaguely defined, and variously understood; hence we find them referred to various genera; some were described under the genus *Dumerilia*, Less., others as species of *Trixis* and *Proustia*, section *Thelecarpus* and *Acourtia*, D. C. Of the 24 North American species recognized by Gray seven are found within tlie southwestern territory of the United States; they were mostly brought to light during later years by the explorations of the arid regions between southwestern Texas and the Pacific Ocean. The first five of the species enumerated below, the flora of the United States has in common with northern Mexico, and the two following seem to be confined to its limits.

Species found in the United States.

1. *Perezia nana*, Gr., Pl. Trendler 110, and Plant. Wright., i, 125, seems to be the most frequent, being found in all the collections made in Southwestern Texas, Southern New Mexico, all parts of Arizona and the adjacent parts of Mexico.

2. *Perezia runcinata*, Lag., from Chihuahua and Sonora to Arizona, and New Mexico as far east as the Colorado river in Texas, where it is not rare on the rocky hills near Austin.

3. *Perezia Thurberi*, Gr., Pl. Thurb., Sonora, Southern Arizona.

4. *Perezia Wrightii*, Gr., Plantæ Wrightianæ,—*P. arizonica*, Gr., Flor. Cal, not rare from Southwestern Texas and Southern Utah through Arizona to San Louis Potosi (Schaffner).

5. *Perezia Parryii*, Gr., Proc. Am. Acad. Sci. and Art, vol. xv. Southern Arizona.

6. *Perezia Wislizeni*, Gr., Plant. Fendl. Southern New Mexico.

7. *Perezia microcephala*, Gr., *Acourtia microcephala*, D. C. Coast of Southern California (Santa Barbara, Monterey).

Species of Northern Mexico.

8. *Perezia formosa*, Gr., *P. turbinata*, Gr., Pl. Wright., non Llav. et Lex. *Acourtia formosa*, Don. *A. macrocephala* and *Trixis turbinata*, Schultz Bip. Leg. Seemann.

9. *Perezia thyrsoidea*, Gr. Bot. Mexic. Bound. Surv., leg. Borland.

10. *Perezia Seemannii*, Gr. Pl. Wright., leg. Seem. Northwestern.

11. *Perezia Coulteri*, Gray. Proc. Am. Acad. xv. Leg. Coult.

12. *Perezia patens*, Gr. *Acourtia formosa* and *Trixis patens*, Schultz Bip.

13. *Perezia platyphylla*, Gr. Fendler, leg. Coulter, Zimapam.

14. *Perezia rigida*, Pl. Gr. Pl. Wright. l. c. *Acourtia rigida*, D. C. *A.*

formosa, Hook. et Arn.

Species of Central Mexico.

15. *Perezia adnata*, Gray. This is the mother plant of the Raiz del Pipitzahuac of the natives, brought, first to the notice of European botanists by Schaffner, who collected the plant near Tolucca. *Trixis Pipitzahuac*, Schaffner et Schultz Brp., *Dumerilia Alami*, D. C. *Perezia Alami*, Hemsia Biol. of Central Americ., Bot. ii. Morelia legit Giesbrecht.

16. *Perezia hebeclada*, PI. Wright. *Acourtia hebeclada*, D. C.

17. *Perezia turbinata*, Llav. et Lex. Valley of Mexico, legit Schaffner.

Species of Eastern and Southern Mexico.

18. *Perezia oxylepis*, Gr. Proceed. Am. Acad., xv. Puebla? Liebman.

19. *Perezia carpholepis*, Gr. *Acourtia carpholepis*, Schultz Bip. Liebman.

20. *Perezia Dugesii*, Gray. Proc. Am. Acad., xix., Guauaxuato Duges leg. Acourtia spec. Plant. Botteriana. 1172. Orizava. Botteri, Mohr legit 1857.

21. *Perezia moschata*, Llav. et Lex. Chiapas, Giesbrecht.

22. *Perezia reticulata*, Gr. *Proustia reticulata*, Lag. *Dumerilia reticulata*, Don. From the Valley of Mexico to Oaxaca, Galeotti.

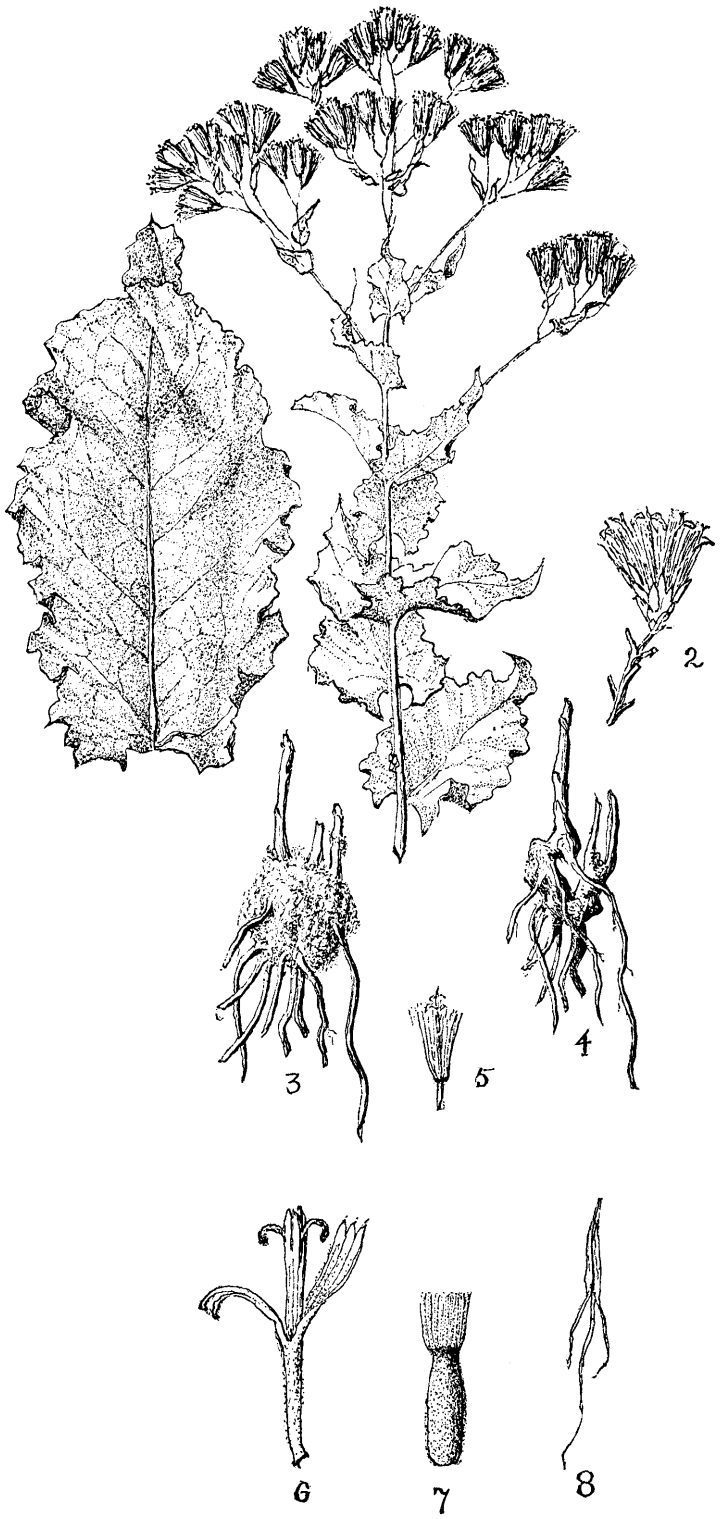
23. *Perezia fruticosa* Llav. et Lex. A dubious species.

24. *Perezia nudicaulis*, Gray. Plant. Wright. Republic Guatemala, Skinner.

Of the species occurring in the United States, the writer has obtained specimens of two species, *Perezia nana* and *Perezia Wrightii*, for which he is indebted to the kindness of Messrs. Lemmon and Pringle, zealous botanists who have spent the past season in the botanical exploration of Arizona and Southern California. The roots attached to several specimens furnished sufficient material to establish the presence of pipitzahoic acid, and the specimens of great perfection served as originals for the accompanying illustrations of these most interesting

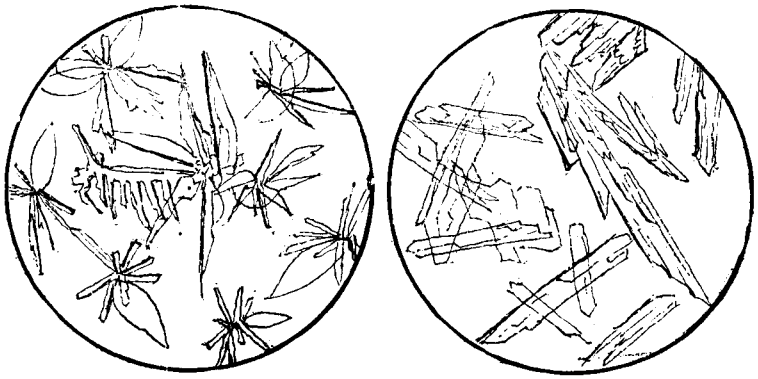
plants.

Perezia (Acourtia) nana, *Gray* (natural size).—1. Corolla. 2. Stamens. 3. Akene (magnified). 4. Floret (natural size).



Perezia (Acourtia) Wr'ghtii, *Gray*.—1. Leaf (nat. size). 2. Flower head (nat. size), with bases of cut pedicels. 3. Root (⅓ nat. size). 4. Root deprived of the woolly covering. 5. Floret (nat. size). 6. Corolla. 7. Akene. 8. Stamens (magnified).

Perezia nana Gr., of slender growth from 4 to 8 inches high, with a slender, creeping or ascending root-stock, articulated mostly, and the joints and head of which are covered with tufts of fine woolly hairs. The slender wiry stem is simple or sparsely branched from the base, slightly flexuous, angled and a little rough. The rigid, coriaceous leaves are shining, glandular, scabrous, strongly reticulate veined, roundish ovate, $1^{1}/_{2}$ to 2 inches wide and but little longer, spinose toothed, sessile by a cordate base or amplexicaul. The large capitula are terminal, subsessile, 20-30 flowered with a campanulate involucre of mucronate cuspidate, ciliated scales, arranged in three rows, of which the exterior ones are ovate and the interior lanceolate, all purplish towards the apex. The akenes are whitish, glandular, puberulent, cylindrical, and have a pappus of copious hairs.



Crystals of pipitzahoic acid, magn. 160 *diam.*

Prepared by precipitating the alcoholic solution with water. By evaporating the alcoholic tincture of the root.

The root of a slightly bitter and astringent taste, imparts to strong alcohol a dingy yellow tint, which by the addition of a weak solution of a caustic alkali deepens to a clear deep yellow color. If a very dilute solution of sodic or potassic hydrate is carefully added, a faint and evanescent tint of impure purple color is perceptible, indicating the presence of small quantities of pipitxahoic acid combined with another substance. As would be expected by the deepening of the color, in consequence of the addition of an alkali to the tincture, this substance proved to be a tannic acid, ferric chloride producing an abundant precipitate of dark green color, which disappeared by the addition of oxalic acid. To obtain the pipitzahoic acid pure, the alcoholic tincture of the root was treated with boiling water, and the very minute quantity of a golden yellow crystalline precipitate washed by decantation. Examined under the microscope it was seen to form stellate groups of acicular or dagger-shaped golden yellow crystals characteristic to this

compound, which by the addition of a drop of diluted solution of sodic hydrate are dissolved with the production of a beautiful deep violet color. Incomplete as the chemical investigation of the few decigrams of the root of this plant at command must appear, its results show that as a source of pipitzahoic acid, it is of but little value, which in reference to the therapeutical virtues claimed for tills substance as a mild purgative, is further impaired by the largely predominating quantities of tannic acid with which it is associated. Of greater interest, in that respect, containing considerable quantities of pipitzahoic acid in an almost pure state, was found the following species:

Perezia Wrightii, Gr. This is a robust plant from 1 to 2 feet in height, with a woody tap root on all sides covered by a dense cushion of long silky dark brown hairs; freed from these, it is found more or less contorted, over an inch long and 1 of an inch in thickness. The transverse section shows, when examined under the microscope, numerous fibro-vascular bundles, separated by the intervening cortical substance. Stem erect, simple below, corymbosely branched above, smoothish, the lower part covered by the leaves which are membranaceous, 3 to 4 inches long, 2 to 3 inches broad, glabrous, strongly ribbed, unequally serrated and spinulose denticulate, closely sessile, with an auriculate or cordate base. Flowering heads numerous, small, with short, glandular hairy, subulately bracted pedicels, terminating in dense clusters the branches of the open, nearly naked corymb, containing 8 to 10 flowers. Involucre small, scarcely exceeding, in length, the fruit; the scales to the number of 12 to 15, are rather membranaceous, greenish, viscid puberulent, the innermost oblong linear, the exterior shorter, oblong-ovate. Akenes 5 ribbed, somewhat fusiform, bearing a pappus of copious, soft, white, capillary bristles.

The root is of a bitterish, not disagreeable taste. The alcoholic extract is of a pure deep yellow color; treated with an excess of boiling water it yields an abundant crystalline, golden yellow precipitate of pipitzahoic acid, which, by the addition of a dilute solution of caustic alkali shows the characteristic splendid reaction already described. From these observations it is evident that the roots of *Perezia Wrightii* will serve as a fit material for the preparation of this acid in larger quantities.

According to Prof. Gray,[4] *Perezia runcinata* possesses thick, tuberous roots similar to those of the dahlia. Unfortunately I could not procure

4 Rep. Mexic. Bound. Sur. Botany.

specimens of this plant, found nearest to the limits of our eastern North American flora. I am, however, in hope to obtain them before the close of another season, as well as a sufficient supply of the roots of *Perezia Wrightii* for the preparation of larger quantities of this highly interesting and peculiar organic constituent of the North American Perezias, so as to be able to study closer its properties, and obtain some light in regard to the uses to which it might possibly be applied to in the laboratory and in the arts, as well as to permit of a closer investigation of its value as a remedial agent.

Mobile, December, 1883.

PIPITZAHOIC ACID[5] OR VEGETABLE GOLD.

BY THOMAS GREENISH, F.C.S.

The author refers to the root and the acid exhibited by Mr. Vigener, of Bieberich, at the meeting of the German Apotheker Verein, in 1883; among the specimens of acid was one in fine flakes, the result of sublimation, and of a brilliant golden yellow color, hence the name "vegetable gold" applied to this product. The drug was first noticed in Europe in 1855, when Dr. Schaffner, a young German pharmacist, obtained of Dr. Leopold Rio de la Loza, Professor of Chemistry and Pharmacy in Mexico, a sample of the acid, which was subsequently analyzed by M. C. Weld ("Annal. Chem. Pharm.," xcv, 188).[6] In his report on the chemical and pharmaceutical products in the Philadelphia Exhibition, Mr. J. R. Jackson mentions pipitzahoic acid and pipitzahuina and briefly describes the former.[7]

The author then gives the following description of specimens presented by Mr. Vigener:

The roots, as furnished me, were in pieces from 8 to 10 cm. long and 2

5 Now called Perezone

6 A notice of the drug is also contained in "Compt. Rend," xlii, 873,1072. Ramon de la Sagra refers the root to Dumerilia (Perezia, Grey) Humboldtii Lessing, and describes the product as riolozinicacid.—EDITOR AMER. JOUR. PHAR.

7 The Mexican Catalogue of the Exhibition of 1876 gives the following information:

Trixis Pipitzahoac, Schaffner, "Pipitzahoac." In the valley of Mexico and in the western mountains. The rhizomes and roots contain a resinous substance, which Mr. L. Rio de la Loza has called pipitzoic acid. It is used as a drastic in a dose of from 4 to 8 grains.—EDITOR AM. JOUR. PHAR.

mm. thick, externally of a brown or reddish brown color, more or less furrowed longitudinally on the surface, apparently through the shrinking of the root in the process of drying; its taste was decidedly bitter, leaving a pungency on the tongue which remained after the bitterness had passed off, and this pungency was somewhat persistent.

In a transverse section of the root the yellow spots of pipitzahoic acid were visible to the naked eye, and more distinctly seen in their relation to the other parts when the section was slightly magnified with a lens. The outer cortical layer consists of a double row of thickened tabular cells, tangentially disposed and deeply colored; this is followed by a layer, several cells deep, of collenchymatous tissue passing inward to the fundamental parenchyma of the root. The pipitzahoic acid is contained in secreting cells, in groups of from three to five; the acid is in yellow lumps of a crystalline structure. These depositories of the acid, striking in the entire section, are arranged in a circle and correspond to the fibro vascular bundles. Stellate spots are scattered throughout the fundamental tissue from the collenchyma to the centre of the root and are due to certain cells only of the tissue becoming thickened by secondary deposit, and converted into sclerenchymatous or stone cells with laminated structure, the intercellular spaces being filled with a dark colored deposit. These cells are found mostly single, but occasionally in groups of two, three or more. A longitudinal section shows, in addition to the relative positions of the cells referred to, the more characteristic constituents of the root as pipitzahoic acid, and the dark deposit around the long stone cell traversing the length of the root.

Most of the parenchymatous cells contain grains of inulin, Perezia being one of the Compositae, and containing inulin as the equivalent of starch present in the plants of other orders.

This brief account of the microscopical structure of the Perezia root will serve to make the more salient features in its histology intelligible. The quantity of root placed at my disposal was only 2 gm., and that of acid 0.33 gm.; it must, therefore, be obvious that few experiments beyond those afforded by micro-chemistry could be undertaken.

A transverse section of the root in which the lumps of pipitzahoic acid were visible were subjected to micro-sublimation on a microscopic glass slide, and at a little over 100°G. the acid sublimed on the cover-glass in yellow crystals. An alcoholic tincture of the root, yellow from solution ,of

the acid, brought into contact with a dilute solution of caustic alkali or alkaline carbonate, developed that fine purple color which induced Herr Vigener to suggest a probable future for the acid as a color indicator in chemical investigations. The tincture on evaporation yielded crystals of pipitzahoic acid.

I was unable to satisfy myself as to the character of the intercellular dark deposit. It was not affected by alcohol, ether, benzol, chloroform or turpentine; neither did caustic alkali dissolve it; it was decomposed by nitric acid. If from the negative results of these experiments I may be allowed to offer an opinion, it would be that the deposit in question is dried latex.

When the pipitzahoic acid first came under my notice it occurred to me as probable that its formation might be due to a degradation of tissue and a rearrangement of its elements similar to that which takes place in araroba or goa powder; but a careful anatomical investigation does not support that view. It appears to be a true secretion in certain cells occupying the same relative position throughout the root, and unaccompanied by any of that breaking down of the surrounding cells so marked in the microscopical investigation of araroba.

The Perezia may prove a valuable medicinal plant, but to determine that point there are yet wanting those careful therapeutic investigations which should precede the appearance in general practice of any new drug, a series of well conducted experiments which very few seem capable of conducting, and for the results of which still fewer have the patience to wait.—*Phar. Jour. and Trans.*, March 1, 1884.

ON KEPHIR.

BY PROFESSOR H. STRUVE.

Translated from Berichte d. Deutschen Chemischen Gesellschaft, 1884, p. 314-316.

Kephir is a beverage which is prepared by a peculiar process of fermentation from the milk of cows and other animals. It has been in use from time immemorial by the inhabitants of the northern declivities of the high Caucasian mountain range, to whom it possesses the same importance as koumis does to the nomades of the southeastern steppes

of Russia. The last-named beverage was for the first time brought to the notice of the scientific world in 1784, and since then it has been frequently the subject of investigations, but only within a few decades has it attained greater importance as a remedy.

On the other hand, kephir was, even in Russia, totally unknown until two years ago, although in 1867 Dr. Sipowitsh had made a short communication on this subject to the Caucasian Medical Society, which remained buried in the archives of the latter. Ten years later, in 1877, Dr. Shublowski published a more detailed paper on kephir which, however, failed to direct the attention of science or that of the public towards this new beverage; the proper impulse was first given from Moscow in 1881, almost a century after the first notice of koumis.

On December 1st, 1881, Ed. Kern read a paper before the Imperial Society of Naturalists at Moscow ("Bull. Soc. Imper. des Natur. de Moscou," 1881, p. 141) on "Kephir, a new milk ferment from the Caucasus," which he had collected during his travels. The requisite investigations had been made by Ed. Kern under the supervision and in the laboratory of Prof. Goroshaukin. The result is that, within the last two years, kephir was not only introduced as a medicine from the southern to the northern section of Russia; but that also a number of papers and pamphlets on this subject has been published. During the latter part of the past year kephir has also been noticed in other countries, among others by Prof. Dr. F. Cahn, at the meeting held December 13, by the section for Natural Sciences of the Silesian Society at Breslau. Kephir has already become an article of speculation, is procurable in commerce, and will doubtless be further scientifically investigated. The narrow circle in which for centuries kephir has been harbored with almost religious piety, has been broken, and it has become public property notwithstanding the method of its preparation is still surrounded with a certain mystery, depending upon the so-called kephir-grains, the new milk ferment of Kern. This can only be procured from the mountain tribes; but after it has been obtained, kephir may be prepared with the requisite precautions, at all times, in winter or in summer.

This present mystery concerning the origin and nature of the kephir-ferment invites further investigations, and it will doubtless not be a long time before the preparation of kephir in all its details will have been ranged with the known phenomena of fermentation in general. Then,

most likely, this simple beverage and remedy of the mountain tribes of the high Caucasus will be accorded an important position among the domestic and general remedies, more particularly as towards koumis. But years of observation will be required to determine its true value; at present kephir is beginning to become a fashion remedy.

The author has undertaken the chemical investigation of kephir with the view of applying to it the results of his protracted investigations of milk, and of determining the changes produced by this ferment; although more difficult and complicated than expected, he hopes in the near future to be able to report his results.

Tiflis, January 30, 1884.