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Botanical Medicine Monographs and Sundry

IMPROVED METHOD OF EXHAUSTING DRUGS.

By ALFRED B. TAYLOR.

For some years past I have employed a process for making some of the fluid extracts, tinctures, etc., of the Pharmacopoeia, which has proved very satisfactory. The plan has probably occurred to others, but I have never seen it published, nor have I ever heard it suggested by any one, and I have thought a notice of it might be acceptable to the readers of the Journal.

I have found it especially serviceable in making those preparations which are made from drugs that are difficult to exhaust with small quantities of menstruum.

The process consists in using a portion of the finished preparation (from a previous operation) to macerate and partially exhaust the drug before using the new portion of menstruum, and as there is no limit to the quantity of finished preparation that can be used where necessary, it is possible to exhaust completely the drug operated on.

For example, let it be required to make two pints of tincture of arnica flowers.

Take of Arnica flowers, in No. 20 powder..... 6 oz. av.
Tincture of arnica flowers..... 2 pints.
Diluted alcohol, a sufficient quantity to make..... 4 pints.

Moisten the powder with a pint of the tincture of arnica flowers, and macerate for twenty-four hours; then pack it firmly in a cylindrical percolator, and gradually pour upon it, first the remainder of the tincture of arnica flowers, and afterward diluted alcohol, until four pints of tincture are obtained.

I have used this process with great advantage in making the fluid extract and the, tinctures of cinchona.

SYRUP OF WILD CHERRY.

By R. ROTHER.

If the statement is correct in regard to the yield of cyanhydric acid from wild cherry bark, then the syrup of this drug must be a more potent preparation than is generally granted. It is alleged that the best wild cherry bark, gathered in October, produces .1436 per cent. of cyanhydric acid, and that in addition the bark contains at this period of the year the largest amount of tannin and peculiar bitter principle. The

cyanhydric acid, or rather the constituents that produce it are by all means the most essential part of the drug. The bitterness and astringency are, however, also of sufficient importance to demand particular attention. With the stated amount of absolute acid in the bark the syrup would contain .1436 X 50 X .12 = .8616 per cent. of the official acid by weight, or somewhat over one per cent. by volume. This shows that an ordinary teaspoonful of such a preparation represents approximately one minim of official cyanhydric acid. With an appropriately fine powder, of the requisite quality, in a carefully conducted operation that standard could perhaps be uniformly attained. But owing to the fact that syrup of wild cherry is not usually conceded to be anything more than a mere adjuvant, its proper preparation is generally unduly neglected. Under this adverse condition it is probable that syrup of wild cherry is but feebly representative of its most powerful constituent. The keeping qualities of the syrup are ordinarily good during a moderate period of storage. But in the generality of cases, with longer time and frequent exposure deterioration and decomposition become so marked as to call, emphatically, for some preservative.

The decomposition is of several kinds. The first that appears results from the formation of mould over the surface, assuming a more tangible form in the larger storage vessels that are not so often handled. This stage of decomposition is mainly confined to the surface, and hence the lower stratum, when carefully separated from the supernatant fungus, is not materially damaged.

The second stage of change consists in positive fermentation whereby the syrup becomes roiled, soured, and generally stale and worthless.

The third stage of deterioration is characterized by the disappearance of the cyanhydric acid, either by evaporation or positive destruction during the fermentative decay. Another change of a peculiar kind is also often noticeable, although in itself not vicious. It seems to be due to the normal presence in the drug of a chemical ferment which rapidly changes the sugar of the syrup into an amorphous deliquescent form. This action may result from the synaptase, but it is more probably effected through a distinct agency. The objection to this species of alteration is that it renders the syrup more conducive to the positively deleterious influences above noted.

Excepting the last, all of these changes are injurious enough, but although the fermentation renders the syrup wholly unfit for use from an aesthetic point of view, the dissipation of the cyanhydric acid causes almost absolute worthlessness, from a therapeutic point of view.

Knowing the relative amount of cyanhydric that the syrup should contain, an article deteriorated simply in the loss of this agent, can be easily regenerated by the requisite addition of the acid and some oil of bitter almonds. In fact, a very definite and practical method for producing this syrup, de novo, would consist in extracting the astringency and bitterness to the exclusion of the synaptase, and completing the syrup by the addition of the known proportion of cyanhydric acid and oil of bitter almond. Since in such a process it becomes essential to employ a fresh and full strength cyanhydric acid, the writer finds it opportune to interpolate a few remarks on this subject, and finally append a formula for such a preparation.

The first formula of the Pharmacopoeia for cyanhydric acid, however excellent it may be in large operations, is not suited as a process for the shop. The second formula to be used as an alternate process expressly for the counter, is badly defective in a practical aspect, although theoretically splendid. The argentic cyanide is one of the most reluctant substances to manipulate for a body having such a bland appearance. It adheres most obstinately to everything, so that its accurate weighing and admixture with acidified water becomes almost impossible. Furthermore the layer of argentic chloride prevents a perfect decomposition, and hence the liquid ultimately contains an excess of chlorohydric acid, and a corresponding deficiency of cyanhydric acid. It is strange that the Pharmacopoeia embodied the first formula, which is in reality only adaptable to factories, and doubly strange that it did not incorporate such an excellent and simple process as that given in Fownes' chemistry. This process is equally applicable to large and small operations, and yields a definite and permanent product, and is therefore unlike that of either of the official methods. It consists in decomposing pure potassic cyanide with tartaric acid in the presence of water and alcohol, as follows:

$$KCy + H_2T = Hcy + KHT.$$

Pure potassic cyanide is as easily obtainable as argentic cyanide, and is ultimately cheaper. There are, strangely enough, but few among the numerous cyanides that are available for the purpose of generating cyanhydric acid fit for medicinal use. Soluble or insoluble they are mostly indefinite and intractable substances. Mercuric cyanide, which might be so useful for this purpose, is much to be regretted undecomposable by those acids, which would render the complete removal of the mercury possible. Hydric sulphide completely decomposes it, and hence the writer attempted to employ the oxysulphides of antimony for this purpose. Although these methods generated cyanhydric acid abundantly and promptly, they yet failed to precipitate the mercury completely. Owing to the great affinity of mercury for the compounds of carbonic sulphide (also called carbon disulphide), it may be that some such combination could be found to answer the purpose.

The formula for cyanhydric acid transcribed from Fownes' is as follows:

Potassic cyanide, pure, . .	65 parts.
Tartaric acid, ...	150 "
Alcohol, ...	675 "
Water sufficient to make . .	1538 "

Mix the potassic cyanide and tartaric acid with 500 parts of water, in a well-stopped bottle, or dissolve each separately in 250 parts of water, and mix the solutions; then add the alcohol and sufficient more water to make 1538 parts. The alcohol may also be mixed with 600 parts of water, first the two salts be then added, and enough water to make 1538 parts as before. After the hydropotassic tartrate has subsided as a heavy crystalline powder, the clear supernatant liquid is decanted.

The yield of official acid is 1350 parts, but the generated cream of tartar weighs 188 parts, thus making the 1538 parts as above directed. The solution contains mere traces of the acid tartrate.

The Pharmacopoeia, recognizing the necessity of adding a preservative to the syrup

of wild cherry, resorted to glycerin. It is, however, rather late in the day to employ glycerin for that purpose, more especially when so sparingly applied. Five per cent. of glycerin is contained in the new official syrup, but it is safe to say that 20 per cent. would not suffice in any case where there is a well-marked tendency to fermentative decomposition. Alcohol would have been amply sufficient at 4 per cent., and should have been used. The writer in this instance strongly recommends alcohol, not alone for its simple preservative effect, but since it also serves another important purpose with equal efficiency.

Several years since the writer employed an odd looking sample of bark for preparing the syrup, and found that little if any cyanhydric acid was developed. The bark possessed bitterness and astringency in moderate degree, and was therefore kept with a view to employ it in alcoholic mixtures containing wild cherry as one of the ingredients. On employing this bark on such an occasion with a 25 per cent. alcohol, cyanhydric acid was quite freely developed. This rather astonishing result showed that a moderate proportion of alcohol did not only not check the generation of the acid, but even caused its appearance where water alone had been powerless. Whilst glycerin, under such circumstances would have retarded or more or less obstructed the production of cyanhydric acid, it would not have obviated the fermentation. Subsequently the writer applied one-eighth alcohol in preparing the syrup, and found that, primarily, it prevented all deterioration, and secondarily, whilst facilitating the production of cyanhydric acid, also yielded a clearer and generally more satisfactory percolate. Substituting the glycerin in the official process by alcohol, the formula then becomes modified as follows:

Wild cherry in No. 20 powder, . . .	**12 parts**
Sugar, granulated, ...	**60 “**
Alcohol, sufficient, or . . .	**4 “**
Water, sufficient to make . . .	**100 “**

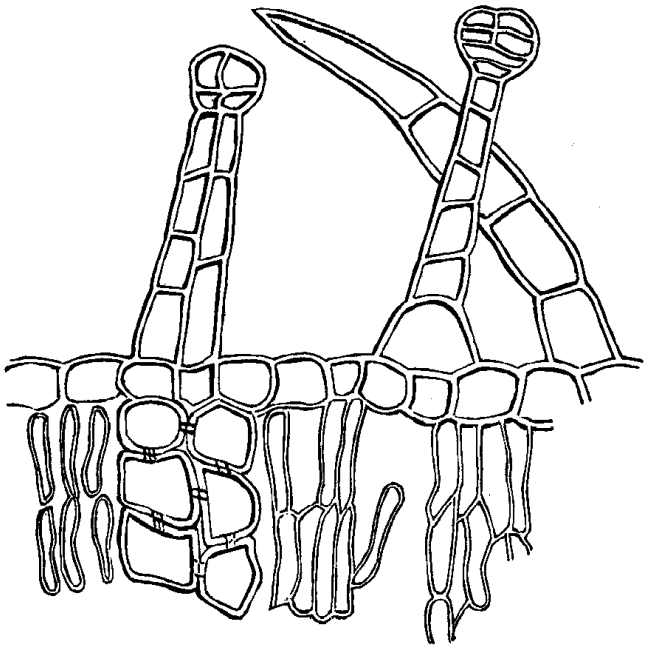
Mix alcohol and water in the proportion of 1 part of the first and 7 parts of the latter and moisten the wild cherry with 6 parts of this mixture. Pack the moistened bark firmly into a glass percolator and pour on of the above mixture until the liquid has slowly penetrated to the bottom of the column. Now check the percolation for 24 hours by closing the exit. On resuming the operation let the current slowly flow so that in the course of 12 hours 40 parts of percolate is obtained. Pour three-fourths to four-fifths of this upon the sugar contained in a bottle and agitate occasionally until no more sugar is dissolved. Decant the clear syrup from the residuary sugar, and pour on this the remainder of the percolate, agitating again as before, until all the sugar has dissolved. Finally mix the two syrupy solutions and strain through a No. 80 sieve.

GLEANINGS IN MATERIA MEDICA.

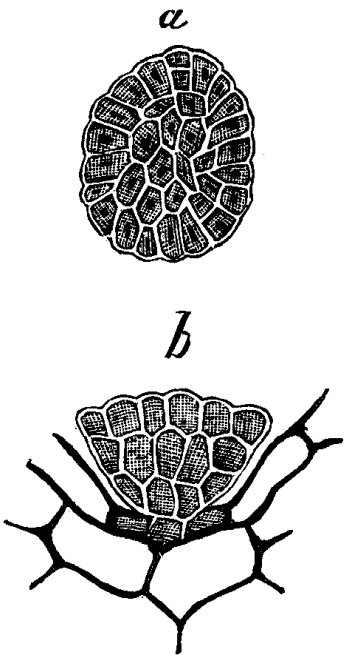
BY THE EDITOR.

Grindelia robusta, Nuttall.—The young parts of the cylindrical stein are covered with white, soft hairs. The leaves are thickish, sessile, more or less amplexicaul, spatulate-lanceolate dentate, and pellucid-punctate. The secondary nerves are sparingly branched, and at some distance from the margin form slings. The flower heads

terminate the branches. The involucre consists of several rows of narrow spatulate, smooth, sharp-edged scales, which are curved back at the apex and are covered with a brown glutinous mass. The receptacle is somewhat convex; the florets are tubular, yellow and hermaphrodite.



Grindelia robusta; transverse section through upper surface of leaf, 250 diam.



Scaly trichoma, *a* from above, *b* section, 400 diam.

The resinous covering of the leaves is secreted by the glandular hairs, which are always simple, frequently with a double row of cells, and occasionally parenchymatic; the terminal gland is four-to several-celled. Similar but pointed hairs are likewise observed. The mesophyll is a loose tissue with indistinct palissade layer, supported by thicker-walled cell-rows, which extend transversely through the leaf. The thin-walled cells contain much tannin.

Quite characteristic trichomes are found upon the involucral scales in depressions near the recurved apex, and consist of a mass of cells. without a stipe.—J. Moeller, in *Phar. Centralhalle,* 1883, No. 19.

Camellia oleifera, s. *Cam. drupifera,* Hooker.—Hugh McCallum obtained from the seeds, deprived of the husk, by means of ether, forty-four per cent. of a somewhat viscid yellowish oil, odorless and having an unpleasant aftertaste. In China it is known as cha yan, or tea oil, and is chiefly used as a hair dressing and as an illuminant. In addition to the oil, about 10 per cent. of a glucoside, giving all the reactions of saponin, was obtained from the seeds. Even then the mare, on being shaken with water, gave a persistent lather. This saponin is a friable, amorphous white powder, having only a slight creamy tinge, and a sweetish, afterwards, bitter, disagreeable and biting taste. Almost odorless when dry, it has a peculiar disagreeable odor when dissolved in water. The dust irritates the nostrils. It is insoluble in ether, sparingly soluble in absolute alcohol, freely in 84 per cent. alcohol, and very soluble in water, the latter solution having an acid reaction, and giving white precipitates with

barium hydrate, basic lead acetate, and, on heating, with normal lead acetate. The solution emulsifies oils and chloroform, and, shaken with mercury, the latter is finely divided. It gives .9 per cent. of ash. Heated with hydrochloric acid, a flocculent, white precipitate (sapogenin) is thrown down, and a glucose remains in solution. The saponin was prepared by exhausting the seed, deprived of oil, with 84 per cent. alcohol, concentrating the tincture to a syrupy liquid, precipitating with absolute alcohol, redissolving in 84 per cent. alcohol, treating with animal charcoal and filtering.

The press cake left on expressing the oil, is called *cha-tsai-peng,* and its powder *cha-tsai-fau.* These are used for washing, for removing grease stains, for destroying worms, grubs, etc., and for poisoning fish, when kept in tanks.—*Phar. Jour. and Tran.,* July 14, 1883.

The Fruit of the Brazilian Coffee Tree has been examined by Dr. Th. Peckolt, a portion of the investigation having been made and published in 1864.

	Weight of berry.	Pulp.	Mucilage and testa.	Coffee bean.	Ash of pulp.
Fresh,	1·780	·658	·282	·840 gm.	1·717
Dried at 100°C.,	·584	·159	·150	·272 "	27·750

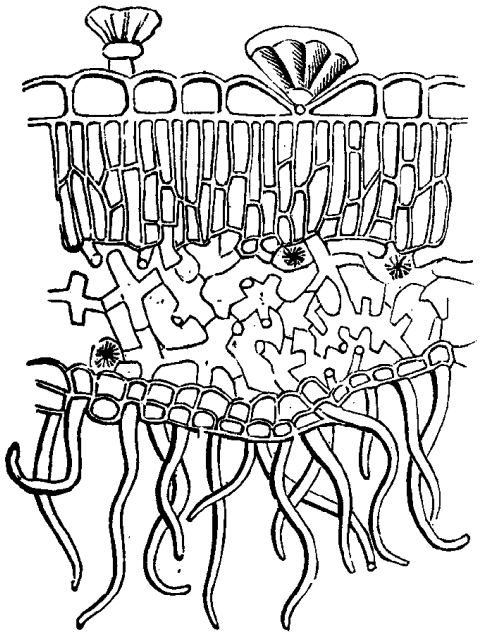
The fresh pulp contains in 1,000 parts,

Caffeine,	·270
Dark yellow, thick oil,	5·000
Wax and red violet color,	5·550
Soft resin, yellow, inodorous, tasteless, insoluble in alkalies,	1·240
Resin, brown yellow, insoluble in ether, sparingly soluble in alkalies,	15·900
Coffeotannin, not identical with that of coffee beans,	14·620
Citric acid, tartrates, malates, trace of gallic acid,	7·950
Glucose,	67·400
Albuminous matter,	11·100
Extractive matter,	34·860
Pectin, mucilage, dextrin, salts,	40·890
Water,	759·800
Ash,	17·170

The ash is interesting for containing iodine, as shown by C. Weinhold, in 1865, who found 0.882 per cent. The author has met with it constantly, the percentage varying between .474 and .105, but in other parts of the tree it could not be detected. The ash of the pulp contains also large amounts of phosphoric acid, 9.987 per cent., ferric oxide, 11.38 per cent., and silica 15.162 per cent.—*Zeitsch. Oest. Apoth. Ver.,* 1883, No. 22.

Eriodictyon Californicum, Bentham.—The leaves are described by J. Moeller. They are leathery, lanceolate, about four inches (10 cm.) long, about half an inch (1 to 1.5 cm.) broad, short petiolate, repand- dentate, green and glossy above, dark reticulate

and gray beneath. The upper epidermis is large-celled and covered with a moderately tough and delicately wavy-furrowed cuticle, the grooves containing many-celled glands upon two- or three-celled stipes. The secretion of the glands is yellowish green, resinous, soluble in alkalies, contains numerous needleshaped crystals, and covers the upper surface sometimes to the thickness of .02 mm. Under the thick palissade layer is the mesophyll. composed of stellate cells, which, between the veins, are in contact with the small-celled epidermis of the lower surface; many of these epidermal cells are elongated to thin gray felt-like hairs. The primary nerves contain on the lower side a thick layer of collenchyma, and a palissade layer is formed in the angles of the secondary nerves. The epidermis alongside of the nerves is smooth, and contains only few glandular hairs like those of the upper surface. The parenchyma is free from tannin; many cells contain groups of oxalate crystals. Strong alcohol takes up 30 to 40 per cent. of resin, having a tolu-like odor. W. H. McLaughlin obtained two resins, one of which was soluble in ether, bitter principle, gum, tannin, fat, volatile oil, sugar, and another crystalline principle.—*Phar. Centrathalle,* 1883, No. 19.



Eriodictyon Californicum. Transverse section of leaf. 250 diam.

Duboisia myoporoides, R. Brown.—J. Moeller made the following observations on the leaves; they resemble willow leaves in outline, attain a length of 12 cm. (44 inches), and width of 3 cm. (11 inch), are short petiolate, entire, the margin slightly revolute, and have a prominent midrib, the secondary veins diverging at nearly right angles and forming slings near the margin. A parenchymatic excrescence along the upper side, upon the midrib is characteristic for the leaves, and may be observed with the naked eye. The upper epidermis has few stomata and somewhat smaller, flatter, and more thick-walled cells than the lower epidermis, which contains numerous stomata and scattered clavate hairs. On placing a microscopic section in warm potassa solution, a large number of acicular crystals make their appearance upon the lower, but not upon the upper side of the leaf. The crystals are soluble in water and alcohol, and make their appearance after the leaf has been kept for several hours in water, but not after it has been extracted with alcohol.—*Phar. Centralhalle,* 1883, No. 20

Tinctura Lappas fructus.[1] —In No. 5 of the Ephemeris a letter by Dr. W. C. Reiter, of Pittsburg, was published, giving a detailed statement of his experience with the fruit (often called seeds) of Lappa major, and the manner of using it in psoriasis inveterata. Dr. Reiter prepared a tincture by macerating 1 lb. of the ground fresh fruit in 1 gallon of two years old whiskey, in a warm place, for two weeks; of the decanted or filtered tincture he gave from a teaspoonful to a tablespoonful. Much stress is laid on the menstruum to be used.

1 Read at the Pharmaceutical Meeting, October 16th.

Having received a prescription for the tincture, to be used by a patient suffering for many years with the disease, I tried the whiskey; but the tincture was not a sightly preparation. After several experiments with menstruums of different strength I adopted the following formula:

Ground burdock fruit	16 troyounces
Alcohol	3 pints
Water	1 pint.

Mix the liquids and percolate in the usual way until 4 pints of tincture are obtained.

The dose used is a teaspoonful 3 or 4 times a day. The remedy seems to be effective; after several months' use, the patient's hands and nails are assuming a normal condition.

Lancaster, Pa. CHAS. A. HEINITSH.

MATE OR PARAGUAY TEA

By DR. THEODORE PECKOLT.

This plant, which belongs to the holly family (Aquifoliaceae), has several names in different parts of South America. In the Guarani language it is *Caá*., which is the Indian word for leaf. The prepared leaves were named by the Spanish "yerba" (herb), and the infusion "mate"[2] from the native name for the vessel in which the tea is made, and the drug is now generally known as mate in Brazilian commerce, although the Spaniards call it "yerva mate" or "yerva de palos." The name "congonha" has been said by some writers to be applied to mate, but this is an error, for the Brazilians understand by the names "congonha mansa" and "congonha brava," other trees belonging to the same natural order, which are used as a substitute for mate when it is not easily procurable.

The plant was first briefly described by St. Hilaire, in 1822, when he gave to it the name *Ilex paraguariensis*, which he altered in 1826, to *Ilex Mate,* subsequently publishing the first name again in 1833 and this is now adopted in the "Flora Brasiliensis." In 1824 the plant was described in detail by Lambert, under the name of *I. paraguensis* and the plant illustrated from specimens obtained from the Jesuit Missions. The synonyms stand as follows :

llex paraguariensis, St. Hil.; *I. Mate*, St. Hil., *I. paraguayensis*, Hooker, fil.; *I. paraguensis*, D. Don.; *I. paraguariensis, a, obtusifolia*, Mart.; *ß, acutifolia*, Mart.; *Cassine Gongonha*, Raben. ; *C. Gouguba*, Guibourt; *Chomelia amara*, Vell.

The mate plant attains the height of an apple tree, becoming even larger in favorable situations, but when cultivated and deprived from time to time of its leaves, it remains small and forms a mere bush. The leaves are shortly stalked, simple, wedge-shaped, obovate or elongate-lanceolate, toothed, dark green above, paler beneath, shining, of leathery consistence, 1 to 3 inches long, and $1/2$ to $1\,1/2$ inch broad. The flowers are axillary, situated on one to three times forked peduncles, white, and of similar size to those of the common holly. The calyx consists of four nearly orbicular

2 The word is not accented, as sometimes written.—T. P.

sepals with a four-parted corolla and four short stamens, the ovary being crowned with a four-lobed stigma. The fruit is red and of the size of a pepper-corn, containing four seeds enclosed in a slightly glutinous pulp, but often one seed only is developed. The home of the Paraguay tea plant is said by Martius to lie between 18º and 30º S. latitude, but the district in which the tea grows most luxuriantly is between 21º and 24º S. latitude in the watershed of the Paraguay river on the west, and in that of the Parana on the east, and it is here in a zone between the Serra Amambuhy on the south and the Serra Maracajú on the north that the best and most highly prized mate is prepared.

How long the South American Indians had been in the habit of using mate is not known, but when the Spaniards seized the provinces on the rivers Paraguay and Uruguay they found this custom prevailed there exactly as first mentioned in the writings of Azara, who stated that the tree grew wild in different parts of Paraguay. In proof of the high estimation in which it was held by the Indians it may be mentioned that the name "caa," which signifies in the Tupi language a tree or plant, was given by way of distinction to mate, that being the tree valued above all others. The use of mate does not appear, however, to have extended to extra-tropical districts, but to have been confined to the more intelligent tribes known now under the name of Guarani Indians. Nevertheless, when these people were driven further north by Europeans, they do not appear to have carried the use of the drug with them, probably thinking it not worth while to obtain it from a distance and from a hostile people when they found a substitute close at hand in the Guarana plant.

The extensive use of mate in South America at the present time is probably due in great measure to the Jesuits, who encouraged its use, finding that it restrained the desire of the Indians for spirituous drinks, while its cultivation, collection and preparation gave employment to converted Indians and brought wealth to the order. In the Jesuit Republic, the Indians were not paid in money but in produce; 4 lbs. of meat, a definite amount of Indian corn and 1 oz. of mate were allowed to each family.

After the expulsion of the Jesuits, the preparation of mate was continued in the Paraguay Republic under the administration of the Dictator Francia and his successors, until the Dictator Solano Lopes was killed in battle with the Brazilians in 1870. An overseer was appointed over the work, who also was paid in kind, receiving for each aroba of the tea natural produce of the value of $^1/_8$ ounce of gold. Since 1870 there has been free trade in the article, which renders an increase of the trade very desirable. At the present time mate is used only by about 12,000,000 of people, and the consumption amounts to about 8,000,000 pounds.

It has been stated that mate is not prepared solely from *I. paraguariensis*, St. Hil., but that the leaves of other species are mixed with it.

In 1842, Sir W. J. Hooker published in the London Journal of Botany (vol. i, p. 30) an exhaustive account of yerba mate, together with the characteristics of the different varieties which he considered identical with *Ilex paraguariensis*. This paper strengthened the previous opinion of Miers, that probably more than one species was used in the preparation of the tea. The investigations made by Miers and the monk Leandro, Director of the Botanical Gardens in Rio Janeiro, confirmed by Bonpland,

indicate that six different species are used for the purpose: 1. *Ilex theezans*, Bonpl., growing in Paraguay, Entre Rios and Brazil; 2. *Ilex ovalifolia*, growing in the neighborhood of Rio Pardo; 3. *Ilex amara*, Bonpl., on the mountains of Santa Cruz and in the forests of the Brazilian province of Parana; 4. *Ilex crepitans*, Bonpl., in the interior of Santa Cruz and the banks of the Parana river; 5. *Ilex gigantea*, Bonpl., on the banks of the Parana river. This is the "caa-una" of the Guaranis. 6. *Ilex Humboldtiana*, Bonpl., in the province of Rio Grande do Sul. This is the "caa-unina" of the Brazilians. The last four species, more especially *I. amara*, yield the "caachira" of the Guaranis and the "caa-una" of the Brazilians. Martius, however, in the "Flora of Brazil," states that in the central districts of Paraguay, where the *I.paraguariensis* is especially abundant, only the leaves of this species are used; in other districts the various species of *Ilex* are similarly employed.

It is certain, however, that *I.paraguariensis* is the only species in cultivation, but this is carried on to a very limited extent as the wild plant is still abundant. The Jesuits planted the tree because they found that under cultivation the leaves had a milder and more pleasant taste. For cultivation the seeds are carefully freed by washing from the glutinous matter in which they are imbedded, without which treatment they would not germinate, this office being probably performed in a natural state by birds, since the Indians believe that the seed will not germinate unless they have been voided by birds. The young plants are taken out of the hotbed when about 6 inches high and planted out about 12 to 15 feet apart, in a damp, somewhat marshy ground, so as to allow of a small trench being made around the plants in which water can collect. They must also be grown under the trees which afford shade, as the young plants are easily killed by a strong sun. When they are about 3 to 6 feet high some of the shade plants are removed, and in four years the leaf harvest can be begun. The young trees should not, however, be entirely deprived of their leaves lest they should not be able to recover. In the seventh year they will yield 30 to 40 kilos of leaves. It is calculated that on 220 square metres of land one thousand six hundred trees can be grown, yielding on an average 25 kilos of leaves per tree, or about 25,454 kilos of leaves, valued at 190,000 marks per 100 square meters. The cultivated plant remains a small bush and never reaches the stature or size of the wild tree. The cultivation of mate has been carried out with much success in the province of Parana by Dr. E. Westphalen, and it promises to be successful in the Dutch colony of S. Leopoldo in the province of Rio Grande do Sul, where the plant grows luxuriantly.

The tree has been planted in the Cape of Good Hope and seems to succeed well there, as well as in Spain and Portugal. The quality of Paraguay tea depends upon the time of year in which it is collected, the leaves possessing most aroma when the fruit is nearly ripe. In the Argentine Republic and in the Brazilian province of Rio Grande do Sul the leaves are collected from February to the end of July. The new shoots are put forth in August, but at that time it would ruin the trees to gather the leaves. In the forest of the Brazilian province of Parana and Santa Catherina the harvest is collected from March to the end of September. In Paraguay it begins in December and continues till August. About a month beforehand the collectors set out in caravans with their wives and children into the forests where the mate trees are abundant, and make their encampment.

The first operation is to prepare a torrefier, which is made in the shape of an arbor.

The twigs are cut off from the branches and slightly scorched by drawing them quickly across the fire. The twigs are then collected into bundles suspended over the torrefier, a small fire of dried wood being kept alight beneath. In about two days the drying is completed, the ashes are removed, and in the spot where the fire was an ox-hide is spread out, on which the leaves are beaten from the twigs with a wooden blade. The dried leaves are then powdered and packed in wooden cases made out of hollowed trunks of trees.

In the province of Parana the leaves have lately been dried in large wrought-iron pans, in the same manner as Chinese tea, or in specially constructed ovens in which they can be prepared so as to retain more aroma; they are then powdered by machinery and sifted; this kind of mate obtains a better price.

Another form in which the leaves are prepared is by carefully separating them from the stalks and twigs and roasting them, but this is not so much esteemed as the powder, except in Chili, where the leaves are preferred.

In the South American Republic and the Brazilian province of Rio Grande do Sul, mate is packed in serons of ox-hide holding 30 kilograms, and in half-serons, containing 15 kilograms; this packing gives to the mate a disagreeable flavor which detracts from its value.

In Parana it is packed in cane baskets; these are lined with dried grass, called Jacaes, and contain 50 to 60 kilograms. The mate in leaves is here sold at 280 to 290 reis (about 56 pence), powdered mate is sold in thick and better-woven cane baskets, containing in a half-seron, 15, and as a seron, 60 kilograms, the price being 10 to 12 per cent. more than the leaves.

In the Spanish Republic three different sorts are sold under the following names:

lst. Caá,-cuy, or Caá-cuys : these are the new leaves of the scarcely developed shoots. They are of more delicate texture, and of a yellowish color. They possess an agreeable and pleasant flavor, but are seldom met with in commerce.

2d. Caá-mirim. This was the chief product in the time of the Jesuits, and consists of the leaves carefully separated from the twigs and stalks, the mid-rib of the leaf being also removed. This kind is chiefly esteemed in Peru, and principally exported there by the Brazilians. It is called Herva mansa.

3d. Caá-guacu, or Caá-una, or Yerva de Palos, is the most inferior kind consisting of the large and old leaves with the twigs and fragments of wood, and possessing a strong and bitter flavor.

In Rio Janeiro two sorts are known to commerce, mate in leaf and mate in powder. In order to test the quality of mate, the merchant takes a small quantity in his hand and blows upon it. If the greater portion is blown away he considers that it has been heated too much and thus deprived of its strength. If it is not easily blown away it is then considered of good quality.

Mate has been the subject of several analyses. In 1836, Trommsdorff analyzed mate and found tannin, two resins, extractive matter, and a substance which he believed to be an alkaloid, but he possessed too little material for complete investigation.

In 1843, Stenhouse found in mate an alkaloid and proved that it was, identical with caffeine.

In 1850, Dr. Rochleder investigated Paraguay tea and found the reactions. of mate-tannic acid to be identical with those of coffee-tannic acid.

Lenoble, who, as well as Dr. Rochleder, supposed mate to be produced by Psoralea glandulosa, named the crystalline active principle he obtained from it, "psoralein."

He also found in it wax, albumen and volatile oil.

According to Dr. Byasson, mate contains as much caffeine as the best Chinese tea. The variety which he experimented upon was caá-guacu. He found also a viscid substance resembling birdlime, soluble in ether; this he considered to be a fatty body of the nature of a compound ether whose alcohol was allied to cholesterin.

His analysis was as follows:

	Grams.
Caffeine	1·850
Substance resembling birdlime, fat substance and coloring matter	3·870
Complex glucoside	2·380
Resin	0·630
Mineral matter	3·920
Malic acid	Not estimated.

Robin has examined several different kinds of mate. The amount of caffeine in young leaves dried without special care was 0.02 to 0.03 per cent.

Mate prepared by the Indians and containing twigs and fragments of fruit yielded 0.16 per cent , and mate from the Mission of the Province of Corrientes, 0.14 per cent. The peculiar tannic acid, which Dr. Byasson did not find, varies between 1 per cent. and 1.6 per cent. The ash of young leaves varies from 0.12 to 0.2.

Professor A. W. Hoffmann, of Berlin, found 0.3 per cent. of caffeine. The average of the published analyses indicates about $^1/_2$ per cent. of caffeine, that of Indian tea being 2 per cent. The value of mate, as in the case of tea, depends not merely upon the caffeine but also upon the tannin and aromatic principles. He considered the tannin to be identical in every respect with that found in tea.

The aromatic principle has not been isolated, but by dry distillation a volatile oil is obtained, which belongs to the phenol group and is soluble in alcohol.

In 1877 the mate-tannic acid was examined by Dr. Pedro N. Arata, who found that

the tannin of mate, while analogous to that of coffee, was not identical. The chief differences noticed by him are as follows: Lime water gives with the coffee-tannic acid a small precipitate soluble in excess, but an abundant insoluble precipitate with the tannin of mate. This, however, does not hold good with all samples of mate, the precipitate being sometimes soluble in an excess of the tannin. Coffee-tannic acid gives by dry distillation. pyrocatechin, while the tannin of mate yields in addition to pyrocatechin the isomeric body resorcin.

Coffee-tannic acid is soluble in 52.84 vol. of alcohol, while mate-tannic acid requires 73.66 vol.

Dr. Arata considers that coffee-tannic acid maybe regarded as dioxyparacinnamylic acid, whilst mate-tannic acid must be classed in the group of oxyphenylpropionic acid.

Soubeiran and Delondre state that mate contains the same essential constituents as the coffee leaf, and in greater amount than the coffee seeds, which I can confirm after numerous experiments with large and small quantities.

In the years 1860 to 1865 I analyzed mate and Congoha leaves. My analyses were made with fresh leaves of the llexparaguariensis from the Orgel Mountains in Neufreiburg, and roasted and unroasted leaves from the province of Parana.

The following constituents were found in 1000 grams of the air dried substances.

	Little twigs from Neufreiburg.	Leaves from		Mate from Parana.
		Orgel Mountains.	Parana.	
Stearoptene	.....	0·021	0 019	.....
Volatile oil, extracted by ether	.....	0·099	0·179	5·550
Fat and waxy substance	.....	19·800	18·800	.....
Green coloring matter	.....	10·900	10·800	.....
Chlorophyll and soft resin	9·400	20·966	51·200	6·102
Brown acid resin	19·700	48·500	84·500	25·500
Caffeine	2·579	6·398	16·750	5·550
Aromatic substance	.....	.....	2·500	.....
Bitter extractive	30·000	2·038	.....	.....
Mate-tannic acid, pure		27·472	44·975	16·785
Pyromate-tannic acid	.....	.....	.....	1·465
Mate-viridic acid, crystallized	.....	0·024	0·025	0·024
Sugar, saccharine extractive	.....	39·266	6·720	1·370
Albumen, salts, dextrin, etc.	.....	47·666	36·102	18·189
Extractive matter	938·321	8·815	65·130	16·610
Moisture		166·660	104·600	908·379
Cellulose and loss		601·386	557·700	

The ash of mate analyzed by Dr. Busse and Mr. Riemann was found to contain potassium, sodium, magnesium, manganese, calcium, aluminium, iron, phosphoric acid, sulphuric acid, carbonic acid, chlorine, silicic acid; but the analyses vary so much in different samples as to lose some of their value. I found in leaves of mate gathered in Neufreiburg oxide of manganese, 8.958; sodium, 10.062; and potassium, 14.615 per cent., whereas these were not found at all by the above-mentioned analysis in leaves obtained from Rio.—Abstracted from *Zeitschr. Oesterr. Apoth. Verein.* in *Phar. Jour. and Trans.*, August 18, 1883, pp. 121-124.

VARIETIES.

Koroniko.—Dr. J. Jardine, writing from Kiukiang, in the "Chinese Imperial Maritime Customs Medical Reports," says that dysentery, acute and chronic, was very prevalent in that community during the autumn of 1880. Acute dysentery had generally become sub-acute or chronic before the patients applied at the hospitals, so that the chronic form had generally to be dealt with. "As everyone knows, these are the difficult cases to influence speedily by drugs, and with the Chinese a change of air or sea voyage is beside the question. In these cases I was induced to try *koroniko*, from the *Veronica parviflora*, which is largely used in New Zealand as a remedy in dysentery and diarrhoea, and some of the results exceeded my most sanguine expectations. Many who received the drug did not return to report themselves; but I have notes of three cases of chronic dysentery, varying in duration from six weeks to four years, and voiding from twenty to thirty motions containing blood and mucus daily. Fifteen doses of tincture of koroniko reduced them to one-half, other fifteen doses reduced them to three or four daily, and a third like quantity effected a complete cure. Judging from the few cases I have been able to follow, I augur a brillant future for this remedy in the chronic forms of the disease."—*Practitioner, Quarterly Therap. Rev.* July, 1883.

Chamomile in Infantile Diarrhea.—Dr. Christopher Elliott, Physician to the British Hospital for Sick Children("Practitioner," December, 1882,) endorses Ringer's claim for the great value of infusion of chamomile in infantile diarrhoea connected with dentition, and in which the stools are many in number, green in color, or are slimy and streaked with blood, and accompanied by pain and cramp. He gives $^1/_2$ to 1 drachm. of the infusion to a child under one year, and double the quantity to a child over that age, giving it three times a day or oftener, according to the severity of the attack. He explains the rationale of this treatment by the power which chamomile flowers possess of subduing reflex excitability, a power residing in the volatile oil contained in them. Grisan was unable to tetanize, by means of strychnia, a decapitated frog which had been fortified with a dose of chamomile oil, and vice versa, when reflex excitability had been artificially produced by means of strychnia, it could be calmed again by chamomile oil.—*The Medical Age. Obstetr. Gaz.* June, 1883.