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COFFEE AS A BEVERAGE, ITS USE AND ABUSE.

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THE writer of this article, having noticed in a printed statement that Colonel Younghusband advised the preparation of a coldwater infusion of coffee as a beverage, to be taken during long outdoor journeys into the wild country of Thibet, was tempted to prepare coffee in the same way for home use. The result of experience taken in connection with the investigation of the well-known composition of the coffee bean seemed to show that the same method can also be greatly improved for domestic use over the usual preparation of making an infusion by the use of boiling water. A cup of coffee may be prepared by passing cold water through finely ground coffee contained in a porcelain or china percolator such as the Austrian coffee biggin; this extracts only one ninth of the bitter caffeine and one fifth of the tannin contained in this bean; it will also preserve the aroma of the volatile oils contained in this bean. These advantages are so obvious that it deserves mention to those who are fond of coffee drinking but who wish to reduce the unpleasant results such as wakefulness, excitability and disturbance of digestive processes, these conditions being largely due to the presence of caffeine and tannin, which are very much more soluble in boiling and hot water used in the ordinary culinary preparation.

The writer has tested this method for a period of more than five years and is well satisfied with the experience. The following article is intended to show the difference between coffee made in the ordinary manner and that made by the "cold-water method" which it describes later.

It may be interesting to learn the experience of one who has spent a long life in studying methods of preparing coffee beverage in various forms, namely, with hot water, boiling water and cold water solutions for drinking. The errors of making coffee beverage should be viewed from the standpoint of its chemical and physical constituents. This article will begin with a description of these.

The coffee bean, which is the product of cultivation in many tropical countries, is gathered and dried by the sun and imported to the various market centers, where it is used to a very large extent, at a distance from the country in which it is grown.

This coffee bean, as is well known, cannot be used to produce an agreeable coffee beverage unless it is roasted and carefully ground to a fine powder; it should, while roasting, be continually

agitated in order to remove the loose particles of its envelope, taking pains to heat the ground bean equally throughout its interior.

Coffee bean contains, among other substances, caffeine, tannin and the volatile oils; the latter give the aromatic flavor, which is stronger when the liquid coffee is hot. This aroma will be increased if the grinding of the bean is rapidly conducted, because the friction will set it free. These aromatic oils will be readily absorbed by cold water used in making an infusion.

The substance called caffeine is supposed to represent the active principle of coffee, and exists as a latent element in the coffee bean. When isolated it is a "white powder" having a slightly bitter taste and an acid reaction. At 77° F. it is soluble in one ninth of the amount of water required for its solution in hot water (175° to 212° F.); its solubility is increased in water containing cerium salts, potassium and sodium salts. These salts are usually contained in spring and well water (hard water).

It will thus be seen that caffeine at a high temperature will require 5.2 parts only of water for its solution, while at a low temperature it will require about nine times as much; and it will also be noticed that its solubility is increased by the presence of certain salts which are usually contained in spring and well water.

Caffeine when given as a medicine, separated from coffee, often causes headache, and in rare instances of susceptibility in the individual, mild form of delirium, noises in the ears and flashes of light, showing derangement of hearing and eyesight. Caffeine, especially in the form of caffeine citrate, is used in some cases to relieve headache, though in other susceptible individuals it may increase it. Where the action of caffeine is not followed by disagreeable sensations, as before stated, its absorption is often followed by increased mental action, sometimes a period of depression, oftentimes exhilaration, and in these cases interferes with sleep. It has the peculiar action of exciting the muscles, and in susceptible people may produce irregular muscular contractions and tremors. It may also sometimes affect the pulsation of the heart, causing irregular action and interfere with the equable effect of circulation throughout the whole body.

Tannin (or tannic acid) is another ingredient of coffee bean. The Pharmacopeia (United States, 1900) states that it is soluble in cold water only to a slight degree, but very soluble in boiling water, and in its solution will turn blue litmus paper pink, showing its acid reaction.

In the vegetable kingdom tannin is found in the oak-gall and in a large number of other growths; both tannin and gallic acid with iron solutions form an inky substance suspended in water, which is favored by heated water. The action of tannin when swallowed produces an astringent sensation in the mouth, throat and gullet, and a disagreeable oppressed feeling in the stomach. Pure tannic acid appears in the form of a yellow-colored amorphous powder. It is used in medicine as an astringent and pro-

duces a constriction of the smaller blood vessels to relieve hemorrhage; also by its astringent action within the alimentary canal to relieve diarrhea.

The volatile oils, which are set free by heating the ground coffee or by its infusion in boiling water, stimulate the interior surface of the stomach and bowels and thus favor the digestion by increasing the peristaltic actions of this part of the alimentary canal, especially in the primary stage of digestion.

Cushny¹ states that "in the stomach tannic acid combines with any proteid substance with which it may come in contact, precipitating it, but as digestion progresses this combination is broken up, as the peptones do not combine with tannic acid in acid solution during the second stages of stomachal digestion, and the astringent action is, therefore, exercised on the walls of the stomach and intestines. Ordinary quantities cause the same superficial coagulation as in the mouth, but if large doses be given when the stomach and intestine are not protected by foodstuffs, a more complete coagulation of the mucous membrane takes place and the consequent irritation results in vomiting, and sometimes in diarrhea.

"The local application of tannic acid causes a diminution of the secretions of glands, as has been demonstrated by Schutz. This is due to its effects upon the protoplasm of the secreting cells, which probably undergo the initial stages of coagulation. . . ."

Another local effect produced by tannic acid is seen in the cessation of the movements of the leucocytes in the tissues around the point of application and the arrest of their diapedesis through the walls of the vessels.

Cushny (p. 254) also states that "coffee is not used in medicine, but in view of its immense dietetic importance it may be mentioned here in what respects it differs from the pure caffeine. The coffee bean contains about two thirds of 1% caffeine, and the roasting does not seem to reduce this percentage at all, as was formerly supposed, and since almost all the caffeine is extracted by the ordinary hot culinary preparation, a cup of coffee contains 0.1-0 to 0.2 gm. (1½ to 3 gr.) of caffeine. Along with the caffeine there are extracted a number of other substances, the most important of which are volatile substances produced by the roasting, which have been called *coffeon*, and resemble in their action the volatile oils.

"The wakefulness and the relief from fatigue which are produced by tea and coffee are undoubtedly due to the caffeine contained in them, and are to be ascribed to the central action chiefly, although the action on the muscles may also be of some value here. On the other hand, the feeling of well-being and comfort produced by coffee after a full meal is probably to be explained by the local action of volatile oils in the stomach. The same result is produced by preparations of the other volatile oils, and, in fact, these are often added to coffee in the form of brandy and other

liquors. Apart from this local action the volatile parts of tea and coffee (*theon*, *coffeon*) seem to have no effect whatever on the economy. In the experiments on the activity of the digestive ferments outside the body it is found that caffeine increases slightly the rapidity of the process, but that coffee and tea retard it considerably. On the other hand, coffee, probably owing to the volatile oils, increases the peristaltic movements of the intestine, while caffeine has no effect on them. . . .

"It was formerly stated that coffee lessened the tissue changes and that it ought, therefore, to be included among foods, and one enthusiast even suggested that diet of tea and coffee exclusively should be served out in the besieged fortresses of France in 1870. It has been shown conclusively, however, that far from lessening the metabolism (organic interchange of tissue) of the body, coffee and tea increase it, the amount of urea and carbonic acid excreted being considerably augmented by their use. This is only to be expected from the increased activity of the nervous centers, which leads to increased movement and increased consumption."

Obviously, from the above review of the physical and chemical constituents of coffee, it will be observed that the beneficial effects of coffee beverage have a stimulant value upon the individual who drinks it. In order to avoid a deleterious, stimulating effect upon the body, caffeine and tannic acid should be excluded as far as possible from the cup of coffee, while as much as possible of the volatile oils should be included in it; coffee, therefore, should be taken with food and not on a fasting stomach. After a full meal, or during it, coffee is beneficial to digestion, as may be gathered by the foregoing remarks. If brain and muscular stimulation are desired, it is much better to take caffeine, the exact dose of which may be limited. Again it is obvious that the hot or boiling water used in preparing coffee beverage should be avoided, and the infusion of coffee should be made with cold water.

The writer of this article has for the last eight years prepared his coffee in a porcelain or china vessel with cold water, and has carried it away with him for two or three weeks at a time, during which it did not lose its color, strength or aroma if kept carefully corked in a cool place. He always prepares this infusion in a concentrated form, and just before drinking adds hot water, hot milk or hot cream (all these heated to boiling point), with the result of setting free the volatile oils. This produces a delicious cup of fragrant coffee, which is free from the bitter taste of an excess of caffeine and tannin. In order to make an agreeable cup of coffee the following directions should be carefully observed: Grind the coffee bean rapidly to a fine powder, as the heat from rapid friction will excite the evolution of the volatile oils. It is important that the grinding should be done immediately before preparing the extract. If the ground coffee stands in the air the volatile oils will evaporate. The coffee should be ground to an impalpable powder. Place the ground

¹ Pharmacology and Therapeutics, 1903.

powder in the upper part of an Austrian china "biggin" (percolator), leaving off the cover and the small saucer; put in a lump of ice and pour on cold water from a water tap (not well or spring water), and let the ice-cold water drip through the ground coffee, stirring the mixture carefully and thoroughly into a paste-like mass. To facilitate the percolation of the infused watery extract it is advisable to place a small piece of wood between the lower edge of the receiver which contains the coffee grounds and the upper portion of the vessel which receives the infusion, as this leaves a little air space between these parts. When the liquid coffee infusion has all dripped through the percolator, pour back through the wet grounds all the liquid from the bottom receiver and allow the percolation to go through the same process as before, replenishing the ice if necessary. Now place the lower portion of the "biggin" in a cool place and put on the cover. It should be noticed that the result of this, unless too much water is used in the percolation, will produce a very strong extract. This is desirable, because in preparing it for the cup it is advisable to add sufficient boiling water to reduce it to the required strength, and the boiling water will set free the aromatic volatile oils which give the agreeable flavor.

The use of a metal "biggin" for preparing an infusion of coffee is entirely wrong for the following reason: The vegetable matter suspended in the liquid infusion collects in the angles of the bottom receiver and rapidly becomes the center of a decomposition, the result of which is accompanied by the development of micro-organisms which destroy the suspended particles left in the infusion, and these particles are what contain the agreeable taste of coffee. On the other hand, clean china or glass does not collect these micro-organisms to any positive degree, especially when the coffee is kept in a cold place. Indeed, if the hot coffee be placed in a corked bottle in a cold refrigerator the rapid cooling of this liquid will so shrink its volume that the reduction of bulk will suck in the cork of the bottle. "Hard water" such as well or spring water should not be used in preparing coffee because both of these contain salts in solution, as previously mentioned, which favor an increase in the proportion of the caffeine and tannin contained in the bean and would give it a bitter taste. In restaurants, coffee is often prepared in large metal vessels, provided with a method of heating by gas or electricity so that it may be always kept hot and ready for use. This is one of the reasons why it has a charred taste. It would always be ready for use if made with cold water, and could easily be made hot by adding the boiling water when needed for use. If any of the readers of this article will try making coffee by the above method the writer feels sure that they will never again make boiled coffee to drink.

CITIZENS of Brantford, Canada, have subscribed \$7,000 of the \$15,000 required for the establishment of a hospital for the treatment of tuberculosis in that city. — *Jour. Am. Med. Asso.*

CASE OF IMPERFORATE ANUS.

BY L. C. KINGMAN, M.D., PROVIDENCE, R. I.

W. T., male, born Dec. 25, 1907, of healthy parents. No history of deformities in either family. The labor was short and uneventful except for an adherent placenta. On superficial examination the child seemed normal. The day following, about fifteen hours after birth, the nurse reported a restless night for the baby, it having cried almost continuously and vomited frequently green and brown vomitus. Clear urine had been passed, but the bowels had not moved. It had not been fed. On separating the nates the skin was found intact along the entire length of the median raphe. At the usual site of the anus was a small dimple about an eighth of an inch in depth, with reddened skin over it. On the child's crying there was some movement of the perineum, apparently muscular action, not fluctuation. Under light ether anesthesia, after passing a filiform to the bladder, a median incision was made from just back of scrotum to tip of coccyx. Dissection carried in this line to the depth of an inch. Front and back of the dimple, circular muscular fibers were encountered. At the bottom of this dissection the finger felt the concavity of the sacrum behind, and in front a baggy, fluctuating mass which proved on further dissection to be the blind end of the rectum. This pouch was freed up until it could be brought down into the wound nearly to the skin edge. Here it was anchored by chromic gut sutures as near as possible to the center of the circular muscle fibers. The pouch was then incised longitudinally and the edge of gut caught to the skin edge with gut sutures. The remainder of the wound closed with silkworm gut. The baby then proceeded to pass about a foot of meconium. He was in somewhat poor condition for the following twenty-four hours, but improved rapidly. The stitches were taken out in a week. The wound healed by first intention except a small area directly back of the anus, which granulated in readily. After the first week dilatation was begun, at first using soft rubber catheters every other day, and later bougies. At first some bleeding would follow, but became less as the size of the bougie increased. The time was lengthened and the size increased up to 30 F. After the first few months the size of the anus increased with the growth of the child independently of the dilatation. Has not been dilated now in six months. The bowels at first were kept free with milk of magnesia, though occasionally a fair-sized constipated movement was passed. The sphincter control has been good nearly from the start and now seems perfect. He had some diarrhea in the summer, but no loss of control at the time. About a week after the operation it was noticed for the first time that on hard straining a small amount of fecal matter was passed by urethra unmixed with urine. This has persisted, though becoming rarer, at times going a fortnight without so doing. The urine has always been clear. This part of the abnormality has occasioned no trouble except some local irritation, which was relieved by circumcision.

INTERMITTENT HYDRONEPHROSIS. WITH A REPORT OF FOUR CASES.

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