# Health Education Bulletin

Compiled by H. W. Vollmer, M.D.

Number 8

**SCIENTIFIC COUNTS AGAINST CAFFEINE BEVERAGES**

A. Sources of caffeine: It is an interesting fact that wherever these plants are found their extracts are used by the natives as stimulating beverages.

<table>
<thead>
<tr>
<th>Preparations</th>
<th>Country</th>
<th>Plant</th>
<th>Plant Part</th>
<th>Amt. of Caffeine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tea</td>
<td>China</td>
<td>Thea sinensis</td>
<td>Dried leaves</td>
<td>3% trace of theobromine</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>India</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ceylon</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>Africa</td>
<td>Coffee arabica</td>
<td>Dried leaves</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mate</td>
<td>S. America</td>
<td>Ilex paraguayensis</td>
<td>Dried leaves</td>
<td>1%</td>
</tr>
<tr>
<td>Cassino</td>
<td>South East U.S.A.</td>
<td>Ilex vomitoria</td>
<td>Dried leaves</td>
<td>?</td>
</tr>
<tr>
<td>Guarana</td>
<td>S. America</td>
<td>Paullinia Cupana</td>
<td>Ground seeds</td>
<td>4%</td>
</tr>
<tr>
<td>Kola</td>
<td>W. Africa</td>
<td>Cola Acuminata</td>
<td>Dried Colyledons</td>
<td>2% Theobromine (Trace of caffeine)</td>
</tr>
<tr>
<td>Cocoa</td>
<td>Central Africa</td>
<td>Theobroma Cocoa</td>
<td>Dried seeds</td>
<td>2% Theobromine (Trace of caffeine)</td>
</tr>
</tbody>
</table>

Crude preparations such as these naturally contain other pharmacologically active substances (tannins, volatile oils, alcohol and various aromatic compounds) which frequently contribute to the total effect. —Clinton Thienes, M.D., Ph.D., University So. Calif., Fundamentals of Pharmacology, 1945, p. 24.

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Caffeine content per cup of:

- **Coffee**: $1\frac{1}{2} - 3$ grains (1 tbsp. ground coffee)
- **Tea**: $1\frac{3}{8} - 2\frac{3}{4}$ grains
- **Coca-Cola**: $1 - 1\frac{1}{2}$ grains

The caffeine goes into solution with very little steeping or percolating of the beverage.

**Medicinal dose:**

Caffeine and sodium benzoate, $7\frac{1}{2}$ grs. by mouth or hypodermically.
B. Harmful effects of caffeine:

They deplete or draw on the body's vital reserves.

"I should like to say to every student that if he gets into a state in which he cannot work without coffee, he is drawing upon his reserves so that when he needs to make a spurt he will be unable to do so. In such a case what he really needs to clear his brain is a short period of rest from excessive study, with open air exercise and good sleep." W. A. Bastet, *Materia Medica, Pharmacology and Therapeutics*, p. 338.

"Students sometimes use caffeine to keep awake before an exam but it should be remembered that the principle here is the same as that used in whipping a tired horse, and the effect may be similar. p. 75-76.

"Palpitation, nervousness, and insomnia are common side-effects which limit the use of caffeine especially in susceptible persons. Those who work at night and depend on excess coffee to keep them awake are prone to develop these symptoms." Essentials of *Pharmacology and Materia Medica for Nurses*, Albert Gilbert, M.D., 2nd Ed., 1944.

II. They contain a habit-forming drug.

"Coffee is a drug. Those who are addicted to its use are drug addicts."—Dr. W. A. Evans, Health Commissioner of Chicago, Ill.

"Tea and coffee as well as most other drugs in common use are habit forming; all such drugs are nerve feeders, and often their chief harm consists in misleading the user to think he is well and rested when he is not, and so beguiling him into overwork or under rest. Moreover, experiments at the Pasteur Institute have shown that the long continued use of very minute doses of poison ultimately produces appreciable harm." Fisher and Fish in *How to Live*.

"The very fact that these beverages (coffee and tea) are such nervous stimulants should prohibit their use by children. By the same decision, coca-cola, which contains on an average from 1-1½ grains of caffeine to the glass, should not be a beverage for a child. The coffee, tea, coca-cola, or other caffeine habit, may be readily acquired by anyone, and may do as much harm, in some cases, as alcohol and tobacco."—Oliver T. Osborne, M.A., M.D., Prof. of Therapeutics, Yale University, *Principles of Therapeutics* p. 603, Philadelphia: W. B. Saunders Co., 1922.

"There is no question but that a caffeine habit can be acquired, whether as such (perhaps in the form of coca-cola) or as a tea or coffee habit. Coca-cola, tea, and coffee 'fiends' are common occurrence... It is not necessary here to discuss the end effects of the coca-cola habit; it is serious, and is especially harmful to children and youth. The cause of the habit is the caffeine in the mixture... The coca-cola habit is pernicious."


Headaches:

That this headache so commonly noted among coffee-habiteers is actually a "caffeine-withdrawal headache" is indicated by the studies of R. H. Dreisback and C. Pfeiffer who produced in '55% of all trials on 22 subjects, headaches extreme
in severity as the subjects had ever experienced" by the sudden withdrawal of caffeine. The characteristics of this common headache are: gradual onset, over a period of a few hours, preceded by lethargy and cerebral fullness. The actual headache, central or occipital in type, usually begins in the early afternoon, later becoming generalized and throbbing, reaching a peak within 3-6 hours. Associated with this headache were "mental depression, drowsiness, yawning, and disinclination to work." Goodman and Gilman. The Pharmacological Basis of Therapeutics, p. 283, 1941.

Dr. John Witherspoon, former president of the American Medical Association, is on record as declaring, "I regard coca-cola as habit forming. One glass creates a demand for another because it stimulates the user and makes him feel better. Then when the effect wears off the feeling is one of depression and he gets very nervous and seemingly cannot do without it very well." Life and Health, May 1944, article by Wells Allen Ruble, M.D.

III. They cause a stimulation which is followed by a depression that is as real and severe as the stimulation.

"An experiment was performed to test the time required to respond by muscle action to various kinds of nerve stimuli. In other words, the reaction time of the individual has been determined. After taking caffeine, they found the reaction time to be reduced 2-6%; but on the day following the tests, when caffeine had not been given, the reaction time was 2-7% slower than normal; in other words, there was depressed function following the use of caffeine." --Horst, K.; Robinson, W. D.; Jenkins, W. L.; J. Pharm. & Exp. Therap., 52: 307, 1934.

"Civilized man in this age is over-stimulated, and needs something to soothe and quiet him. He (and also she) is beginning to get that quieting from more tobacco than he (or she) ever before used. But if this does not satisfy him, he, also as well as those who do not smoke, will drink more tea and coffee. The result is greater nervous tension, greater nervous irritability, loss of sleep, more indigestion, and finally a loss of mental balance and of physical strength. We are now menaced with the probable overuse of tea and coffee; hence this warning is issued."—O. T. Osborne, M.D., "Principles of Therapeutics." p. 216.

"While caffeine is perhaps the best cerebral and mental stimulant we possess, and inhibits mental fatigue and allows longer continued work, it of course cannot take the place of the cerebral rest caused by sleep. Consequently, while it stimulates, it leaves the brain more fatigued after its action is over and when it is used repeatedly as a cerebral stimulant and to prevent sleep, when it is necessary for a person to be awake, it can do nothing but cause general nerve and brain fatigue unless adequate sleep is obtained." --O. T. Osborne, Principles of Therapeutics. p. 214.

"The average individual usually denies that he has experienced stimulation from ingesting a caffeine containing beverage. The reason for this is that the type of stimulation derived from small amounts of caffeine is so physiological that one is usually unaware of it. It is only by careful tests that the true action of the drug can be demonstrated. Excitation of the central nervous system is usually followed by depression." --Goodman and Gilman, The Pharmacological Basis of Therapeutics, p. 276.
"The degree to which an individual is stimulated by a given amount of caffeine varies. . . . Others boast of their ability to drink coffee and sleep like a log. . . . In fact, there are rare persons who are so sensitive to caffeine that even a single cup of coffee will cause a response bordering on the toxic." -- Goodman and Gilman, The Pharmacological Basis of Therapeutics, p. 283.

IV. They are harmful to vital organs of the body.

"The New York Extension Institute reports that out of more than 16,000 men examined, excessive use of alcohol was responsible for 7% of physical defects found, while coffee, tea were assigned as a cause of 50% of the difficulties found." -- Life and Health, Feb. 1939, p. 12.

"A large number of investigators condemn its habitual use even for the healthy. It is held by many medical men that the effects of coffee are wholly bad." -- Encyclopedia Americana.

"A Chase and Sanborn advertisement recently circulated by Standard Brands, Inc., which incidentally is also responsible for false and extravagant claims made for Fleischmann's Yeast, urges everyone to drink five cups of coffee a day, as representing the coffee tolerance of the average man or woman. Among the falsehoods appearing in this advertisement (for coffee) are the following: First, that new scientific findings have done away with that ancient superstition about too much coffee; second, that it is the rancid oil in stale coffee that is harmful; third, that five cups a day of fresh coffee is not too much; fourth, that this coffee is a natural, healthful aid to digestion. If there is any evidence to support any one of these claims, it is not available in modern scientific medical literature . . . . Such advertising is vicious and harmful in every sense of the word and must inevitably react unfavorably against those who are responsible for it." -- J.A.M.A., 99: 1784, Nov. 19, 1932.

(a) Effects on the nerves and brain.

"In larger (5 gr.) doses there is an increase in mental activity but ideas crowd into consciousness and it is hard to fix the attention on one subject. The patient is more wakeful. Finer movements are slightly less accurate. Yet if hard work is being done, the feeling of fatigue is less and more work can be accomplished." p. 142, Material Medica and Pharmacy for medical students by the Staff on Pharmacy-Pharmacology University of Toronto, 1943, 6th Ed.

It is possible for this stimulating action of caffeine on the brain to produce certain untoward effects upon a very ill patient. Physicians who make a practice of "treating the patient instead of the disease" occasionally are forced to decide that the resulting insomnia, increased sensitivity to pain, and in some cases the keener realization of the seriousness of the illness, outweigh any therapeutic effects secured from caffeine. Material Medica Pharmacology and Therapeutics by Maude B. Muse, p. 101, 3rd Ed., 1940.

"Emerson asserts that poisoning by alcohol, tea, coffee, and tobacco, form part of one of the four great group causes of heart disease.

"Some years ago the writer was sitting in an amphitheatre with a large number of other medical men, listening to Harold Styles, F.R.C.S., Edinburgh, the chief of Staff in the Royal Infirmary, Edinburgh, give a clinic on a woman who
was brought into the hospital in a stupor. The doctor went over the many symptoms and signs presented by the subject, and then, turning to the assembled physicians, asked, 'Now Gentlemen, you see this woman. You have heard her history. You have heard her symptoms. What is your diagnosis?'

"Without hesitation the doctors replied in unison 'An alcoholic.' 'No,' said the professor, 'She is not an alcoholic, she is a tea toper. I have brought this case before you to demonstrate the fact that tea drinking can produce many of the same symptoms and conditions that alcohol does.'" "Are Coffee and Soft Drinks Harmful?" by Wells Allen Ruble, M.D., Life and Health, May 1944, p. 17.

"The underlying mechanism of any of the actions of caffeine are so little understood that only guess as to their nature are possible at this time. It may be pointed out that drinking one cup a day may be over indulgence for an individual with unusual sensitivity, hyperirritability, insomnia, anxiety, exaggerated reflexes, and muscular tremors result from regular stimulation of the central nervous system and in extreme cases may lead to various neuroses." -- Fundamentals of Pharmacology by Clinton Theines, 1945, pp. 28, 29.

(b) Effects on the Heart.

HEART: "After high doses of caffeine, or the injection of large amounts in experimental animals, a definite tachycardia ensues from a direct stimulation of the myocardium. Eventually this stimulation may become so great as to cause cardiac irregularities. Occasionally, arrhythmias may be encountered in persons who use caffeine beverages to excess." -- Goodman and Gilman, The Pharmacological Basis of Therapeutics, p. 277.

Entirely too many night nurses have learned from personal experience the symptoms of "coffee heart" due to chronic caffeine poisoning. The distressing symptoms which result from unacquainted indulgence in several cups of coffee several times in twenty-four hours are enough to cause almost any normal person to become temporarily a hypo chondriac. The nervousness exaggerated reflex: insomnia, anxiety, neuroses, palpitation and other functional cardiac symptoms usually disappear, however, upon the discontinuance of the caffeine-bearing beverages. p. 107. Materia Medica Pharmacology and Therapeutics by Maude B. House, RNAM, 3rd Ed., 1940.

(c) Effects on Stomach and Intestines:

The caffeine has a stimulating effect in the stomach and the caffeoil and extractive matter are irritating. "Pincusohn has found coffee to result in a prompt increase in the amount of the acidity of the gastric juice. . . . Tea --because it contains less extractive matter than coffee, properly made tea is less disturbing to the stomach. Strong tea contains much astringent tannic acid and tends to lessen gastric secretion to retard absorption and constipate." --Eastedo Materia Medica, Pharmacology and Therapeutics, p. 337.

"Judd observed acute and subacute gastric ulcers in 40 to 50 per cent of cats when they were given caffeine in a beeswax-petroleum mixture to insure the slow and more prolonged absorption of the drug." -- E. S. Judd, Bull. Am. Coll. Surg. 28:46, August, 1943.
Conclusions of article by J. A. Roth, M.D. Ph.D. JAMA, November 25, 1941, p. 819--

"1. Caffeine in relatively large doses causes acute and subacute ulceration of the gastric mucosa in cats.

"2. Caffeine (80-250 mg) stimulate gastric secretion in man and the cat, but not in the dog.

"3. Caffeine acts synergistically with histamin or alcohol in stimulation of gastric secretion in man and the cat.

"4. Caffeine and caffeine-containing beverages provoke a prolonged increase in the total output of acid by the stomach in patients with "peptic" ulcer.

"5. Five of a group of 50 normal or asymptomatic human subjects responded to the caffeine test meal, like an ulcer patient. Three of the 5 have subsequently developed the ulcer type of distress, and 1 of these has developed an ulcer as demonstrated by Xray.

"6. The evidence indicates that the excessive use of caffeine-containing beverages may contribute to the pathogenesis of 'peptic' ulcer in the ulcer susceptible person and will render the therapeutic management of the condition more difficult."

(d) Effects on the kidneys.

Richards finds by direct observation with the microscope that relatively few of the glomeruli are active in the normal kidney, while under the action of caffeine a great many more become active. The increase in urine, therefore, seems to be due to an increase in the number of active glomeruli. --McQuigian Applied Pharmacology, p. 399.

V. They decrease mental and physical efficiency.

"In Germany Dr. Voight studied the effect of ordinary coffee on the efficiency of soldiers whose service consisted largely in measuring distances from moving objects. The tests were made on ten men, and covered a period of eight weeks. It was found that the drinking of coffee impaired the efficiency of 23\%.

JAMA, March 28, 1936.

"Hawk in studying the effects of coffee drinking among 100 young men observed a definitely unfavorable action in nervous and mental reactions. The coffee drinkers were shown to be less accurate in color selection, in target practice, and in drawing a straight line. Horst and co-workers reported that both caffeine and coffee taken daily produced a sustained deleterious influence on the performance of acquired motor skills."

VI. They weaken the will power and teach the nervous system to lie.

"Many natives reach a condition where their craving for tea is so imperative that they sell their belongings and their tools in order to procure it, and in many cases take to thieving." Good Health, June 1935.

"Two hundred years ago one of the kings of England prohibited tea taverns, because as he said, they threaten the peace and good order of his kingdom; people gathered there and drank tea until they became careless and talked treason."
A Spurious Basis for Happiness

"The basis of intemperance is the effort to secure through drugs the feeling of happiness when happiness does not exist. They destroy their nervous system for the tingling pleasure they feel as its structures are torn apart. There are many drugs which can cause this pleasure, and in proportion to the delight they seem to give is the real mischief they work.

"Pain is the warning to the brain that something is wrong in the organ in which the pain is felt. Sometimes that which should be felt as pain is interpreted as pleasure. If a man lay his fingers upon an anvil and strike them one by one with a hammer, the brain will feel the shock as pain. It will give orders to have the blows checked. But if, through some abnormal condition, some twist of the nerves, or clot on the brain, the injury were felt as exquisite delight, there would arise the impulse to repeat it. This would be a temptation. The knowledge of the injury which the eye would tell the brain would lead the will to stop the blows. The impulse of delight would plead for their repetition; and in this fashion the hand might be sacrificed for a feeling of pleasure, which is no pleasure at all, but a form of mania. Of this character is the effect of all nerve-excitng drugs. As a drop of water is of the nature of the sea, so in its degree is the effect of alcohol, opium, tobacco, cocaine, kola, tea, or coffee of the nature of mania. They give a feeling of pleasure or rest, when rest or pleasure does not exist. This feeling arises from injury to the nerves which the brain does not truthfully interpret.

"Some phase of mental unsoundness is the natural effect of any of those drugs called stimulants or narcotics. Alcohol gives a feeling of warmth or vigor or exhilaration, when the real warmth or vigor or exhilaration does not exist. Tobacco gives a feeling of rest which is not restfulness. The use of opium seems to intensify the imagination, giving its clumsy wings a wondrous power of flight. It destroys the sense of time and space; but it is in time and space alone that man has his being. Cocaine gives a strength which is not strength. Strychnine quickens the motor response which follows sensation. Coffee and tea, like alcohol, enable one to borrow from his future store of force for present purposes. And none of these make any provision for paying back the loan. One and all, these various drugs tend to give the impression of a power, or a pleasure or an activity, which we do not possess. One and all their function is to force the nervous system to lie. One and all, the result of their habitual use is to render the nervous system incapable of ever telling the truth. One and all, their supposed pleasures are followed by a reaction of subjective pains as spurious and as unreal as the pleasure which they follow. Each of them, if used to excess, brings in time insanity, incapacity, and death. With each of them, the first use makes the second easier. To yield to temptation makes it easier to yield again. The weakening effect on the will is greater than the injury to the body."

-- David Starr Jordan -- President of Leland Stanford University.
(1891-1916)
Note how medical science places the cola drinks containing caffeine in the same class with tea and coffee.

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"Nutritionally, whisky, candy, carbonated beverages are on the same caloric basis, having the same effect on the vitamin-calory ratio. Coca-cola is 10 per cent sugar. In 6 ounces there are 18 grams of sugar, 72 calories, the same as in 2½ cubic centimeters of whisky. A bottle of coca-cola and a little bit more than two-thirds of an ounce of whisky contain the same number of calories. Coca-cola contains no vitamins. Pepsi-cola is twice as bad, for it contains twice as much sugar." -- Norman Jolliffe, M.D., "The Nutritional Aspects of Alcohol," Scientific Temperance Journal, Autumn, 1944.

"In considering cocoa as a beverage for children, it should be regarded as a stimulant, similar to coffee. Made with 2/3 tsp. per cup of milk contains 1/2 grain theobromine. Two tsp. per cup contains 1.2 to 1.6 grains." -- Journal of the American Medical Association, January 31, 1939, p. 263.

Medical science speaks also regarding this form of intemperance.

The following appeared in the Journal of the American Medical Association, November 7, 1942, page 763 in the section, "Council on Foods and Nutrition":

"... The consumption of sugar and of other relatively pure carbohydrates has become so great during recent years that it presents a serious obstacle to the improved nutrition of the general public.

"It is obvious that a school lunch suffers gross deterioration when the beverage chosen in place of milk is a solution of sugar in flavored water. It also is generally conceded that excessive sugar eating between meals, or sugar eaten in smaller amounts within an hour of the regular mealtime, impairs the appetite for food at meals."

"Faulty diet produces another fundamental defect in the average drinker. He has partaken of high caloric foods from youth up, eating when and as he pleased. He has used sweets until his system has grown dependent upon frequent food-energy renewals. This continual habit of food-stimulation has checked normal nutritional unfolding, and he reaches puberty already a toxic dependent upon soda-counter dopes, hourly confections, ham and fried egg sandwiches, hot dogs, hamburgers, or
barbecues. Without their fortification he promptly is restless and has a gnawing emptiness. Already a vitality-deficiency has developed; it is but a step from this food-crave to the quicker satisfaction of some artificial pick-me-up. So far from being the adult who works and strives in comfort on three square meals a day, he is nutritionally but an overgrown infant, still bottle-fed." -- What Price Alcohol, p. 53.

"Food is the chemical basis of health and vitality. Fears that her child may get something poisonous as he roots around the garden, or get stung by some poisonbug as he gathers wildflowers, provoke a fusillade of don'ts. Meanwhile, within his little body the same mother has already initiated the chemical disturbances which evolve into chronic self-poisoning through frequent piecing between meals of sweets and rich foods 'to give him strength'." -- What Price Alcohol, p. 52.

"It will pay you, mothers, to use the precious hours which are given you by God in forming the characters of your children, and in teaching them to adhere strictly to the principles of temperance in eating and drinking.

"A sacred trust is committed to parents, to guard the physical and moral constitutions of their children, so that the nervous system may be well balanced, and the soul not endangered. Fathers and mothers should understand the laws of life, that they may not, through ignorance, allow wrong tendencies to develop in their children. The diet affects both physical and moral health. How carefully, then, should mothers study to supply the table with the most simple, healthful food, in order that the digestive organs may not be weakened, the nerves unbalanced, or the instruction which they give their children counteracted." --Fundamentals of Christian Education, p. 143.


"We have no right to indulge in anything that will result in a condition of mind that hinders the Spirit of God from impressing us with the sense of our duty. It is a masterpiece of satanic skill to place men where they can with difficulty be reached with the gospel." --Counsels on Health, p. 432.

"And thine ears shall hear a word behind thee, saying, this is the way, walk ye in it, when ye turn to the right hand, and when ye turn to the left." Isa. 30:21.

"I will hear what God the Lord will speak: for he will speak peace unto his people, and to his saints: but let them not turn again to folly." Psalm 85:8.