

Non- alcoholic Beverages

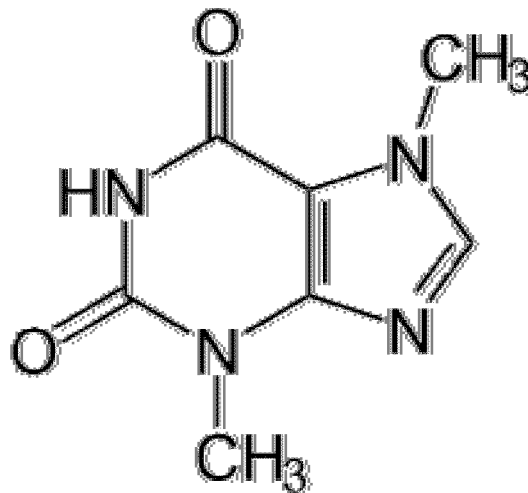
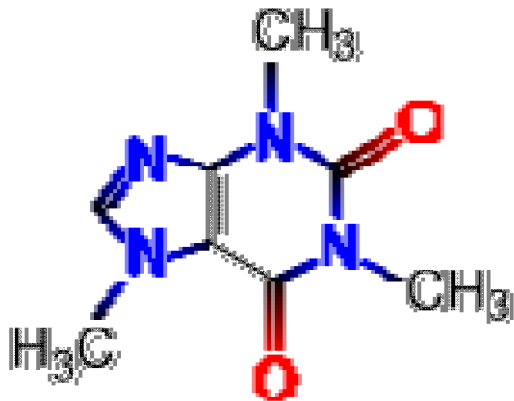
Breakfast Drinks from Plants

Drink for Caffeine

- Beverages that contain caffeine or purine derivatives, are used world wide for their stimulating and refreshing qualities.
- Caffeine is an alkaloid that is a diuretic and nerve stimulant (<2%)

Purines

- Small molecules that contain nitrogen possessing purine skeleton.
- 15 compounds are reported
- Adenine and Guanine are nucleotides



Caffeine and adenosine

- Adenosine found in brain binds to adenosine receptors.
- The binding of adenosine causes drowsiness by slowing down nerve cell activity.
- In the brain, adenosine binding also causes blood vessels to dilate (presumably to let more oxygen in during sleep).

Affects of caffiene

- Caffeine looks like adenosine and binds to the adenosine receptor – competitive inhibitor
- Since there is no adenosine to slow, the cells speed up by increases neuron firing.
 - Adrenalin is produced
 - Fight or flight situation
 - Increase in breathing, heart rate, blood sugar and muscle tighten up.
 - Causes the brain's blood vessels to constrict (an affective headache medicine anacin.)

Three musketeers

Tea from Asia

Coffee from Africa

Coca South America

Countries involved

- Originated in around Tibet and is also indigenous to Assam, China and Southern Cambodia
- Production:
 - Asia – 70%
 - India 30% but consumes more than 50%
 - Sri Lanka – 10%
 - East Africa –Kenya
 - Indonesia, Thailand, China, Turkey, USSR
- British are world's biggest tea drinkers

Plant

- *Camellia sinensis*
 - *Two main varieties*
 - *C.sinensis var. sinensis*
 - *C. sinensis var. assaminca*
- *Family: Theaceae*
- Mainly grown in subtropics and mountainous regions of tropics
- It can be grown from above sea level and just over 2100 meters

<http://davesgarden.com/pf/showimage/22980/>



Morphology

- Small evergreen trees
- From rooting of cuttings to maintain uniformity of particular variety
- They are allowed to grow knee high for easy picking
- Mature when 4 yrs
- Only first two young leaves and the terminal buds called as “flush” are picked (high concentration of caffeine)
- Can be picked every 10 -14 days

Tea Types

- Assam tea – Black tea, “heavy” stronger
- Black tea: Process involves
 - Withering by blowing air through the leaves that are in troughs to reduce water content and enzymatic release of aroma
 - Fermentation – by rolling leaves and leaving them in a warm damp condition to rupture cells, allow oxidation of phenolics and turn copper color
 - Finally dry or fire the tea leaves with hot air to remove excess water, gives black color
- Chinese tea – Green tea, flowery flavor and light
 - Freshly picked leaves are steamed and dried without the withering stage and thus retain a faint but distinctive ‘grassy’ taste, and their green color.

Interesting tea varieties

- Chai – India, taken with spices and milk
- Herbal "Tea". Herbs such as chamomile, mint, sage, thyme and rosemary are commonly used as infusions.
- White tea (bud)
- Pu-erh (bacterial fermentation)
- Scented teas (held with flowers) ..

Chemistry of tea

- Caffeine the stimulant 3-4%, theobromine (.017%) and theophylline (.013%)
- Tannins (ECG)
- Polyphenols – flavonoids, catechins
 - Antitumor and antimutagenic
 - Prevent tumor cell growth and division
 - Green tea is 6 times better than black tea

Coffee

- Second only to petroleum, as a revenue earner, coffee is an immensely valuable commodity.
- This drink revives 1/3 of world's population.
- Finns drinks on average 5 cups each day
- Japanese bath in coffee grounds for the health giving properties
- Turks scan the dregs of their coffee cups for omens of future

Discovery

- East African origin
- Native of Abyssinia
- By Ethiopians goatherds
 - Noticed that their goats were unusually frisky after eating the ripe red berries of wild coffee bushes
- 2nd AD, local tribe men
 - made small cakes from the pulverized fruits mixed with fat and grains to sustain them on long journeys and to relieve fatigue
 - Made stimulant drink by fermenting berries and mixing with water.
- Arabs were the first to brew coffee

The plant

- *Coffea arabica* (arabica coffee) – 75%, *C. canephora* (robusta coffee) 24% and *C. liberica* are grown commercially
- Family - Rubiaceae
- Three varieties are known
 - Arabica
 - Robusta
 - Liberica

<http://www.google.com/search?sourceid=navclient&ie=UTF-8&rls=GGIH,GGIH:2007-04,GGIH:en&q=picture+of+coffee+plant>



Morphology

- Source of coffee is the seed that is part of a fleshy berry (sometimes called as cherry)
- Grows well at higher elevation. Plants are grown directly from seed. Harvesting after 3 -5 yrs and will produce coffee for 30 yrs.
- Small tree with glossy, evergreen leaves and white, sweet smelling flowers
- After fertilization, mature berries turning dark green to yellow then red.
- Inside the sweet pulpy outer layers are two coffee-seed surrounded by a delicate silvery seed coat.
- Cannot tolerate frost they are grown in tropical and sub-tropical countries with an average rainfall of at least 1.9 meters per annum

Coffee Types

- **Espresso** - a 30ml (1 oz.) shot of rich, full bodied dark coffee with a silky layer of crema
- **Latte** - a standard Espresso with hot milk topped by a small layer of silky milk foam.
- **Cappuccino** - a standard Espresso with silky foamed milk poured into it, topped with a dusting of chocolate powder.
- **Mocha** - a standard Espresso, hot chocolate and hot milk served in a glass.

Processing

- Harvesting the fruits – called cherry
- Fermenting:
 - The sweet pulp which surrounds the coffee beans (really seeds) is removed in one of two ways.
 - Dry process – produces beans sometimes known as ‘hard’, ‘native’, or ‘natural’ in trade
 - Dry whole fruit in the sun
 - Remove dried pulp and fine endocarp and the silver lining around the seed
 - Wet processing produces mild but superior flavor coffee
 - Depulped machine
 - The parchment is washed and left for fermenting for 12 -24 hrs – leading to chemical change takes place to give characteristic aroma and taste
 - Beans then dried and the fine endocarp is removed

Processing

- Roasting – reduces the moisture and bring out aromatic oils
- Very sophisticated-computer control mechanism is involved
- Varieties: variety of coffee, region it is grown, preparation method and roasting time
- Instant coffee making
 - Coarsely ground coffee is placed in sealed stainless percolators and brewed under pressure for several hrs.
 - Coffee aroma is added
 - The concentrate is either
 - sprayed under high pressure through fine nozzles into a very high towers. As the liquid falls back it dries into powder which is tumbled with steam to form granules OR
 - Freeze dried - Coffee brew is dried into thin sheets which is often cut into granules. Temperature is then raised under vacuum. This will water is “boiled –off” without the coffee getting wet. There is no heat damage or loss of aroma

Coffee Chemistry

- Since it is a seed, it has cotyledons (young leaves) and embryo. Similar to a seed it has
- Caffeine (1-2%) and annins (3-5%) – prevent insect attack
- Chlorogenic acid, Sugars (15-17%), Fatty oils (10 -15%) and Proteins (10 -15%) – nutrients for the embryo

Cocoa

- Cocoa and chocolate are prepared from the seeds of the cocoa tree
- A native of Mexico and found in South American rainforest
- It was chief drink of the Aztecs and other native Americans
- Cocoa beans were used as currency by Aztecs
- The use of cocoa by other than natives is of recent origin

Cocoa

- *Theobroma cacao* (meaning food of the Gods)
- Family - Sterculeaceae
- It is a small tree 15 – 25 ft, with numerous branches. The flowers and fruits are borne directly on the tree trunk.
- Mature at 4 – 5yrs. It flowers throughout the year, so one gets several crops annually

<http://www.molon.de/galleries/Malaysia/WestCoast/Cocoa/>



Cocoa process

- Source of cocoa is the seeds
 - Harvesting - a large pod with mucilage pulp and 40 – 60 seeds
 - Fermenting – seeds
 - Roasting - in iron drums to develop flavor and increase the fat and protein content and lower tannins
 - Grinding - to an oily paste – the bitter chocolate

Types of chocolate

- Baking chocolate – pure cocoa
- Cocoa powder – cocoa with butter removed
- Semisweet chocolate – pure cocoa liquor with extra cocoa butter and sugar
- Milk Chocolate – semisweet chocolate + milk
- White chocolate – cocoa butter + sugar + milk, no cocoa bean solids

Chemistry

- Contains caffeine alkaloid called theobromine (1 -3%) – the stimulant
- Caffeine (.2 – 3%)
- It also has fat (35-40%) and starch (15%)
- It also contain phenyl ethylamine, a natural amphetamine found in human brain, which induces feeling of euphoria
- The level of this is claimed, decrease when one is in love-sick – explaining the craving of chocolate as a solace at such times
- Also has reputation as an aphrodisiac and Casanova is said to prefer this as an inducement to romance