Camellia sinensis (L.) Kuntze

General

Tea was first cultivated in China in 6 or 7 AD. Arab travellers brought news of it to Europe in the 9th century. The East India Company started importing it in 1660, and by the end of the 17th century tea drinking had become established in England. Tea has been official in Germany since the middle of the 17th century. It was described both as a food and semi-luxury food, and as stimulant. Tea has a mildly analgesic, stimulating effect in moderation. It is used for fatigue symptoms, migraine, short-term treatment of diarrhoea and to increase performance. Excessive consumption, especially of green tea, can produce insomnia and nervous activity. Green tea is dried for a shorter time than black tea, and heated sooner to prevent fermentation.
The medicinal part is the very-young downy leaves, from which green or black tea is prepared according to the treatment being given.

Etymology

The plant was named by the botanist and zoologist George Joseph Kamel/Kammel (1661-1706) who brought it back from an expedition to the Philippines. 'Sinensis' indicates Chinese origin, after the Greek 'sinai, thina' (China).

Botany

Flower and Fruit: The flowers grow short-pedicled and singly or in cluster of a few flowers in leaf axils. They are white or pale pink and have a diameter of 3 to 5 cm. They have between 5 and 7 sepals and petals at a time. The petals are fused at the base with the numerous stamens. The ovary has 3 chambers. The fruit is a greenish-brown, woody capsule with a diameter of 1 to 1.5 cm and has 1 to 3 smooth brown seeds.
Leaves, Stem and Root: The plant is an evergreen, heavily-branched shrub. The leaves are alternate, short-petiolate, coracious, dark green, glossy, lanceolate or elongate-ovate, roughly serrate and when young appear silver because of the covering of downy hairs on the surface.

Habitat

The plant does not originate from the wild. It was originally cultivated in China and is grown as a tea plant today in India, China, Sri Lanka, Japan, CIS, Indonesia, Kenya, Turkey, Pakistan, Malawi and Argentina

Synonyms

Camellia assamica (J.W. Masters) W. Wight
Camellia bohea (L.) Sweet
Camellia chinensis (Sims) Kuntze
Camellia oleosa (Lour.) Rehder
Camellia thea Link
Camellia viridis (L.) Sweet
Thea bohea L.
Thea cochinchinensis Lour.
Thea grandiflora Salisb.

Thea macrophylla Makino
Thea oleosa Lour.
Thea parviflora Salisb.
Thea sinensis L.
Thea stricta Hayne
Thea viridis L.
Theaphylla assamica J. W. Masters
Theaphylla cantonensis (Lour) Raf.
Theaphylla lanceolata Raf.
Theaphylla laxa Raf.
Theaphylla viridis Raf.

Vernacular Names

Black Tea (eng.)
Cajnoe derevo (russ.)
Chinese Tea (eng.)
Green Tea (eng.)
té (esp.)
Tea (eng.)
Tea plant (eng.)
Tee, chinesischer (ger.)
Tee, russischer (ger.)
Tee, schwarzer (ger.)
Teestrauch (ger.)
Théier (fr.)

Drugs

Theae folium (+)

Theae folium (+)

Usage

Internal application: migraine, symptoms of fatigue and a short-term treatment for diarrhoea. It can be used to increase performance.
Homoeopathy: cardiac and circulatory conditions, headaches, states of agitation, states of depression and stomach complaints.
Indian medicine: diarrhoeal diseases, loss of appetite, hyperdipsia, migraine, cardiac pain, fever and fatigue.
Chinese medicine: migraine, nausea, diarrhoea resulting from malaria and digestion problems.

Dosage

Tea: boiling water is poured over a heaped teaspoon of leaf tea, a level teaspoon of crushed leaves or a tea bag and left to draw for 3 to 10 minutes as required. The caffeine is almost completely drawn after approx. 3 minutes. The tannins, which are the antidiarrhoeal agent, are only fully drawn after approximately 10 minutes or longer.
Homoeopathic: 5 to 10 drops, 1 tablet, 5 to 10 globules or 1 rubbed knife-tip 1 to 3 times daily or 1 ml injection solution sc twice weekly (HAB).

Modes of Action

The most pharmacologically important constituent of the tea leaves is caffeine. Its antagonistic effect on the adenosin receptors causes a release of the neurotransmitters dopamine, GABA and seratonin, thus leading to a stimulation of the central nervous system. It has been repeatedly demonstrated that caffeine increases concentration, reaction and learning capability, particularly in the presence of tiredenss, and improves information processing processes in the human brain (Lorist et al. 1994, Akerstedt und Ficca 1997).
Caffeine is positively inotropic, promotes the secretion of gastric juices, glycolysis and lipolysis.
In animal tests, bradykinin and prostaglandin antagonism caused a capillary sealing (Vitamin P) and anti-inflammatory effect.
The polyphenols contained in green tea inhibit the enzyme a-amylase, which plays a key role in the metabolism of starch into sugar and which offers a possible point of attack for the treatment of obesity. A fraction of catechins reduces the amylase activitiy in the intestine and the glucose and insulin levels in the blood, both with rats and in a case study involving humans. The catechins also retarded the accumulation of body fat and reduced the serum cholesterol level animal experiements. Green tea extracts also enhanced the burning of fat in humans (Dullo et al. 1999). The catechins are strong antioxidants (Vinson et al. 1995), which can inhibit lipid oxidation (Nanjo et al. 1993, Hong et al. 1994).
The polyphenols of green tea cause a complete inhibition of carcinogenic streptococci and other bacteria which cause inflammations in the mouth and throat cavities (Makimura et al. 1993, Sakanaka et al. 1996). Green tea extracts also have an inhibitory effect on Staphylococcus aureus and epidermidis, various Salmonella species, Shigella flexneri and dysentrial and Vibrio cholerae (Mitscher et al. 1997). A protective effect of the polyphenols was demonstrated with viral hepatitis in a rat model (Mitscher et al. 1997), as was the way that green tea in general is able to protect the liver against toxic influences (Luper 1999).
The polyphenol fraction or the entire extract from green tea exhibited manifold antimutagenic and anticarcinogenic effects in animal experiments (Chen 1992, Conney et al. 1992, Hayatsu et al. 1992, Mukhtar et al. 1992, Xu et al. 1992). Caffeine as well as the polyphenols of green tea cause a growth inhibition in cultures of different human tumour cells (breast, intestine and lung carcinoma and melanoma) (Valcic et al. 1996). A study involving healthy male smokers and non-smokers indicates that green tea is

able to block the cell mutations caused by cigarette smoke (Lee et al. 1997). Epidemiological investigations indicate a connection between the consumption of green tea and a reduced cancer mortality (Oguni et al. 1992, Yang und Wang 1993).

Use Restrictions

No health hazards are known in conjunction with the proper administration of designated therapeutic dosages. Side effects of tea consumption are possible with persons who have sensitive stomachs, chiefly brought about by the chlorogenic acid and tannin content. Hyperacidity, gastric irritation, reduction of appetite, as well as obstipation or diarrhoea could be the result of intense tea consumption. These side effects could be generally avoided through the addition of milk (reduction of the chlorogenic acid and other tannins). Care should be taken with persons who have weakened cardiovascular systems, renal diseases, thyroid hyperfunction, elevated susceptibility to spasm and certain psychic disorders, for example panicky states of anxiety.
Overdosage (quantities corresponding to more than 300 mg caffeine, or approx. 5 cups of beverage tea in rapid succession) could lead to restlessness, tremor and elevated reflex excitability. The first symptoms of poisoning are vomiting and abdominal spasm. Fatal poisoning is not possible with tea beverages. With long-term intake of dosages above 1.5 g caffeine/day, non-specific symptoms occur, such as restlessness, irritability, sleeplessness, palpitation, vertigo, vomiting, diarrhoea, loss of appetite and headache. Pregnant women should under no circumstances exceed a dosage of 300 mg/day (5 cups of tea spread out over the course of a day), and in fact should avoid caffeine altogether. Infants whose breast-feeding mothers consume beverages containing caffeine could suffer from sleep disorders.
The absorbance of alkaline medications could be delayed because of chemical bonding with the tannins.

Specification

Tea leaves are the fermented and/or dried leaves of Camellia sinensis (L.) O.
Kuntze.

Origin
Cultivated mainly in India, Sri Lanka and China.

Production
C.sinensis is cultivated in South China, Assam and Sri Lanka. Harvesting is carried out under stringent quality control.

Forms
Whole, cut and powdered drug.

Adulterations and Mistaken Identity
There are many cases described in the literature. It is therefore recommended that the leaves be examined under UV light. Tea leaves do not flouresce in contrast to most of the species it can be confused with.

Preparation
Filter tea bags are available commercially containing 1.8 to 2.2 g tea.
Dried extract (instant tea): using steam extraction followed by drying.

Identification
Microscopically and using TLC methods.

Purity
Ash content: 5 to 6.5% (Helv V)
Heavy metal content of ash: maximum 8.5% (Helv V)

Content and Content Assay
Caffeine content: minimum 2.2% (Helv V)
Water soluble extract substances: minimum 32% (Helv V)
Caffeine determination possible with TLC, GC, HPLC and titration.

Storage
Tightly sealed and dry; store separately from other chemicals and aromatic substances.

Form of Commercial Pharmaceutical Preparations
Tea leaves, tea bags and tablets.

Substances

- purine alkaloids (methyl xanthines): caffeine (previously referred to as theine or teine; depending upon the development stage of the leaves, 2.9 to 4.2%, content declining with age), theobromine (0.15 to 0.2%), theophylline (0.02 to 0.04%)
- triterpene saponins (theafolia saponins): aglycones including barringtogenol C, R1-barrigenol, ester saponins estered with cinnamic acid or angelic acid
- catechins: in unfermented (green) tea, 10 to 25%; partially changing over through fermentation into such oligomeric quinones with tannin character as theaflavines, theaflavic acids, thearubigens, or non-water soluble polymers
- flavonoids (ca. 1.5%): including quercetin, kaempferol, myricetin
- caffeic acid derivatives: including chlorogenic acid, theogallin
- anorganic ions: high fluoride (130 to 160 mg/kg), potassium and aluminium ions contents
- volatile oil: chief component linalool, in fermented tea 2-methyl-hept-2-en-6-one, alpha-ionone and beta-ionone as well; more than 300 volatile compounds are involved in tea aroma

Usage in Foods

Tea is another functional food per se due to its stimulating, diuretic, mildly analgesic and significant anti-diarrhoeal effects as well as possible anti-arteriosclerotic and "vitamin P" activities. Green tea is reported to possess anti-tumor properties.

Synonyms

Folia Theae
Folium Theae

Vernacular Names

Caj (russ.)
Feuilles du Théier (fr.)
Té (esp.)
Tea (eng.)

Tee (ger.)
Thé (fr.)

Indications

cardiodynia (Asian, I)
diarrhoea (Other, ?)
dyspeptic complaints (Asian, C)
dyspeptic complaints (Other, ?)
fever (Asian, I)
headache (Hom.)
headache (Asian, C)
heart disorders (Hom.)
insomnia (Hom.)
malaria (Asian, C)
migraine (Asian, I)
somnolence (Asian, C)
travel sickness (Other, ?)
vertigo (Asian, C)

Safety

Specific use restrictions.

Comm. E Monographs

None

Efficacy

As a result of the well-investigated constituents caffeine, flavanols and flavanoids, and of the current state of empirical data, it can be assumed that the drug is effective as a migraine remedy, signs of tiredness and diarrhoea, in addition to being a performance stimulator. The antioxidant/anticarcinogenic characteristics with which the drug is credited require further investigations, as do the capillary-sealing and anti-inflammatory effects.