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TEA

BY

LLEWELYN WILLIAMS

CURATOR OF ECONOMIC BOTANY



BOTANY
LEAFLET 21

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FIELD MUSEUM OF NATURAL HISTORY
CHICAGO
1937

The Botanical Leaflets of Field Museum are designed to give brief, non-technical accounts of various features of plant life, especially with reference to the botanical exhibits in Field Museum, and of the local flora of the Chicago region.

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CLIFFORD C. GREGG, DIRECTOR

FIELD MUSEUM OF NATURAL HISTORY
CHICAGO, U. S. A.

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FLOWERING AND FRUITING BRANCH OF A TEA-BUSH
From an exhibit in Field Museum

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FIELD MUSEUM OF NATURAL HISTORY

DEPARTMENT OF BOTANY

CHICAGO, 1937

LEAFLET NUMBER 21

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TEA

Tea is prepared from the young leaves of an evergreen shrub or small tree, native to the uplands of southeastern Asia's monsoon regions. In 1753, Linnaeus described the plant as a single species, *Thea sinensis*. Later, however, he recognized two species, *Thea Bohea* and *Thea viridis*, as cultivated in China, and it was long thought that these were the origin of black and green tea respectively. Most botanists now agree that there is only one species and that the various forms are varieties of it.

When left to its natural habit of growth and not subjected to the repeated pruning necessary for the production of a size and shape convenient for plucking, the tea plant may attain the dimensions of a tree, 20 or 30 feet in height. Its leaves are elliptical-oblong or lanceolate-pointed, toothed along the margin except at the base, smooth on both sides, green, shining, and supported on short stalks. Oil glands present in the substance of the leaf contain an essential or volatile oil. The flowers, resembling those of the mock orange, are slightly fragrant, white or cream-colored, and appear solitary or in clusters of two or three in the axils of the leaves. The fruit is a 3-celled capsule, usually with one large spherical seed in each rounded compartment.

The tea plant thrives best in humid tropical or subtropical regions with high temperatures, a long growing season, and a heavy, well-distributed rainfall to ensure a continuous, rapid growth of new and tender shoots. It favors rocky, undulating tracts where water flows freely, yet without washing away the light, friable soil.

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HISTORICAL ASPECTS

Much controversy has arisen as to the original home of the tea plant, the point in question being whether it originated in China or in the neighboring Indian province of Assam. Some maintain that plants had been transported from India into China for cultivation; others believe that the tea plant was carried from China to India despite the fact that the shrub was discovered in 1823 growing wild in northeastern India. The modern view is that the plant is indigenous to the hill-lands and mountains of southwestern China, northern Siam, upper Indo-China, eastern Burma, and Assam.

Tea as a beverage had its genesis in China untold centuries ago, but its early history is lost in the obscurity of China's antiquity and for the most part is traditional. Probably it will never be known when tea was first used, nor how it was discovered that tea leaves could be treated to make a palatable beverage. The legendary origin of tea, according to Chinese sources, dates back to approximately 2700 B.C. The earliest credible reference is contained in a Chinese dictionary of about A.D. 350. By the fifth century tea had become an article of trade in China and late in the sixth century the Chinese generally began to regard the beverage as something more than a medicinal drink. Contemporary Chinese records indicate that tea cultivation began in the interior province of Szechuan about A.D. 350, gradually extending down the Yangtze Valley to the seaboard provinces.

After the cultivation had spread through the provinces, it came to the attention of travelers from other shores, and China became the fountain-head whence tea culture spread to other countries. The first of these was Japan. Knowledge of tea was probably introduced into that country, along with Chinese civilization and Buddhism, late in the sixth century.

Tea-drinking is one of the customs that the West shares with the East, yet it was many centuries after tea



A TEA-BUSH FROM SOUTHERN CHINA
Exhibit in Hall of Food Plants, Field Museum of Natural History

had come into common use in the Orient that Europeans became familiar with it. The earliest known mention of tea (under the name *Chai Catai*, Tea of China) in European literature was made by Giambattista Ramusio (1485–1557), a Venetian author who published a collection of narratives of voyages and discoveries. In 1595–96, a Dutch navigator, Jan Hugo van Linschooten, published an account of Japanese manners and customs, and their mode of drinking tea. The Dutch were the first to bring tea to Europe, in 1610. By 1640 the aristocracy of the Netherlands had begun to drink it and soon afterwards its use became general in that country.

The earliest known reference to tea by an Englishman is found in a letter, dated June 27, 1615, from R. L. Wickham, agent for the East India Company at Firando (now Kyoto), Japan, to another agent of the company at Macao, China, requesting the latter to forward "a pot of the best sort of *chaw*," *chaw* being Chinese for tea. Samuel Pepys, the English diarist to whom we are indebted for many intimate glimpses of the customs of his time, wrote in 1660: "I did send for a cup of tee, a China drink of which I had never drunk before." Seventeenth-century records agree that the real introduction of tea into England began in the London coffee-houses and that about the middle of that century tea-drinking became known in England. As the eighteenth century progressed, its use spread rapidly and attempts were begun to establish plantations in northeastern India. The Dutch were rather earlier than the English in attempting tea plantations in the Far East, though without much success until the middle of the nineteenth century.

The use of tea as a beverage was known to the American colonists who settled along the Atlantic seaboard. Although there are no records of its earliest use in America, it is probable that the custom was brought from the Netherlands about the middle of the seventeenth century. A few years after the close of the Seven Years' War (1756–

63), the British Parliament passed an act whereby duty was imposed on tea, as well as on other commodities imported into the American colonies. The colonists resented the imposition of such duties, showing their resentment by staging the famous Boston Tea Party in 1773. This was followed by similar occurrences at other places, incidents in the chain of events culminating in the Declaration of Independence and the subsequent Revolutionary War.

CLASSES OF TEA

Although there are several grades of tea, the product placed on the market is derived from two main varieties: namely, the small-leaved Chinese shrub and the large-leaved Assam type. The Chinese variety is a small, hardy bush, capable of thriving under more severe climatic conditions than the more prolific Assam type, and is the variety commonly cultivated in China and Japan. The Assam type is larger, attaining tree dimensions if unpruned, and with leaves from four to six inches or more in length. It is tender and requires a hot, moist, equable climate. It is the one most widely cultivated in India, Ceylon, and the Dutch East Indies.

The quality of the prepared leaf is dependent upon the elevation at which it is grown, and the care taken in cultivation. The flavor is due to the essential or volatile oil in the leaf and is affected by the method of curing, but the stimulating quality is due to theine, which it contains. Theine is an alkaloid similar to that found in coffee, cocoa, and the cola-nut. Two main classes of processed tea are recognized: namely, black and green tea, the former being almost exclusively the product of India, Ceylon, the Dutch East Indies, and, to a less extent, China, while green tea is obtained mostly from China and Japan.

In the manufacture of black tea the leaf is plucked and is allowed to wither and ferment for a definite period before it is rolled and dried, while in the processing of

green tea the raw leaf is subjected to a period of great heat immediately after being harvested, to prevent fermentation. In this last method, the treated leaf retains the original color and flavor. The so-called oolong tea of Formosa is semi-fermented, the period of withering being considerably less than is required in the manufacture of black tea.

PRINCIPAL TEA-PRODUCING COUNTRIES

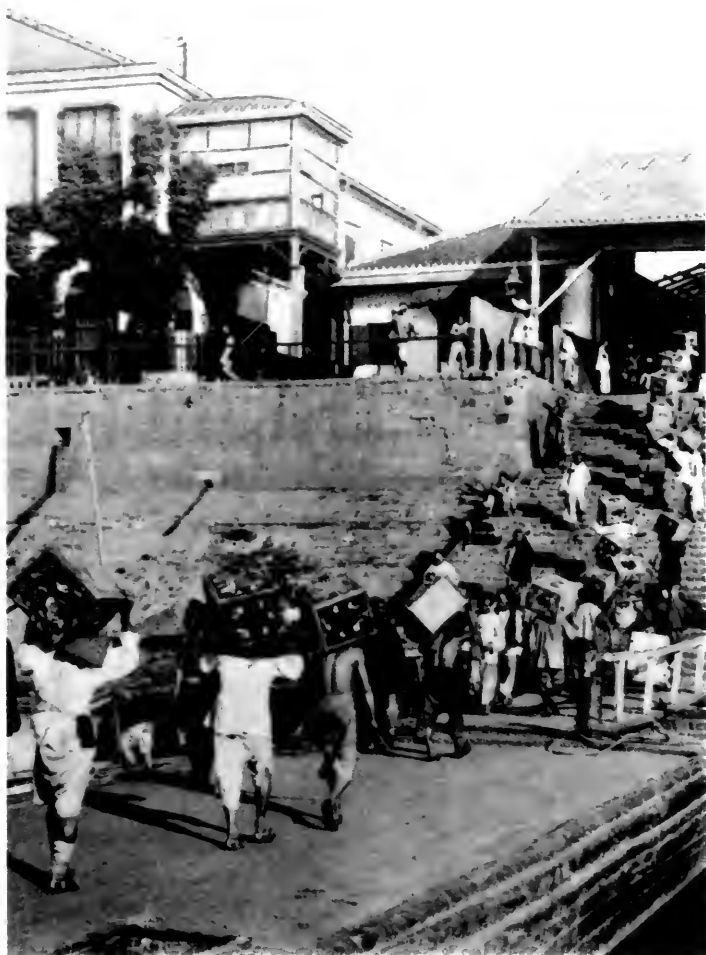
CHINA

For hundreds of years tea has been cultivated mostly in China where the larger part of the annual crop is used for domestic consumption. Because of its immense home market, China is a leader in tea acreage and production, although the exports have declined from first to fourth position. As in other branches of agriculture, the Chinese tea industry is a family affair and the gardens are mostly small patches, four or five acres in area, preferably on the south side of hill-slopes. The cultivation of tea is concentrated in those southwestern provinces bordering the Yangtze and from that river southward. The more severe climate of North China, its short growing season, and relatively low rainfall make that region unsatisfactory for the cultivation of tea.

China produces both green and black tea, the former usually predominating in export trade in the ratio of about two to one. Green tea for shipment abroad originates mostly in the provinces of Chekiang, Anhwei, Fukien, and Kiangsi, while black tea for export is grown principally in the provinces of Hunan and Hupeh. Hankow, on the Yangtze River and surrounded by a vast tea-growing area, is the largest tea market in China.

JAPAN

Like China, Japan grows its tea mostly on small patches, one-quarter to one acre in area, in mountain foothills and terraced uplands. The crop is confined to central and southern Japan, and is especially concentrated



Photograph courtesy of Underwood & Underwood

UNLOADING TEA IN HANKOW, CHINA

on the Pacific Ocean side of the country, where there is more summer rainfall and more sunshine, where the growing season is longer, and the winter temperatures are less severe than on the Japan Sea side. One of the most famous tea-producing areas is Shizuoka, southwest of Tokyo, and Shizuoka City is the principal center for the manufacturing and exporting of tea in Japan.

All the tea produced in Japan is of the green variety. It is estimated that there are approximately 120,000 acres under cultivation, and it is claimed that the tea from each district possesses individual character both as to the formation of the leaf and the quality of the brew.

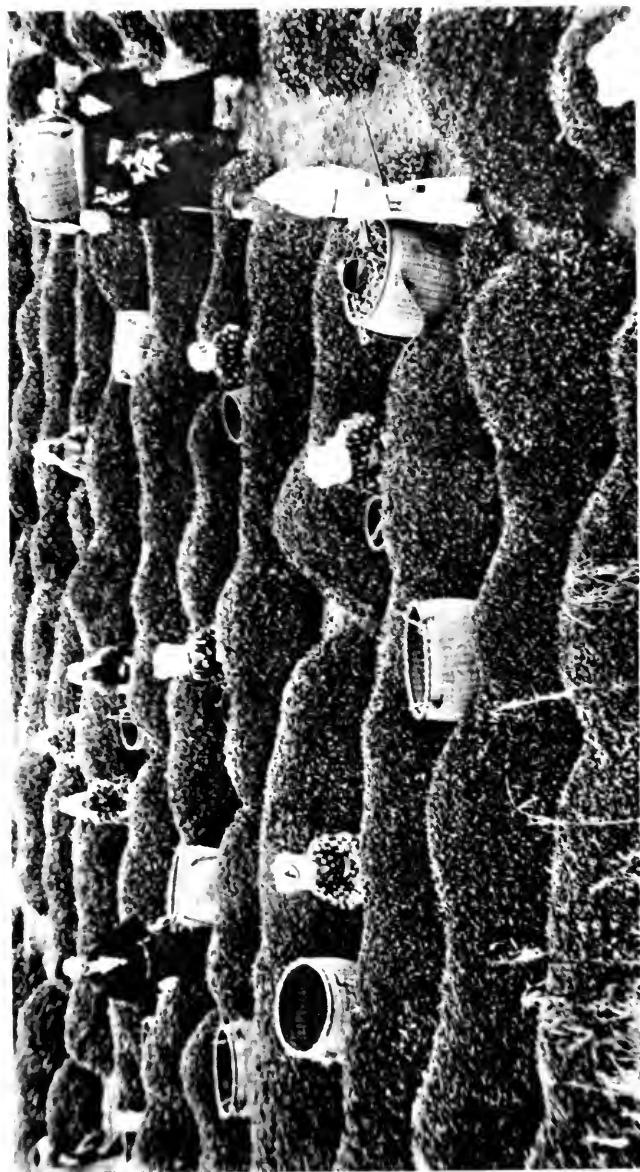
Unlike cultivation of tea in India or Ceylon, where plants grown from seeds are transplanted into rows, in Japan the seeds are allowed to grow into dense, rounded, hedge-like rows of bushes in the original soil in which they were placed. It takes about five years for the bushes to attain maturity, ready for plucking. The young leaves are picked in the early spring. This is known as the first crop and is regarded as possessing the best quality. The second crop is harvested about the middle of June until August, and the third crop from the middle of August to the end of September.

FORMOSA

The tea gardens of Formosa are concentrated on the terraced mountain slopes in the northern part of the island. Small tea gardens are the rule, although efforts have begun recently to establish large estates. Oolong tea, a semi-fermented product exported mostly to the United States, constitutes nearly two-thirds of the entire tea crop, and pouchong, a scented variety sold mostly in the markets of the Far East, forms the remaining one-third.

INDIA

The first practical suggestion for the establishment of tea plantations in India was made in 1788 by Sir Joseph



Photograph courtesy of Underwood & Underwood

TEA HARVEST IN JAPAN

Banks to the East India Company, but was not acted upon until 1833, when experimental stations were laid out in the Himalayan region, using seeds and plants imported from China. Soon after the experiments were initiated, attention was drawn to the fact that a tea plant had been found growing wild in Assam, northeastern India, and that this variety was probably more suited for cultivation than the Chinese. Although the plant assured an abundance of yield, it was regarded at that time as inferior to the Chinese variety. In 1837 and subsequent years extensive tracts were cleared in Assam for tea-growing, and the first consignment of the commodity was exported in 1838.

In India there are two large, distinct, and widely separated tea regions, the larger of the two being in the province of Assam and in the Darjeeling area, province of Bengal, while the smaller region is in extreme southwestern India. Besides these two regions, there are smaller areas in the northern hill country of Bihar and Orissa and others in the Himalayan foothills of the United Provinces and Punjab. The total area planted to tea in India is estimated to be approximately 707,700 acres and the crop is exclusively of the black variety.

Tea-growing in India is done on large estates, measuring up to two thousand acres or more in area, and located on the plains as well as on hill-slopes. Each estate is a self-sufficient community, with its native village, where the laborers dwell, its hospital, school, tea factory, and homes for the white managerial staff.

CEYLON

After India, Ceylon is the greatest exporter of tea, and it also specializes almost entirely in black tea. The story of the development of the tea industry in Ceylon is one of the most interesting in the history of planting. Up to the middle of the nineteenth century coffee-growing formed one of the principal industries of the island, but



VIEW OF PLANTATION IN THE ROCKY HIGHLANDS OF CEYLON

In the foreground is the factory and in front is the nursery for young plants for replacements and new gardens

Photograph of diorama in tea exhibit in Field Museum

in the 1860's a serious fungoid disease attacked the coffee bushes and in a few years it became evident that the industry was doomed. The planters turned their attention to cacao, spices, and other crops, and it was subsequently found that the warm, damp climate of the island was eminently suited for the cultivation of tea.

Ceylon's more tropical climate, with no distinct cool season and with abundant rainfall throughout the year, permits the tea bush to produce leaves throughout the entire year, in contrast to climatic conditions in north-eastern India, which allow plucking only from April to October or November.

The tea gardens are equal in size to those in India and are concentrated mostly in the mountain and broken hill-country of south central Ceylon. The tea plant grows from almost sea level up to 7,000 feet, though most of the estates are situated at an altitude of 3,000 feet. As in India, there is a contrast in quality and quantity of the product at various elevations. Trees grown in the plains furnish a larger yield, but the leaves have no distinctive flavor. The teas produced in the hill regions, where the growth of leaf is slower, are noted for their quality.

DUTCH EAST INDIES

These islands are third in rank among the tea-exporting countries, their trade being mostly in black tea.

In Java, tea is grown mostly in the volcanic mountain range of the western part of the island, where there is a heavy and well-distributed rainfall. Java is not so famous as Ceylon or India for its fine quality teas. This is due in part to the large amount of tea produced on small patches by the natives, although there are many large, scientifically managed estates. These small gardens are usually poorly cultivated and the leaves are not carefully picked.

Sumatra is still in its infancy as a tea-producing country, although plenty of suitable land is available for the cultivation of tea.



Photograph courtesy of Underwood & Underwood

PICKING TEA LEAVES IN CEYLON

OTHER REGIONS

It is believed that the tea plant was first introduced into South Africa about 1850, but tea-growing on a large scale was not undertaken until about 1875. The most productive gardens are situated at an elevation of about 1,000 feet on undulating, well-watered land. Recent developments in Nyasaland have proved that this part of South Africa is well suited for cultivation of tea.

For several years prior to the World War, efforts were made by the Russian government and private individuals to establish a tea industry in the Caucasus, chiefly in Georgia. Small plantations, mostly in the experimental stage, exist also in the Fiji Islands, State of Johore in the Straits Settlements, Andamans, Burma, and Jamaica. Tea can be grown in some parts of the United States, such as South Carolina, but development of the industry here is prevented by the low cost of labor in Asia.

CULTIVATION

When selecting a site for a plantation, the first consideration is the general lie of the land. The soil must be sufficiently drained, but not too steep for planting. Exposure to the prevailing winds must also be taken into account, as the crop makes very poor growth in a windy situation.

While tea is grown on a wide variety of soils, it thrives best in light friable loam, rich in organic matter, with porous subsoil to allow healthy development of the plant's taproot and to permit free percolation of water, for the tea plant is intolerant of stagnant water in the soil or subsoil. Undulating, well-watered tracts, where the water flows freely without serious soil erosion, represent the ideal conditions for the growing of tea.

NURSERY

In establishing a large tea garden, as in India or in Ceylon, the first step is to clear the jungle growth of

bamboo, tall trees, and undergrowth. The virgin soil is then hoed thoroughly until it becomes well pulverized, and this forms the nursery for raising young plants to fill the garden and to replace old or diseased shrubs. The nursery is divided into a number of beds, each 4 or 5 feet wide and separated by paths $1\frac{1}{2}$ to 2 feet in width. Before planting, the seeds are placed in water to separate those that float from those that sink. The floaters usually do not germinate well nor do they produce vigorous seedlings. The seeds are then planted from 4 to 8 inches apart and about $1\frac{1}{2}$ inches below the surface of the soil, and are covered with thatch to prevent scorching of the plants by the sun.

Meanwhile, the clearing of the future garden has been proceeding. The soil is hoed several times and marked out with stakes, about 4 feet apart, indicating the rows which are to receive the young plants. The saplings are removed from the nursery when about 12 inches high, and are planted in holes 18 to 20 inches deep. Normally, about 3,500 saplings are planted out to the acre. Old or unhealthy shrubs are weeded out every year and supplanted by young, healthy plants. The soil around the base of the bush is hoed continuously to keep down the weeds, and at the same time food materials taken from the soil are returned by the decomposition of the weeds hoed into the soil.

As the land is being cleared, it is necessary to cut drains, roads, and pathways. If the garden is situated on hillsides, terraces have to be built to prevent the washing away of the soil by heavy rains. The soil is analyzed and the necessary fertilizers are added. The bushes are sprayed at frequent intervals to keep them free from insect and fungoid diseases. Except at the higher elevations, it is the usual practice to grow tea under shade. The trees commonly used for this purpose are members of the bean family (*Leguminosae*), which are planted between the rows of tea bushes.

PRUNING

In northern India, from one-third to one-half of the total number of bushes are pruned every year during the dry or cold season. The bushes are thus kept down to a convenient height and a broad surface is produced, giving the largest possible area for plucking. If allowed to attain too great a height, the bushes grow more slowly and consequently produce less leaf suitable for harvesting. Also, old bushes have to be pruned to remove snags and old wood.

PLUCKING

A period of four or five years must elapse before a bush is sufficiently mature to harvest the leaves. Once this maturity has been reached, a healthy bush will continue to grow and yield indefinitely. The plucking or harvesting of the crop consists of removing the young shoots by breaking them off with the thumb and forefinger. Picking is done mostly by women and children, the men being employed in tilling the land, digging and cleaning ditches, and building roadways. Each person carries a basket suspended on the back, so that the two hands are free for gathering leaves. On a normal day each person will pluck from fifty to eighty pounds of leaf. The work follows a definite cycle. If a very delicate quality of tea is required, only the bud and the two youngest leaves are picked, while another crop of new shoots will appear in eight or nine days ready for plucking.

In Assam the bushes are first tipped or plucked in late March or early April, but the first real "flush" occurs in May and the second in June. This continues until November, but in Ceylon, southern India, and the Dutch East Indies, picking is continued throughout the year. The leaf collected is weighed two or three times a day, at a convenient place in the field or at the factory. After weighing, the leaf is spread out on bamboo mats for examination, and is then placed in large baskets or sheets

for transport to the factory, care being taken to prevent the leaves from heating in transit.

In China the first picking occurs in April before the beginning of the spring rains, and this crop produces the best tea. The second crop is harvested in May and at this time the leaves are thicker and tougher so that the liquor brewed from them is stronger. Third and fourth pickings, harvested in August and September, furnish low-grade teas for domestic consumption.

In Japan there are, as a rule, two crops each year, one in May and the second in the middle of June, after the rains; a third crop is sometimes obtained, but the quality of the leaf is poor. The bushes are pruned after the first crop, and again during the winter.

MANUFACTURE OF TEA

BLACK TEA

On arrival at the factory the leaf is examined to eliminate stalks, coarse leaf, and foreign matter. The bulk is then weighed and taken into the withering-shed.

Withering.—The initial, and a very important step in the manufacture of tea is withering, which is done in large lofts. These are long rooms, running the entire length of the upper floors of the building. They contain a series of racks, each with a large number of shelves made of jute cloth stretched over wires. These racks are set 4 or 5 inches apart to allow free passage of air between them.

On arrival at the lofts the leaves are spread evenly and thinly on the racks, which are exposed to the outside air. The necessity for withering lies in the fact that the leaf must be in a flaccid or soft state, so that the alkaloid present may be released during the subsequent process of rolling. To make this possible, the water content in the leaf, which may run as high as 55 per cent, must be evaporated. Under normal conditions, 24 hours is sufficient for proper withering.

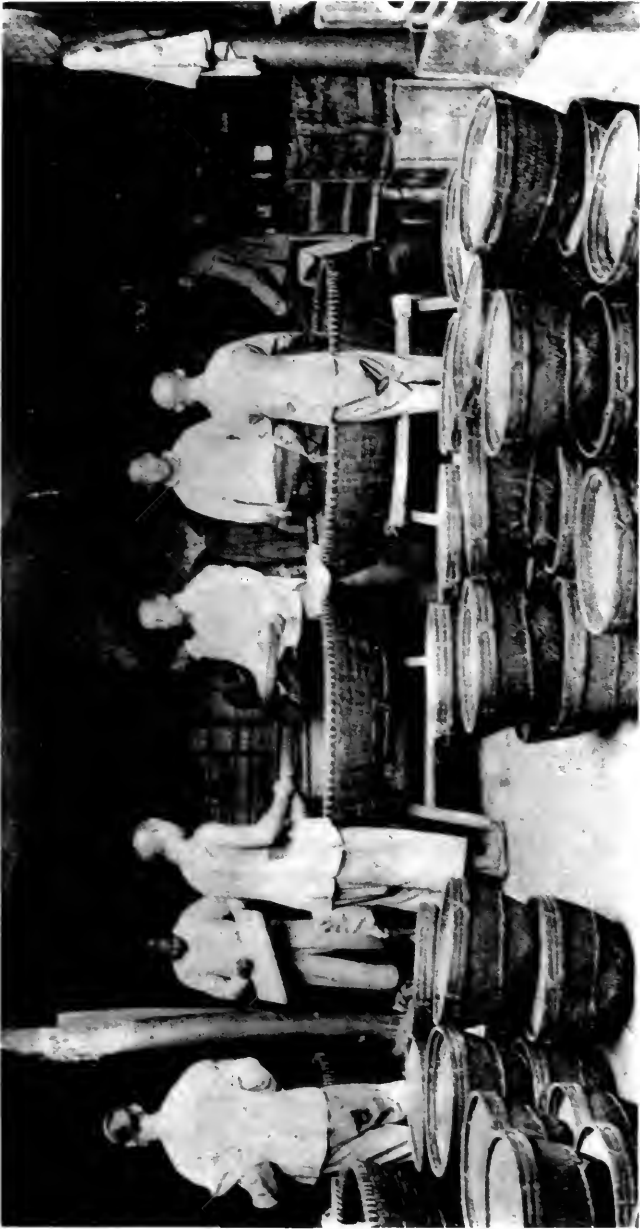
Rolling.—After the withering is completed, the dried leaf is sent through chutes into the rolling room. The object of rolling is to crush and twist the leaves, thereby breaking up the cells in the leaf and releasing the juices which contain theine. The machine used for this purpose resembles an old-fashioned grinding mill.

Rolling usually occupies about 3 hours, divided into 5 or 6 periods of 30 minutes each. During the first two rolls no pressure is put on the leaf, but in the succeeding rolls the pressure is gradually increased. After each roll the leaf is put into a "roll-breaker" machine, which moves in an oscillating manner. The object of this is to disperse the lumps of leaves which have formed during the process of rolling.

Fermenting.—After the final roll, the leaf is removed to the fermenting room, where the temperature is always kept many degrees lower than in other parts of the factory. This room is usually roofed with galvanized iron sheets, over which water is run continuously; inside are hung jute curtains through which water is allowed to percolate in order to ensure sufficient moisture in the air, and the windows are covered so that no direct rays can enter.

The leaf is spread to a depth of about $\frac{1}{2}$ inch on the floor, on glass or concrete tables, or on shelves. When the leaf is first spread the color is greenish brown, but as fermentation or oxidation proceeds it gradually becomes darker, owing to chemical changes. When complete fermentation has taken place the leaf is a rich golden brown and has a pleasing aroma. As in the case of withering, the period of fermentation varies, but, depending on weather conditions, from 4 to $4\frac{1}{2}$ hours is usually sufficient.

Firing.—After fermentation has been completed, the leaf is taken to the drying room and placed in firing machines or driers, resembling large ovens. The principle involved is to pass hot air through or over the fermented leaf. Cold air from the outside is drawn through the back of



SIFTING TEA IN CHINA

the drier and passes through pipes to the bottom part containing the trays, below which is the furnace. The leaf is spread thinly on a chain of trays and conveyed through the hot air chambers, in which the temperature is increased gradually to 220° F. The average time necessary for firing is about 25 minutes.

After this period of drying, the treated tea leaf is deep black and the moisture content has been reduced to about 3 per cent, but after standing for some time in bins awaiting packing, moisture accumulates from the air and may increase to 6 per cent.

Tasting.—At different intervals during the process of firing, samples of tea are taken from the drying machine. A series of pots and cups is laid out on a counter. A tiny quantity of each grade of tea is selected for examination and placed in separate pots, to which is added water that has just been brought to the boiling point. The infusions are then allowed to brew for 5 or 6 minutes and the liquors are strained into cups. The infused leaf resting on the inverted lid is placed immediately in front of the cup containing the brew or liquor. The method of tasting involves examination of the dry or unused leaf, flavor of the liquor, and inspection of the infused leaf, which should be bright red if properly prepared.

Grading.—After removal from the firing machine, the manufactured tea is stacked in heaps on the floor of the grading and packing room, for the removal of stalks and coarse or improperly treated leaves.

The tea is then sifted into grades by a machine consisting of a series of moving sieves of different sizes of mesh. The resulting siftings are known as “unbroken teas,” Flowery Orange Pekoe, Orange Pekoe, and Pekoe No. 1. The first-mentioned is regarded as the finest quality. The coarser tea which does not pass through the meshes is transferred to a “breaking machine” to be broken up and again sifted, the products being known as Broken Orange Pekoe, Pekoe No. 2, etc. The tea dust

which accumulates during these processes is kept separate from the better qualities, and shipped as "Dust" and "Fannings."

Packing.—After the tea has been sorted, the different grades are stored in separate air-tight bins, where they remain until a sufficient quantity of the required size has accumulated. The whole of each grade is carefully mixed to ensure that the quality is uniform throughout, and is then packed in lead-lined chests, each containing about 100 pounds. The packed chests are marked with the name of the estate and grade of the contents, and loaded in bullock carts, on trucks, or on the backs of elephants for transit to the railway to be sent to the nearest port, such as Calcutta in India or Colombo in Ceylon.

GREEN TEA

In China the manufacture of green tea is mostly by hand. When mature, the leaves are picked, usually by women and girls, and the quantity collected is taken to the factory, which is centrally located. As the leaves are brought in from the gardens, each parcel is placed in pans over fire to seal the pores in the leaves and thus prevent fermentation. The leaves are stirred to ensure that the moisture present is evaporated. Stalks and impurities are then removed and the leaves are again placed in the heated pans and stirred in a circular fashion. The leaves are then spread out on tables and rolled by hand lengthwise or into balls. After further firing, the tea is ready to be sorted out in various grades, by winnowing or sifting, and is then packed in air-tight chests to be transported down river to the nearest port.

There are two main grades of Chinese green tea, depending upon the appearance of the leaf. Those rolled between the palms of the hands into small rounded balls are known as "Gun-powder" and "Imperials"; and leaves rolled lengthwise furnish what is known as "Young Hyson" and "Hyson" tea.

The tea manufactured in Japan is mostly green or unfermented. As soon as the leaves are brought into the factory, they are steamed or heated to dry up the natural sap and prevent oxidation or fermentation. After this treatment, the leaf is still soft and pliable, and is then rolled either by hand or by machinery.

The tea is still in the raw leaf or crude stage and must be subjected to further firing. There are two ways of final curing. The first is by heating the tea in long rows of pans operated by machinery, in which are wire brushes that continually turn over the leaves in the pans.

There are two rows of these pans, one above the other, the top ones heated, and the lower ones the cooling pans. Tea dried in this manner is known as "pan-fired." The other method is to place the tea in a wicker basket, divided in the center with a board upon which the tea rests. The basket is then set over charcoal fire. The tea is stirred by hand and rolled lengthwise. Thus is produced what is known as "basket-fired" tea. Probably because of the fumes from the charcoal fire, the tea is darkened until it becomes almost black. There is a third type called "natural leaf," in which all the grades are kept together so that the finished product is a mixture of large and small leaf. This may be finally cured either by pan- or basket-firing.

The dried tea is now passed through sieves and sorted into the various grades of broken leaf, fannings, siftings, and nibs. Each of these grades, pan-fired, basket-fired, and natural leaf, is grown in distinct districts, each producing its own variety of tea. The tea is packed in zinc- or aluminum-lined chests or made into small packages for export.

OOLONG TEA

Tea produced in Formosa, to which the name oolong, meaning "black dragon," is given, is semi-fermented. The shrubs are ready to bear leaf, suitable for plucking, when they are about three years old, the plants having been



Photograph courtesy of Irwin-Harrison-Whitney

PACKING TEA IN CEYLON

pruned to limit the height and the circumference to about 3 feet. The harvest season lasts from April until November, and the successive pluckings are known as spring, summer, autumn, and winter crops.

The preliminary step in the preparation of oolong tea is to spread the leaves out on bamboo trays. These are placed in the sun for partial drying, and, at the same time, to allow a certain amount of fermentation to take place. In this manner the leaf changes its color from dark green to a reddish or dark brown. During this time the leaves are rolled and crushed gently to eliminate moisture and to keep them pliable. By repeating the process of rolling and drying, the leaf is brought to the proper state of fermentation. When this is completed, the semi-moist and still crude leaf is transported to the manufacturing plant.

This consists of a room with a series of circular wells, about 2 feet in diameter, in the floor. In these, burning charcoal is placed, and over it stand bamboo baskets about 3 feet high, divided in the middle by a board. The tea is placed on this board and worked by hand until completely dried. It is then removed to another room where it is thoroughly mixed and packed in lead-lined chests for export.

BRICK TEA

An interesting variety of tea is that used in Tibet and in some parts of Russia under the name of "brick tea." The product may be described as cheap coarse tea made by compressing small twigs and coarse leaves. The chief center of production is in western China.

There is no preliminary withering or fermenting, but the leaves and twigs are heated for a few minutes in iron pans, and then tied in bundles or placed in sacks for transport to the factory, where the material is placed in heaps and allowed to ferment. The leaf is then dried in the sun, sorted into grades, steamed, and finally placed for 3 or 4 days in brick-shaped molds to be pressed. When



Photograph courtesy of National Geographic Society

TRANSPORTING TEA IN TIBET

sufficiently dry, the bricks are stamped with the maker's name and are then ready to be packed in loads to be carried on the backs of porters or horses.

Another form made in China and sold in the Russian market is "tablet tea," which is made either from tea dust obtained in the manufacture of better quality tea or by pulverizing tea leaves. The dust is steamed for a few minutes, after which it is cast into bricks by placing it in molds. The bricks are allowed to dry and harden in these molds for 2 or 3 weeks, after which they are packed in bamboo baskets for transport, mostly to Russia.

JASMINE TEA

Also called Jasmine Oolong, this is semi-fermented tea produced in the province of Foochow, China. When sufficiently dried to stop fermentation, the tea is spread out on the ground and a layer of jasmine blossoms is spread over it. Another layer of tea is added and more blossoms, until several layers have been formed. The mixture is then left to stand for several hours. The tea and blossoms are gathered together and finally heated, during which process the jasmine flowers are taken out; but their aroma remains.

There are many grades of tea sold in the market under different names, but the following brief descriptions serve to characterize the principal varieties.

FULLY FERMENTED OR BLACK TEA

Teas from India, Ceylon, Java, and Sumatra are similar in growth and manufacture. The tea leaf is reddish or dark brown to black, and the brew or liquor varies from light to dark brown. The grades, listed in the order of their quality, are:

LEAF GRADES

Orange Pekoe.—Well-defined and closely twisted leaf.

Pekoe No. 1.—Small tightly rolled leaf to more open leaf and similar to Orange Pekoe.

Souchong.—The largest or coarsest leaf picked.

BROKEN GRADES

Broken Orange Pekoe.—Smallest parts of leaf, well made.

Broken Pekoe or *Pekoe No. 2*.—Next largest parts of leaf to the Broken Orange Pekoe, more open.

Broken Pekoe Souchong.—Still larger leaf than Broken Pekoe, but similar.

China black tea is usually classified according to the region in which it is produced. The best quality is that from the Keemun district. This tea has a small, well-made grayish black leaf. The brew is a deep amber color and has a distinctive flavor. Other grades are Ichang, Ningchow, and Hankow, of which seventeen different kinds are recognized locally.

UNFERMENTED OR GREEN TEA

Chinese green teas produce a liquor of a light to dark yellow shade. The principal grades are Gunpowder, Hysons, and Young Hysons, and Imperials, according to whether they are rolled into small round balls or rolled lengthwise.

Japanese green teas produce the same general character of liquor, which is light green to pale yellow in color.

GRADES

Pan-fired.—Small tightly twisted leaf, greenish in color.

Basket-fired.—Long leaf, cured in such a way as to produce length.

Natural Leaf.—Leaves of medium size, all grades cured together.

Fannings, Siftings, Dust, and Nibs.—Considered as by-products in the manufacture of the above-named grades.

SEMI-FERMENTED TEA

Formosa semi-fermented or oolong tea is black in color, the highest grades consisting of small, tightly rolled leaf, while the lower grades are more open leaf. The grades, listed in the order of quality, are: Choicest, Choice, Fine, Good, Medium, and Standard. All produce a brew of amber color, which is highly flavored in the better grades.

Jasmine tea or Jasmine oolong tea is a mixture of tea leaves mixed with jasmine blossoms to impart aroma.

This is grown in the Foochow district, in China, and prepared from the so-called Wysan leaf.

Scented Orange Pekoe is manufactured also in the Foochow district, from the youngest and smallest shoots, and is scented with jasmine flowers.

PRODUCTION, EXPORTS, AND CONSUMPTION

During the season 1933-34 the world production of tea of all kinds grown for export, amounted to approximately 1,031 million pounds. The quantity produced by the different countries is as follows:

(In millions of pounds)

North India.....	320
Ceylon.....	220
China.....	200
Java.....	135
Japan.....	60
South India.....	50
Sumatra.....	26
Formosa.....	20
Total.....	1,031

This total, of 1,031 million pounds, was exported to the following countries:

(In millions of pounds)

United Kingdom and Ireland.....	438
For home consumption in various tea-producing countries.....	180
United States.....	86
Soviet Russia.....	75
Africa.....	60
Australia.....	60
Asia.....	40
Canada.....	40
Europe.....	40
South America.....	12
Total.....	1,031

In the United States the yearly consumption of tea per capita amounts to $\frac{3}{4}$ pound. In the United Kingdom the amount per capita is 11 pounds, in Australia $8\frac{1}{2}$ pounds, in Ireland and South Africa 8 pounds each, and in Canada 4 pounds.

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