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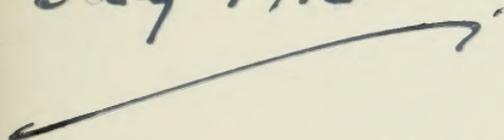




J. W. B.

Sydney

July 1912





COFFEE TREE AND BERRIES.

COFFEE

—ITS—

HISTORY, CLASSIFICATION AND DESCRIPTION

—BY—

JOSEPH M. WALSH,

AUTHOR OF

"TEA: ITS HISTORY AND MYSTERY."



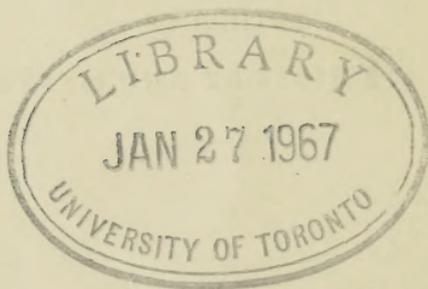
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CHAPTER I.

EARLY HISTORY.

THE gigantic extent to which the production and consumption of Coffee has been carried of late years, the vast number of hands employed in its cultivation and preparation for market, including the great quantity of shipping necessary for its transportation, and the enormous amount of capital invested in its production and trade, naturally invest the commodity, not only from a commercial but also from a moral and social standpoint, with great importance, creating as it does an industry of almost fabulous proportions and capital, rendering it second to no other article of food or drink in the world. The early history of Coffee, however, like that of Tea, is involved in considerable obscurity, the almost total absence of any historical fact being only compensated for by an unusual profusion of legendary and conjectural statements, or by purely mythical stories. As far as can be ascertained, it was not known to the ancients, although one writer claims that it is mentioned in the Bible, making the bold assertion that the potion offered to King David on a certain occasion, at the hands of the fair Abigail, to calm the temper of the excited monarch, must have been Coffee, basing his argument on the untenable grounds that the beverage, whatever it may have been, was prepared from *something roasted*. Yet no mention of the plant or its product is to be found among the Egyptians in the time of the Pharaohs,

although their trade at their period, as in the present, lay up the valley of the Nile toward Berber, its reputed birthplace. It was unknown to the Greeks and Romans in any form, and though claimed to have been in use among the Arabs at a very remote time, no reference is made to it by Mohamet or his followers up to the seventh century. No account of its use is to be found during the first Moslem invasion of southern Europe by Abdulrahman in the ninth century, although large quantities of the commodity were captured in their camp before Vienna during their second invasion of eastern Europe in the seventeenth century, and it is not even alluded to by any of the writers who accompanied the Crusaders into Syria during the thirteenth century.

To the Ethiopians its use is said to have been known from time immemorial, and that the plant and its virtues were first discovered in that country is now generally admitted by all authorities on the subject. The first human beings who appear to have used the Coffee-berry in any form being the semi-savage tribes inhabiting higher Ethiopia, to which country the Coffee-plant is indigenous, and where it is to be found at the present time, growing abundantly both in a wild and cultivated state. Bruce, in his Travels to Discover the Source of the Nile, published in 1678, informs us that "The Gallæ is a wandering nation of Africa, who, in their incursions into Abyssinia, are obliged to traverse immense deserts, and being desirous of falling on the towns and villages of that country without warning, carry nothing to eat with them but the berries of the Coffee tree *roasted* and *pulverized*, which they mix with grease to a certain consistency that will permit of its being rolled into masses about the size of billiard balls and then put in leathern bags until required for use. One of these balls they

claim will support them for a whole day, when on a marauding incursion or in active war, better than a loaf of bread or a meal of meat, because it cheers their spirits as we^{ll} as feeds them."

From Ethiopia, the Coffee-plant is claimed to have been introduced into Abyssinia as early as A. D. 875, while, according to Lagrenie, Coffee has been known and used in Abyssinia, from the very earliest times, quoting the Abbé Raynal, a missionary to that country in the latter part of the sixteenth century, to that effect, stating that "he procured some of the berries from cultivated plants, and made a trial of them, finding them larger, rather longer and quite as fragrant as those obtained from Arabia." From Abyssinia it was evidently first introduced into Arabia, but at what period of the world's history, or under what circumstances is also lost in doubt. Tradition—never at a loss for some marvelous story—ascribes its first discovery in the latter country to a Dervish, who in the year 1275 was driven out of Moka, pursued and surrounded by his enemies in the adjacent mountains. In the extremity of hunger he is said to have gathered some Coffee-berries and eaten them, then, steeping some of the parched berries in some water to allay his thirst, he accidentally discovered their agreeable flavor and nutritious properties. While another Arabian legend attributes its first discovery as an alimentary infusion in that country to a Mollah named Chadeley, who on being informed by a goat-herd of the peculiar and exciting effect produced on his goats, whenever they happened to browse on the leaves and fruit of a certain kind of tree, resolved to test their virtues on his monks, with whom it is related he had considerable difficulty in keeping awake during their nocturnal devotions. Preparing an infusion from the berries of the plant indicated,

he served it to them, the experiment proving a complete success; the dervishes taking eagerly thereafter to the new and exciting beverage. While, according to an Arabian manuscript, now to be found in the Bibliothèque Nationale of Paris, the use of Coffee was known in Arabia as early as the thirteenth century. This coffee-colored document states that "a certain Mufti of Aden, on his return from a journey to Persia, about the middle of the fifteenth century, brought back with him some *roasted* beans of Coffee." While in an old treatise upon Coffee, published in 1566 by an Arabian sheikh, it is stated that the first knowledge of Coffee and its use was brought from Abyssinia to Arabia about the beginning of the fifteenth century by a learned and pious mollah named Djmaleddin Abou Elfager. According to this document, the use of Coffee as a beverage was prevalent among the Abyssinians from the most remote times, and that in Arabia, when first introduced, it only supplanted a preparation made from the leaves of the *Celastrus* in that country. The introduction and use of the beverage by the Mufti gave reputation to the practice, his example soon rendering the new luxury popular among his countrymen, "first among lawyers and professional men, then with students and those who learned reading, the custom eventually spreading to artisans and others who worked in the night, and finally by travelers, who journeyed in the night to avoid the heat of the day." In a short time it was declared in Aden "that this liquor purified the blood, by a gentle agitation, dissipated the ill condition of the stomach and aroused the spirits." As a result of this high extolation it was quickly adopted by those who had no occasion to keep awake at night, and in a brief space of time, says M. Galland, "the whole inhabitants of Aden became inveterate coffee-drinkers." Its peculiar

property of dissipating drowsiness and preventing sleep was taken advantage of in connection with the prolonged religious services of the Mahometans, and its use as a devotional anti-soporific stirred up a fierce opposition on the part of the strictly orthodox and conservative section of the priesthood. Coffee being held by them to be an intoxicant beverage, and therefore prohibited by the Koran, and the dreadful penalties of an outraged sacred law were held over the heads of all who became addicted to its use in any form. But notwithstanding the threats of divine retribution, and though all manner of devices were adopted in order to check its growth, the coffee-drinking habit spread rapidly among the Arabian Mahometans, and the growth of coffee, as well as its use as a national beverage, became as inseparably associated with Arabia as tea has with China.

From Aden, the use of coffee extended to Mecca, Medina and other cities and towns of Arabia, the knowledge and taste for it rapidly spreading outwards from that country to Syria and Persia. Public coffee-houses being everywhere established, also in many of the other countries in western Asia, affording, according to one authority, "a lounge for the idle and a relaxation for the man of business, where the politician retailed the news of the state; the poet recited his verses, and the Mollahs delivered their sermons to the frequenters." But the mania for coffee becoming so great about this period, particularly in Syria, that an effort was made by authority of the government to check, if not to entirely suppress, the further growth of its consumption among the inhabitants, on the alleged ground of "its intoxicating properties," but in reality because of its use leading to social and festive gatherings, incompatible with the strictness and teaching of the Mahometan religion.

From Syria the use of the "benign potation," as it was then termed, reached Cairo about 1510, being received with equal avidity in that city, so much so that in that year its indiscriminate use was prohibited on religious grounds, also by Khaine Beg, the then governor of the city. In his proclamation forbidding the use of coffee, it was assailed by him as "having an inebriating effect, and of producing inclinations condemned by the Koran." This edict was, however, rescinded by his successor, Causin, soon after his assuming the governorship. But another effort was made to suppress its use in 1523 by the chief priest, Abdallah Ibrahim, who denounced its use in a sermon delivered in the mosque of Haffanaine, a violent commotion being produced among the populace, the opposing factions coming to blows over its use. The governor, Sheikh Obelek, a man wise in his generation and time, then assembled the mollahs, doctors and others of the opponents of coffee-drinking at his residence, and after listening patiently to their tedious harangues against its use, treated them all to a cup of coffee each, first setting the example by drinking one himself. Then dismissing them, courteously withdrew from their presence without uttering a single word. By this prudent conduct the public peace was soon restored, and coffee was ever afterward allowed to be used in Cairo.

Coffee continued its progress without further molestation through Egypt, the beverage being received in Damascus in 1530, and in Aleppo a few years later, without opposition, becoming known to the inhabitants of Constantinople for the first time in 1554, in which year two persons, named Schems and Heken, the former coming from Damascus, and the latter from Aleppo, opened the first coffee-houses in that city, where it soon became the favorite drink with all classes, "the

coffee-houses being thronged night and day, the poorer classes actually begging money in the streets for the sole object of purchasing coffee." And in Constantinople, at this time, we are informed that "a refusal to supply a wife with a specified quantity of coffee per diem was admitted to be a valid cause for divorce." But in Constantinople, as in Cairo, the new habit excited considerable commotion among the ecclesiastical authorities and political rulers, owing to the popularity of the coffee-houses having a depressing influence on the attendance at the mosques, on which account a fierce hostility was excited among the religious orders against the new beverage. They laid their grievances before the Sultan, who first prohibited and then laid a heavy tax upon the coffee-houses, notwithstanding which they continued to flourish and extend. A similar persecution to that in Syria and Cairo soon attended its use in the Turkish capital, having not only to contend there with religious but also with political opposition, the religious, as usual, predominating in its severity. The dervishes had the *sagacity* to discover "that coffee when roasted became a kind of coal, and coal being one of the substances which their prophet had declared was not intended by Allah for human food," they therefore declaimed against it with unbounded fury. The mufti being of their party, the coffee-houses were at once closed by a firman of the Sultan, Amuret III. This prohibition was, however, found impossible to maintain, as a few years later a more liberal governor succeeding, he assured the faithful "that *roasted Coffee* was not *coal*, and had no relation to it." The coffee-houses were immediately reopened, and soon became as much patronized as before. But though religious superstition thus readily gave way to the seductive influences of sensitive

enjoyment, a submission not at all uncommon, the political objections were not so easily silenced. The government, first with that instinctive faculty so natural to all despotic rulers of converting to their own advantage the tastes and prejudices of their subjects, laid a heavy tax on the sale and consumption of coffee, from which it derived an enormous revenue. But the ever-trembling apprehensions of such forms of government, not satisfied with this restriction, found, or rather fancied it found, in the coffee-houses resorts for the disaffected and nurseries of sedition. These "dangerous places" were consequently regarded with a jealous eye, and again proclaimed against by the edict of the Sultan. But not being deemed formidable beyond the precincts of the city, and also being of too much importance to the public revenue, they were suffered to remain open in all other parts of the empire. Scruples of conscience and political objections, however, eventually died out, religious superstition and political opposition being no longer excited against the use of coffee as a beverage, so far as the Turkish empire was concerned.

INTRODUCTION INTO EUROPE.

It is likewise very difficult to determine in what year and in what exact manner coffee was first carried from Constantinople to western Europe, but it is generally admitted that the Venetians, on account of the proximity of their dominions and extensive trade with the Levant, were the first Europeans to become acquainted with it. And it is a noteworthy fact that the three principal dietical beverages of the world were introduced into Europe within a few years of each other, Cocoa being the first of the three which actually appeared there, having been

brought to Spain from South America. Coffee followed, coming from Arabia, and Tea, the latest of the series, coming from China by the hands of the Portuguese.

The first authentic mention made of Coffee or its use by a European is probably that of Rauwolf, a German physician and traveler, upon his return from an extended tour through Syria, in 1573. The first scientific account of the plant being that given by Alpinus, an Italian naturalist, in his *Medicina Egyptorium*, published in Venice in 1591. Its use as a beverage is first referred to by two English travelers — Biddulph and Finch—the former, in writing of it in 1603, stating “that the Turks have for their most common drink Coffee—a blackish drink made from a kind of pulse-like pease, and called by them *Coava*.” In 1607 Finch relates that “the people of the island Socotra have for their best entertainment a China dish called *Cobo*, a black, bitterish drink, made of a berry very like a bay-berry, brought from Moka, and supped off hot.” While Pietro Valla, a Venetian, in a letter written from Constantinople, in 1615, states that upon his return to Venice “he would bring back with him some coffee which he believed was a thing heretofore unknown in his country,” and which he subsequently did. It is also referred to, in 1621, by Burton in his “Anatomy of Melancholy” as follows: “The Turks have a drink called Coffee, so named from a berry, black as soot and as bitter, which they sip up hot, because they find by experience that that kind of drink, so used, helpeth digestion and promoteth alacrity.” And coffee in a liquid state is said to have been sold in Rome as early as 1625. Some of the prepared beans of Coffee were first carried from Turkey to France by De la Haye, as early as 1644; “not only coffee, but also the proper apparatus for preparing it.” In 1657 a small quantity

was brought to Paris by Thevenot, its use, however, being confined solely to his own immediate family and a few friends. Up to this period, however, and for many years after, it had never been seen and scarcely ever heard of by the public at large in that country. But in 1660 "several bales of coffee" were shipped from Alexandria to Marseillaise, and in 1671 the first coffee-house was opened in the latter city near the Exchange, "where the merchants met to smoke, talk business and divert themselves with play." But it was not until the year 1669 that Coffee drinking became popular in France, though infrequent travelers had brought with them from the East a few pounds of the then curious berry. In that year Solieman Aga was sent as Ambassador from Mahomet IV. to the court of Louis XIV., where he soon became a "lion," through the splendid and unique entertainments at which he figured as host. On bended knees, the black slaves of the Ambassador, arrayed in the most gorgeous Oriental costumes, presented the choicest Moka, in tiny cups of egg-shell porcelain, hot, strong and fragrant, poured out on saucers of gold and silver, placed on embroidered silk napkins fringed with gold bullion, to the grand dames who fluttered their fans with many grimaces, and bent their piquant faces—berouged, bepowdered and bepatched—over the new and steaming beverage. Such was the half-barbaric occasion by which Coffee first became generally known to that nation, which is now so largely dependent upon the "brown berry of Arabia." The Parisians immediately became quite enthusiastic over it, the aristocracy adopting it as the fashionable beverage, it being recorded that the daughters of Louis XIV. had Coffee imported expressly for the use of the royal household, at a cost of \$15,000 yearly.

The first Coffee-house was opened in Paris, in 1672, by an Armenian, at the fair of St. Germaine. Meeting with considerable success, he was encouraged to open another at the Quai d'Ecole, where he was subsequently succeeded by another, but who, owing to a lack of address and a proper place to serve it in, was soon compelled to relinquish the business. About 1675 an enterprising Frenchman, Ettienné d'Alep, fitted up spacious apartments in the Rue des Italiennes, with Oriental magnificence for the purpose of catering to the public taste for coffee. This Café—as it was called—was the first of these now famous institutions, was furnished in the most elegant and expensive manner, ornamented with rich tapestries, mirrors, pictures, divans and costly lustres, tea and chocolate being also sold in it. This style of coffee-house multiplied in a very short time in the gay city, and were regularly frequented by people of fashion, artists, men of letters and politicians, the Café Procope in particular becoming immortalized from its being patronized by Voltaire, Molière, Boileau, Fontaine and other Encyclopedists, while another, the Café de la Régence, became the Mecca of chess players. In a brief period these coffee-houses had increased to nearly three hundred in Paris alone, the Cafés eventually becoming dangerous rivals to the Cabarets, finally becoming the cradle of the modern clubs, it being in one of these coffee-houses—the Café Procope—that Camille Desmoulins was wont to deliver his stirring addresses. But, as in the East, at first, coffee here again met with considerable opposition. Madame Sévigné presuming “that coffee and other poisons would soon go out of fashion.”

The use of coffee as a beverage is claimed to have been known in England prior to its introduction into France, and by some authorities even before the return

of Thevenot from the East. One account states that it was first offered for sale there by a Jew named Jacobs at Oxford, as early as 1640. And according to the journal of Thomas Rugg, dated September 22, 1651, coffee was then sold in a liquid state at the "Sultanness Head, a Cophee house by the Royal Exchange, London," there being also distinct evidence extant that for some years prior to that date it was also offered for sale in many other parts of that city. The first authentic account, however, states that coffee was first introduced into England by a Turkey merchant named Daniel Edwards, who, on his return from a trip to Smyrna, brought back with him a quantity of it, and with it a Greek servant from Ragusa, named Pasquale Rossie, who understood the Eastern method of roasting and preparing it. Edwards had it prepared and served every day to his friends and visitors in true Oriental style, but finding that the novelty began to attract too many visitors, his house being thronged daily by those anxious to taste the new beverage, he established Rossie, in company with another named Bowman, in a tent for its sale in St. Michael's Alley, Cornhill, London, over which Rossie erected a sign with his own portrait, and subsequently announcing himself to be "the first person who made and publicly sold Coffee drink in England." Bowman, later, opened a coffee-house on his own account on Lombard street, his former partner, Rossie, going to Holland, where, it is said, he was the first to introduce coffee in the drink. At this time coffee sold for from twenty to twenty-five dollars per pound, but soon became cheaper.

In 1657 many other houses were opened in London for the sale of coffee, an excise tax of eight pence per gallon being paid on it, when made and sold in the infusion at that time. The same year a newspaper advertisement

appeared, stating that "In Bartholomew Lane on the back of the old Exchange the drink called *Cophce* is sold in the morning and at three o'clock in the afternoon." The first mention of coffee on the statute books was in 1660, when a duty of four pence was laid on every gallon of coffee made and sold, to be paid by the maker thereof, another particular statute, in 1663, directing that "all coffee-houses should be licensed at the general quarter sessions of the peace for the county in which they are kept." While another advertisement in that year says of coffee: "It much quickens the spirits, and makes the heart lightsome, suppresseth the fumes exceedingly, and, therefore, is good against headache, prevents cough and consumption, and is excellent for the cure of gout, dropsy, scurvey, hypochondria and the like."

In London, as in the other cities where Coffee was first introduced, coffee-houses multiplied rapidly, not only in the capital, but in all the larger cities of England, there being in 1688, according to Ray, as many coffee-houses in London alone as in grand Cairo itself, Coffee becoming a beverage of general consumption throughout the entire country. Long antedating newspapers, the coffee-houses became news-centres, where the intelligent men of the times gathered to learn what was occurring in the literary and political world, to discuss public affairs, governmental measures, and form public opinion. Wits and poets, essayists and philosophers, daily gathered in the coffee-houses of London, during several generations, to quote from favorite authors. How faithfully they harangued and button-holed each other in that fashion so common to all ages, and within their precincts, what fear and folly, what foolishness and wisdom, have been uttered over steaming cups of Mocha.

Many of these London coffee-houses afterwards became famous as the resorts of celebrated men. It was at "Will's Coffee-house," in Covent Garden, that Dryden and Addison, Steel and Davenant, Cary and Pope, met with other luminaries, while others frequented "Buttons"; Garrick sipping his Mocha at "Paine's," in Buchnal Lane. It being at the famous coffee-houses of "Garraway," "Coventrie," and the "St. James," that the Whigs of that time "did most congregate," and if it be proved that other potations more fiery and deep mingled with those of the Arabian product, it may be taken for granted that Coffee often supplied the place of worse beverages, or, at least, mitigated their evil effects, the "intellectual drink" gaining friends daily among the wits of the reign of Queen Anne. It was in a London coffee-house that Pope found the inspiration of "The Rape of the Lock," if not the "Essay on Man," also, an inspiration, which he celebrated in the following lines:—

"From silver spirits the grateful liquors glide,
While China's earth receives the smoking tide;
At once they gratify their sense and taste,
And frequent cups prolong the rich repast;
Coffee! which makes the politician wise,
And see through all things with half-closed eyes."

The coffee-houses of London, as in other cities, eventually became convenient and much frequented resorts of association and acquaintance where politics, literature and business topics were freely discussed, and it is also remarkable that the introduction of coffee into England encountered the same hostility that it was fated to meet with in all other countries where it was first introduced. Here also it had its fanatical opponents, numerous pamphlets being published in favor of and against its use.

It was discussed from every point of view, medical, moral, physical and political, at one time threatening to become a *causus belli* between the sexes. The "Women's petition against coffee" and the "Men's answer" to the same have become a matter of history. Among the men also the new beverage had its opponents, as in 1657 the "Rainbow Coffee-house" kept by James Farr in Queen's Temple was reputed and persecuted by them as "a great nuisance, and a prejudice to the neighborhood," and as such was suppressed, but reopened in a short time afterwards. In 1675 Charles II. for political reasons attempted to suppress the coffee-houses by a royal proclamation, classing all of them as "Seminaries of sedition," and in which it was stated that "they were the resort of disaffected persons who devised and spread abroad divers false, malicious and scandalous reports to the defamation of His Majesty's Government, the disturbance of the peace and quiet of the nation." This proclamation caused so much excitement throughout the city that it had to be rescinded in a few days on a petition from the tea and coffee dealers. On the opinion of legal officials being taken as to the legality of that step, an oracular deliverance was given to the effect "that the retailing of coffee might be an innocent trade, but as it was used to nourish sedition, spread lies and scandalize great men, it might also prove a common nuisance." Cromwell ordered them closed again during the Protectorate for somewhat similar reasons, but having become necessary to the people they could not be put down for any length of time. But in England also, as in the other countries, the most effective check on the increase of the consumption of coffee was found to be a heavy tax, which, while restricting honest trade, opened up a channel for extensive smuggling operations.

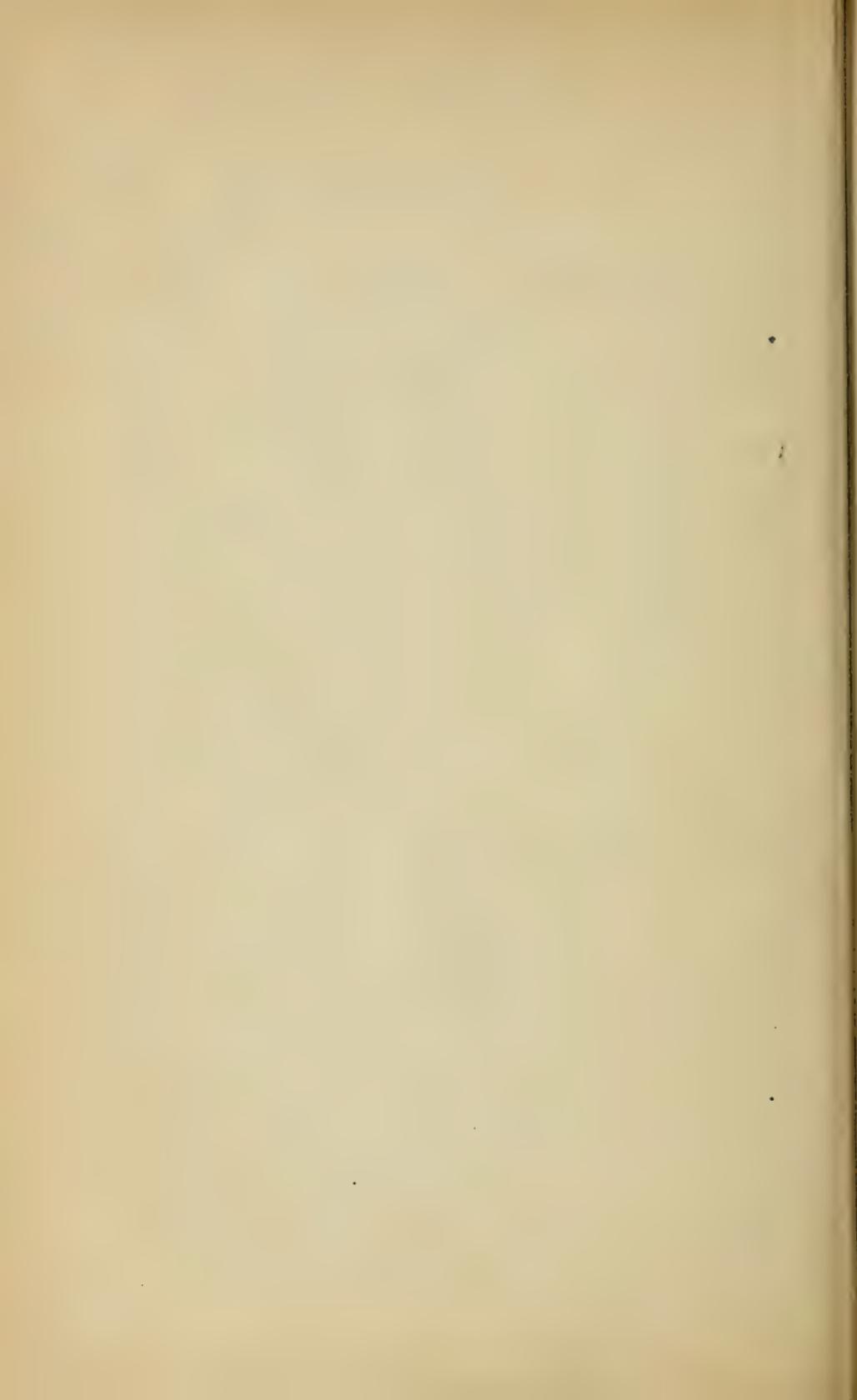
The London coffee-houses, however, soon assumed the additional character of Taverns also, other liquors being added to the fare, thereby losing their attraction for the temperately inclined, the Café or coffee-house proper flourishing only for any length of time in Paris alone. But while the people of London began to complain that the company to be found in their coffee-houses was somewhat mixed, those of the Parisians from the very first continued to be the most elegant and select places of resort even to the present day. Before their doors the equipages of the nobility stopped, while ladies of the highest rank drank their coffee without alighting, and the Salons within were crowded with nobles, philosophers, poets, artists and litterateurs.

The sale of Coffee in a liquid form is claimed to have been first introduced to Holland by the aforementioned Rossie in 1664, from whence its use soon spread throughout Germany and other parts of the continent of Europe. While to Vienna the Turks themselves first introduced coffee in 1683, under somewhat singular circumstances. In that year the Moslems besieged that city with an enormous force, the siege being raised, as history tells, by the Polish King, John Sobieski, and the Moslem hordes completely routed. Large quantities of coffee were found in their deserted camp, and presented to one Kolschutski as a reward for the heroic services he had rendered during the investment of the city, and utilized by him in the establishment of the first Coffee-house in Vienna.

Coffee-houses have been known in the United States from an early period in its history, but for a long time New Orleans was the only city where they existed in their true character, the manner being learned from Paris. Among the American people, however, the beverage has

met from the first with great favor, being at the present time more extensively used here than in any country of the world, not excepting the countries of original production.

Thus in a course of a few centuries has a berry, until then entirely unknown as an article of diet, except to the semi-savage tribes of Ethiopia and Abyssinia, made its way through the whole civilized world. In the nations professing the religion of Mahomet it is drunk at all hours of the day, and during the night by all ranks and classes of the people, from the Sultan and the Mufti to the merchant, the artisan and the peasant. While among the nations professing Christianity, by whom it has been known for a couple of centuries, it is still regarded as a luxury, but indulged in, more or less, by all classes and conditions of society. In none of the states of Christendom was its use ever opposed by religious fanaticism, nor had it to encounter much opposition from political jealousy, except for a brief period in England, when its use was interdicted by Charles II. But, like every other innovation which has occupied the human mind, it could not fail to occasion a difference of opinion among medical experts, social reformers and similar bodies. Its history, at the present time, being only valuable as an example of a commodity for which there is a universal craving amongst mankind in general, civilized as well as savage, and to illustrate how it has struggled successfully, and at length triumphantly, over religious superstition, political opposition, physiological prejudice, fiscal restrictions, exorbitant taxes, differential duties and an endless accumulation of antiquated obstructions. Yet, still, in common with other important necessities of life, it has never attained to the natural state of "unrestricted competition."



CHAPTER II.

GEOGRAPHICAL DISTRIBUTION

THE Coffee plant, although now so widely and extensively grown and cultivated in both hemispheres, and to be found in all the Botanic gardens as well as in many of the private conservatories of the new and old worlds, was entirely unknown outside of Abyssinia and Arabia up to the close of the seventeenth century. Ray, in his "History of Plants," published in 1688, expresses his surprise "that the neighboring countries of Europe should permit so rare a treasure to be confined to a single province, and wonders what watchful dragon is employed by the natives to prevent strangers from procuring either the plant or its seed, which could be readily grown in similar climates and soil;" adding, "It cannot be imagined how the enterprising commercial nations of Europe, which founded colonies in the tropics can be so inattentive to the value and importance of such an acquisition." Whether acting on this suggestion or not, the plant soon afterwards was introduced and extensively cultivated in many of the countries colonized by Europeans.

Between well-recognized limits north and south of the equator Coffee is found growing and bearing highly profitable crops in a wide range of countries to attempt anything like an exhaustive account of which, is impossible within the range of a single chapter. Originally a

native of Southeastern Africa the coffee plant has been widely distributed, successfully cultivated and propagated in regions and countries geographically apart and in districts widely differing in climatic and topographic conditions, and as having been found to endure greater extremes of climate, variations in soil and situation than any other variety of plant of tropical origin. Its facility of propagation and production under such extreme conditions is admitted by botanists as most remarkable and equalled only by few members of the vegetable kingdom, its cultivation at the present time extending over the entire tropical belt of the globe.

It is practically indigenous to almost the whole of Africa, being one of the few useful economic products that the African flora has as yet given to the world. It is to be found growing there abundantly in a wild state, particularly between the 5th and 15th parallels, and in a state of cultivation on the west coast in Liberia, Loango and northern Angola, as well as in many of the districts lying between the lower Congo and the latter country, wherein no white man has as yet penetrated, its planting and gathering being carried on by the natives, who bring their harvests down to the coast at Ambrig and neighboring settlements to sell to the white traders. The Portuguese colonists of Principe and Sao Thorné, cultivate coffee extensively, their products standing in high repute. It has been grown with success in the Gaboon by French missionaries, and some desultory planting is also being carried on in Senegal, St. Helena, Sierra Leone and the Gambia colonies. It grows wild in the Congo region, the districts around Glandypool being eminently adapted to its cultivation, but is as yet not taken advantage of there, the natives of these countries, unlike those further south, ignoring the properties of its fruit.

It is cultivated in Natal and on the Zambesi river as well as in Usumbara, opposite to Zanzibar. which presents a splendid field for Coffee planting, containing as it does admirable soil, cheap labor, easy transport and land which is to be had for next to nothing, the missionaries distributing the Coffee seed among the inhabitants to induce them to cultivate it more extensively. While further into the interior, towards Pare, Nyanza and Killimanjaro, there are increasingly fine sites and suitable soil for successful and profitable Coffee planting only owned as yet by the birds of the air and the beasts of the field. It is to be found both in a wild state as well as in a state of cultivation in Abyssinia and the Nyassa district, being also cultivated for commercial purposes further north in lower Egypt, Nubia, Somali and the Soudan, as well as in Mozambique, and the islands of Madagascar, Bourbon and Mauritius. But the total yield of Africa so far as its influence on the world's supply is concerned is comparatively insignificant, the export capacity of the latter countries not exceeding 800 tons annually. The total product of the eastern provinces of Africa taken in connection with the small quantities raised on the west coast making Africa contribute only between 3,000 to 4,000 tons to the world's production, this amount including all the Coffee grown in Egypt and the interior countries of that continent.

From Africa the coffee plant was undoubtedly carried to Arabia, but at what period of the world's history or under what circumstances is not definitely known. It was introduced from Arabia to Java in 1690, according to Boerhave, who tells us that "Nicholas Wilser, Burgo-master of Amsterdam and Governor of the Dutch East India Company, in that year instructed Van Horn, the then Governor of Batavia, to procure some plants or

seeds of the Coffee tree from Arabia and endeavor to cultivate them in that settlement." Although its introduction into Java is placed later by Stavornius, who claims that the plant was first carried from Mocha to Batavia as late as 1722 by Zwardekiom, the governor of the colony in that year, other authorities claiming that Zwardekiom only helped to extend its cultivation on that island. The latter account is probably the most correct one, as it is recorded that coffee in the bean, grown in Java, was offered for sale in the Amsterdam market the exact year that Stavornius states that it was first introduced into that island. Be this as it may, the undertaking was successful from the beginning, many plants being propagated there, one of which, the first seen in Europe, was sent to the botanic garden in Amsterdam, where it in due time bore fruit. Many young trees were subsequently propagated from this plant and distributed among the gardens and conservatories of Europe, one of these being sent as a rare present to the king of France. The Dutch later extending the cultivation of coffee to Sumatra, Celebes, Bali, Timour and many other of the smaller islands of the Malay archipelago.

The Coffee plant was introduced into India, on the Malabar coast, about the year 1700, from Aden, although it is claimed to have been grown in that country, in the province of Mysore, long anterior to that year, tradition, relating that the plant was first introduced by Baba Booden, a Musselman pilgrim, who brought "seven berries" with him from Arabia about the year 1600, which he is said to have planted around his hut in the hills of Mysore, near which coffee trees over one hundred years old are yet to be seen. The earliest written account of the cultivation of the coffee plant in India is that contained in a Dutch work, entitled "Letters from

Malabar," by Jacob Visscher, chaplain at Cochin, in one of which he states that "the Coffee shrub is planted in gardens there for pleasure, and yields plenty of fruit, which attains a proper degree of ripeness, but has not the refined taste of Mocha coffee." The exact year in which these letters were written is not known, but the Dutch editor's preface is dated 1743, so that it may be concluded that the plant must have been introduced and known in India prior to that year, although there is no official record made of the plant or its product in that country further back than 1822, and though undoubtedly grown there at an early period, does not seem to have met with much attention there up to the close of the last century, no allusion being made to it in any Indian work until we come to "Heynes' Tracts," published in 1800, in one of which we are merely told that coffee was then being sold in the bazaars of Bangalore and Seringapatam. At the present time Coffee is grown all along India from the northern limits of Mysore and south to the summits and slopes of the western Ghats in British Cape Comorin, Coorg and Travancore, in the Wynaad and Neilgherry mountains, as well as in the slopes of the Shevany and Pulney hills. In 1880 over 500,000 acres had been taken up for Coffee culture in the Cochin, Madras, Mysore, Travancore, Belgaum and Bengal presidences, of which nearly 200,000 acres have now maturing plants. A very large portion of the surface of Burmah which still remains in its primeval state of unproductive jungle—owing to the almost total absence of natural energy on the part of the natives—is admirably adapted to the successful and profitable cultivation of Coffee. While in the hilly districts of the east coast of the Gulf of Siam, Cochin-China and the Straits settlements, the cultivation of Coffee is carried on to a limited extent, some fine samples being shown at the Exhibition of 1862.

The Coffee plant was introduced from Java into the island of Ceylon by the Dutch in 1720, where they began to cultivate it without any successful results, their efforts being confined to the lowlands in the districts of Galle and Negonogo, the location proving unfavorable in soil and temperature, the natives being also opposed to the innovation. But although some coffee of excellent quality was produced, notwithstanding these obstacles, it was found that it could not be cultivated there to advantage, when compared with the Java product. Yet though suspended for a time by the Dutch, it was not entirely abandoned by the native Cinghese, who having, in the meantime, learned the commercial value of the article, continued to grow it in small quantities, so that after the British obtained possession of the island the Moors, who collected it in the villages, brought the hulled beans to Galle and Colombo, to barter them for cutlery, cotton and trinkets. It is claimed, on the other hand, to have been grown in Ceylon long before the arrival of the Dutch, and even the Portuguese, but that the preparation of a beverage from its fruit was unheard of by the natives, who only employed its tender leaves for their curries, and its delicate, jassamine-like flowers for ornamenting their shrines and temples. On the occupation of Ceylon, after its concession to the British in 1825, however, the English troops found the coffee tree growing in profusion in the vicinity of the temples in Kandy, and also large coffee gardens, highly cultivated, were found on the banks of the river Mahawelli and close to the palace of Hangaurau.

The coffee plant was introduced into the Phillipine Islands by Spanish missionaries from Java about 1740, but a species of wild coffee trees have been found on the island of Luzon, the berries being left ungathered, the

natives being ignorant of their use or preparation, there being well-authentic instances of the same kind at the present day where the natives wonder what is done with the berries when hulled and cleaned, whether it is eaten or for what purpose intended. It was first introduced into the islands of Bourbon and Mauritius by the French through Du Fougerais Grenier in 1717, from Arabia and from Mozambique to Madagascar by natives about the same period.

The island of Borneo grows good Coffee, and since the country has been opened up to settlers some 200,000 acres of forest lands have been selected by Cantonese, European and Australian planters for this purpose, the gardens around Silam particularly being very encouraging as regards the new product. With the splendid and well-proportioned rain-fall Coffee grows extremely well, especially Liberian Coffee, for which the soil and climate of that island seems well adapted. Coffee cultivation is carried on there in the gardens of the Europeans and thrives remarkably well, while the Malays state that it is grown extensively by the Dyaks of the Pontianak river for the use of that settlement, but its cultivation on an extensive or systematic scale has not been encouraged, the government not wishing to create a competition with Java. The hills on the mainland opposite Lubuhan are well adapted for its successful cultivation, since there Coffee can be grown without the trouble and expense of raising trees amongst the plantations to protect the plants from the sun, as has to be done in so many other countries. It is also systematically cultivated in the islands of Guinea, Fiji, the Friendly and Hawaiian Islands, as well as in many others of the South Pacific ocean. The Coffee plant having been in existence in Samoa and other islands of that group for some years

past where it is found to flourish luxuriantly, proving the suitability of the soil and climate, but in consequence of never being scientifically treated there it has not as yet become an article of commerce from these islands. Coffee cultivation has been successfully introduced into Caledonia and other groups in the South Pacific, which, in the course of a few years, will probably form an important export, the trees raised there from seed bearing fruit in the fourth year. In Honolulu its cultivation is also progressing, large plantations having been laid out with a view to supplying the markets of Chili, Peru, Sydney and California.

The mountain ranges on the northern coast of Australia from Moreton bay to Torres straits, and other parts of that section, are recommended for Coffee cultivation, while in Queensland the plant has long been successfully grown, but it has not as yet become an article of export there, the plantations having recently suffered much from disease. It has been found to thrive well, however, in the vicinity of Brisbane, Cardwell and other northern districts, especially among the sheltered ridges of the Herbert and Endeavor rivers, these sites offering the most favorable conditions, the smaller farmers finding that Coffee pays them better than corn or potatoes, several of them having recently sold to the merchants of Brisbane some of their product as high as 20 cents per pound. This list does not by any means exhaust the possible sections in the South Pacific where Coffee cultivation has been tried with great advantage, but simply touches upon some of the chief centres adapted to the enterprise.

**INTRODUCTION OF THE COFFEE
PLANT INTO AMERICA.**

The history of the first introduction of the coffee plant into the new world is as romantic as it is interesting. In the year 1714 the French king, Louis XIV, was presented by the magistrates of Amsterdam with a fine specimen of the Coffee plant, almost five feet high and in full foliage, from the botanic garden of that city. This plant was carefully nursed, and from it some sprouts were sent to Martinique in 1717, being committed to the care of De Clieux, an officer in the French naval service, who subsequently proved himself worthy of the trust reposed in him. The voyage being long and the weather unfavorable, the whole ship's crew were at length reduced to a short allowance of water, all the young plants dying except one for lack of nourishment. It was at this juncture that this zealous patriot divided his own scanty allowance with the plant committed to his care, happily succeeding in bringing it safe to Martinique uninjured, where it afterwards flourished and from which was propagated sufficient to supply the adjacent islands, De Tour claiming that from this single plant was produced the almost innumerable varieties now to be found on the American continent.

In 1718, however, the Dutch colony of Surinam began to introduce and cultivate Coffee, from plants received from Java. In 1722 the French governor of the adjoining colony of Cayenne, having business in Surinam, contrived, by an artifice, to bring away with him from there a small Coffee plant, which, in the year 1725, had produced many thousands, which were distributed among all the French colonies on the mainland, its cultivation being extended to Para from Cayenne, by the French, in 1732; the first

Coffee plantation opened in Brazil being commenced in that province a few years later. Its cultivation, however, made little or no progress in that now world-famous Coffee-growing country until 1767, when its cultivation was still further extended to the province of Maranhao, where it soon increased rapidly under careful and judicious management.

In 1774 a Belgian monk, named Molke, procured some plants from one of the prosperous Maranhao estates, and carried them to Rio de Janeiro, the first one being planted in the garden of the Capuchin monastery of Adjuda, then situated in the suburbs, but now almost in the centre of that city. This plant prospered so well under his care, and he, becoming convinced of its future importance as a valuable acquisition to the industries of the country, that a few years later he cleared a plantation for its systematic and more extensive cultivation. Joachim Bruno, the then Bishop of Rio de Janeiro, also perceiving the valuable benefits to be derived by the country from Coffee cultivation, and to whom Brazil is indebted for the introduction and cultivation of many of its now valuable trees and plants, was accustomed to distribute the seeds of the coffee produced on Molke's plantation and the garden of the monastery among the religious institutions of his diocese, personally recommending and encouraging its cultivation by them, at the same time presenting many specimens to the laity. From this simple and unostentatious beginning, has grown the extensive coffee-lands of to-day in Brazil, hundreds of thousands of acres of land being devoted to its culture at the present day, over \$100,000,000 being invested in the industry.

From Brazil the coffee plant was later carried to Peru, Chili, Paraguay and other South American countries,

while from Martinique it was first introduced into Jamaica by Sir Nicholas Lawes in 1732, a special act of Parliament being passed in that year to encourage and foster its cultivation on that island. Coffee culture is claimed to have been first introduced into San Domingo by wild fowl who carried the seeds in their craws from one of the neighboring islands about 1735, being later introduced to the smaller islands of the Antilles by the French themselves.

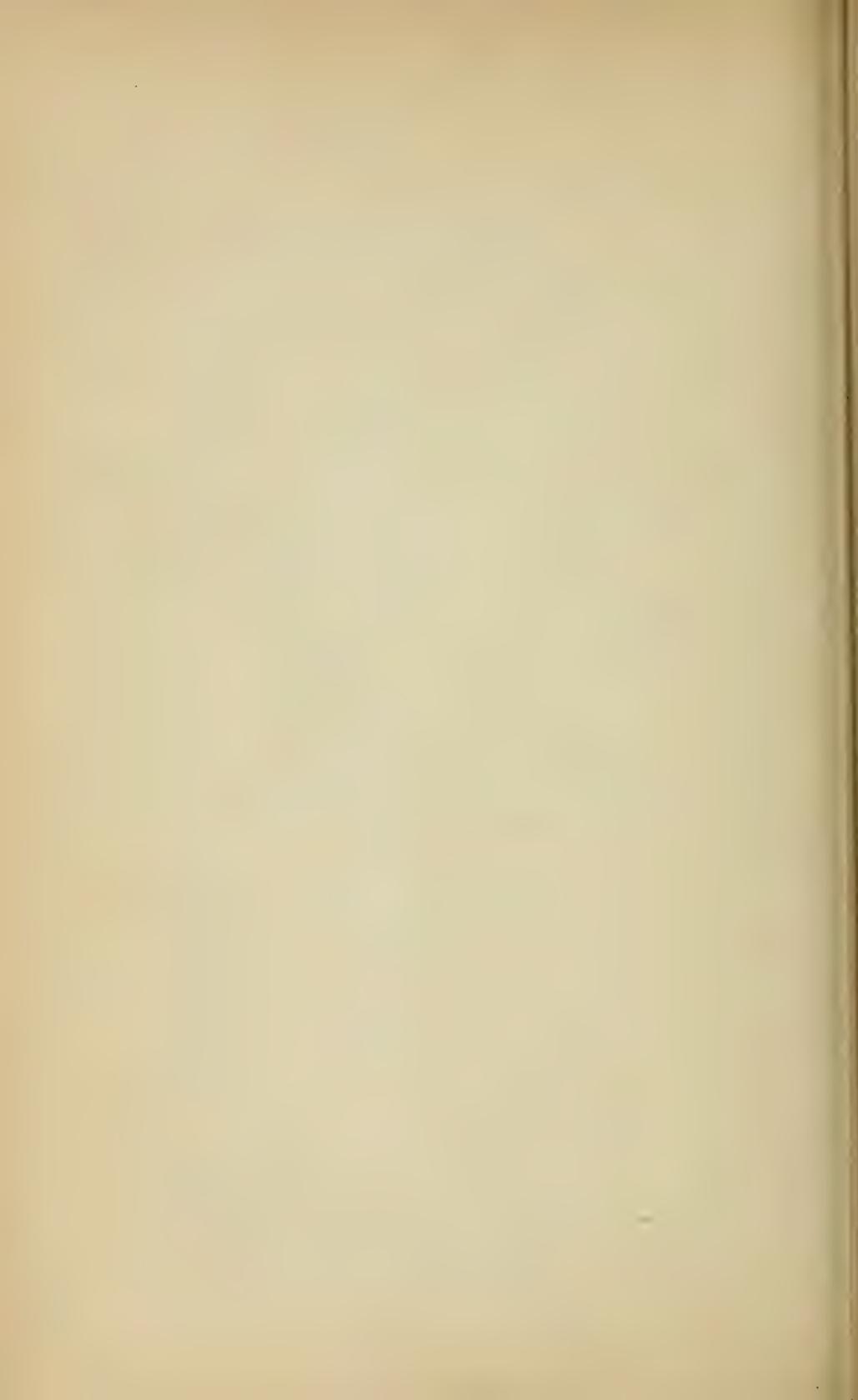
The Spaniards procured some plants from Martinique, and undertook its cultivation in Cuba, Porto Rico and others of their possessions in the West Indies about 1750, its culture prospering well in these islands until replaced later by the less expensive and more profitable sugar industry, but it was not until 1784 that they undertook its cultivation in their possessions on the mainland. In that year Bartholemew Blandin started a plantation in the Chacao valley, situated about a league from the now famous coffee-growing district of Caracas, a Dr. Sligo, soon afterwards, following Blandin's example in the equally famous district of Maracaibo, the new branch of industry being soon generally adopted throughout Venezuela, Columbo, Ecuador and Bolivia, where several varieties are grown, particularly throughout the Yungas district, the best product being valued as not inferior to the far-famed Mocha itself.

In 1818 the profitableness of coffee culture in the West Indies led to the establishment of extensive plantations in Mexico in the cantons of Orizaba and Cordova, which in 1825 were in a most flourishing state, its cultivation in that country being still further extended to the valleys of the interior, in 1826 there being in Cuentla and Cuenmarca alone estates containing as many as 500,000 coffee trees. Elsewhere in Mexico at the time much

attention was bestowed in extending its cultivation, great hopes being entertained that every available spot would be occupied in its cultivation and that its people would be largely engaged in its cultivation and exportation to foreign countries. But the civil disorders which begun so soon after its introduction to that country and which continued for so long a time after paralyzed the industry in its infancy, disappointing these hopes so much so that the production of coffee in Mexico has been almost limited to supplying the home demand. Now, however, a brighter era has arrived, more attention being given to its cultivation in that country, her coffee product steadily increasing and improving from year to year. From Mexico the cultivation of the coffee plant spread through Guatamala to Nicaragua, Honduras, Salvador and Costa Rica, until it is or will be grown throughout all the Central and South American countries.

Efforts have been made from time to time during the past twenty years to introduce the cultivation of coffee into the United States, many thousands of plants being distributed throughout Florida, Texas and Lower California with that object in view. Reported results to the Agricultural Department in Washington from these distributions lead to the belief that the climate is too cold for its production for commercial purposes. Some years ago the department received a sample of coffee berries which had been gathered from plants said to have been grown in the open air near the Manatee river in Florida. It was afterwards learned upon investigation that these plants had been protected during the coldest nights by canvas coverings, and in some instances with blankets, yet it is admitted that while it is more than likely that in the extreme southern parts of Florida the coffee plant would thrive without protection and in the open air, the

topographical conformation of that part of the State is most unfavorable for its commercial cultivation. Again, in the extreme southern part of California climatic conditions favorable to its production has been found, but so far little encouragement has been received from the efforts to cultivate the plant in that section. Some years ago Liberian coffee-plants were introduced by the Agricultural Department, this species being hardier and needing less care and attention when transplanted to other countries. But, contrary to all precedent and expectations, they were found to require a warmer climate and more congenial topographic conditions than the Arabian species already tried. Here it is a fact worthy of note, that in many of the countries into which the coffee plant has been introduced, indigenous varieties were subsequently discovered. This is more particularly true of Liberia, Mauritius, Malabar and Manilla in the Eastern Hemisphere, and in Mexico, Costa Rica, Bolivia, Peru and Brazil in the Western. No less than sixteen different species being claimed to have been discovered in the latter country alone.



CHAPTER III.

BOTANICAL CHARACTERISTICS AND FORM.

THIS now important and valuable article of food was known to the early inhabitants of Ethiopia, where its virtues were first discovered and used, as *Bun*, signifying "brown" or "roasted." In Arabia it is termed *Kawah*, meaning "strength" or "vigor," the infusion being called *Quahouch*; while to the Turks it is known as *Chaube* in the bean, and *Kahve* in the liquid state; to Persians, *Karveh*; to the natives of the Malay Archipelago as *Kopi*, and finally *Kaffa* or *Caffia* by the inhabitants of that district, situated in the Province of Narca, in southeastern Abyssinia, where it is to be found growing in wild abundance, even at the present day, whence its botanical name, *Coffea*, adopted by Linnæus and others.

The genus known as *Coffea* is divided by botanists into some sixty species, of which fifteen are referred to Africa, seven to Asia and about twenty-two to America; but there is abundant reason for supposing that the majority of these so-called *species* are but mere varieties, a single *genus*, due to different conditions of soil, climate and cultivation, three of which it will be sufficient for all practical purposes to distinguish in this work. It is classed botanically as a species coming under the head of the *Pentandria* of Linnæus and the family *Rubiceæ*, although by others it is placed among the *Cinchonaceæ* family of plants which comprise numerous species of tropical berry-bearing shrubs, one of which only is known to possess valuable properties celebrated for the

agreeable and stimulating effect of an infusion made from its roasted albumen.

The common Coffee shrub is an evergreen plant, which, under natural conditions, grows to a height of from eighteen to twenty feet, having the appearance of an upright, slender tree, with main stem very erect, and free from branches for the greater part of its height, but opening at the top into drooping branches, few but long, with an abundance of fine fibrous roots under ground, and an all-important top-root. But in a state of cultivation it is a shrub of close and systematic growth of low-standing, and averaging only from four to six feet in height, its upward growth being checked by the pruning-knife of the cultivator, and also trained by frequent cutting and topping so as to assume a pyramidal form for the purpose of increasing the quantity and improving the quality of its product as well as to facilitate the picking of its crop. The branches are brachiate, horizontal, simple and opposite, growing regularly from the ground up, but trailing towards the top, cylindrical in form, flexible, loose and expanding out and downwards like those of the apple tree, and extremely pleasing in general appearance. The leaves are from five to six inches in length, and from two to three wide in the middle when full grown, oblong-ovate, acuminate, smooth, and of a dark, shiny-green color on the upper surface, but pale underneath, firm and leathery in texture, closely resembling those of the Portuguese laurel, continuing three years, and possessing slightly tonic and stimulating properties. The flowers, which are produced in dense clusters in the axils of the leaves fitting close to the axils, are funnel-shaped and small but numerous, having a five-toothed calyx, a tubular five-parted corolla, five stamens and a single bifid style, snow-white in color,

possessing a rich, fragrant odor, approaching that of the jessamine, the plants in blossom having a peculiarly rich and attractive appearance, the bloom being very evanescent and of short duration, but are quickly followed by fruit, there being generally two, sometimes three, relays of blossoms before all the buds mature, until after a day or two, when they gradually turn brown and fade away; the slower and more gradual this process the better for the crop, which is always estimated by the abundance of the blossoms. The fruit, which quickly follows in the hollow of the leaves, is a fleshy or "pulpy" berry, at first greenish and hard to the touch, assumes a yellowish hue as it continues to ripen under the meridian sun, the color deepening not regularly but by crimson or scarlet shades and tints which spread over the surface, having at this stage the size and appearance of a small cherry, assuming a dark-red or deep, glossy purple black color with a smooth and bloomless cuticle as it matures. In both states of flower and fruit nature is nowhere so profuse and beautiful in the variety of its colors and forms. The plant, being an evergreen, the foliage is always fresh, and, though, in the autumn season, the blossoms appear scattered among the dark-green leaves, resembling flakes of snow, they are hardly ever absent from the tree. It continues to put forth fruit, while the blossoms are arriving at maturity, and nothing is more singular or striking of its kind than its producing capabilities, as at all seasons, leaves, blossoms and ripe fruit are to be seen on the same tree at the same time, and the fruit may be gathered at any period, but the regular harvests are usually two in the course of a year.

Each fruit contains two seeds embedded in a yellowish pulp, the seeds being again enclosed in a thin membranous parchment. The *Epicarp* or outer-skin of the

berry is at first dark-green in color, but assumes a yellow and finally a bright-scarlet color as it ripens, becoming dark-purple as it dries, having a little circular area at the summit and a callous point through it. In this condition it contains a mucilaginous, saccharine, glutinous substance, technically termed the "pulp," a succulent, sweet and palatable matter, closely enveloping the seeds, frequently eaten by the pickers. Another substance, known as the *Mesocarp*, secures and separates the *Pyrenes* or seeds, and as the fruit dries this mesocarp hardens and becomes part of the shell or hull surrounding the seeds, which it becomes necessary to remove by a milling or hulling process in order to free them from this covering. These pyrenes or seeds are again invested by a cartilaginous membrane termed the *Endocarp*, but commonly known as the "parchment," a papery, elastic substance, loosely but completely enveloping them. On removing this parchment we have exposed two small, oval seeds facing each other, though sometimes there is but one called from its shape male or "pea-berry." These seeds, which constitute the raw Coffee of commerce, are plano-convex in form, the flat surfaces which are laid against each other within the berry, having a longitudinal furrow or groove extending their entire length. When first exposed they are of a soft, semi-translucent bluish or greenish color, afterwards becoming hard, tough or flinty in texture, in which state it is known as "rice coffee," the bulk of which forms the Coffees of commerce. This seed or "bean" as it is called in trade is still incased in what is known as the *Testa*, another covering which forms an integument of the seed and which is known to commerce as the "silver-skin," the mass of the coffee beneath this testa being termed the *Albumen*. Contained in this albumen and embedded near its base is to be found

the *Embryo*. The first of these structures, that is, the epicarp, mesocarp and endocarp, belong to the fruit or berry, the other three, that is, the testa, albumen and embryo, being essentially parts of the seed or bean. The uses of these various structures surrounding the embryo are to protect it from injury and at the same time supply it with proper nourishment until such time as it is enabled to take care of itself. The testa or silver-skin enveloping every part of the albumen, following and dipping into the furrow on the face of the Coffee bean by its tough, leatherly nature, acts as an effectual protection to the delicate structures contained within. The albumen, bearing the same relation to the bean that flour does to wheat, the white-meat to cocoanut, and the aromatic, ruminated secretion to the nutmeg. It is a secretion, found in the *internal* of the seed, enveloping the embryo plant, and for the support of which it is destined when it first begins to germinate. Each perfect Coffee berry should contain two such oval seeds, placed facing each other, the flat sides opposite; but it frequently occurs that only one seed forms, the other becoming abortive, and variously known as "virgin" "male" or "pea-berry." Coffee seeds are generally termed "beans" in commerce, a term not derived from any resemblance they may have to a bean; while, again, they are termed by many as "berries," the latter term being applicable only to the fruit or pod, the term "bean" being more appropriate to the seed.

SUB-VARIETIES.

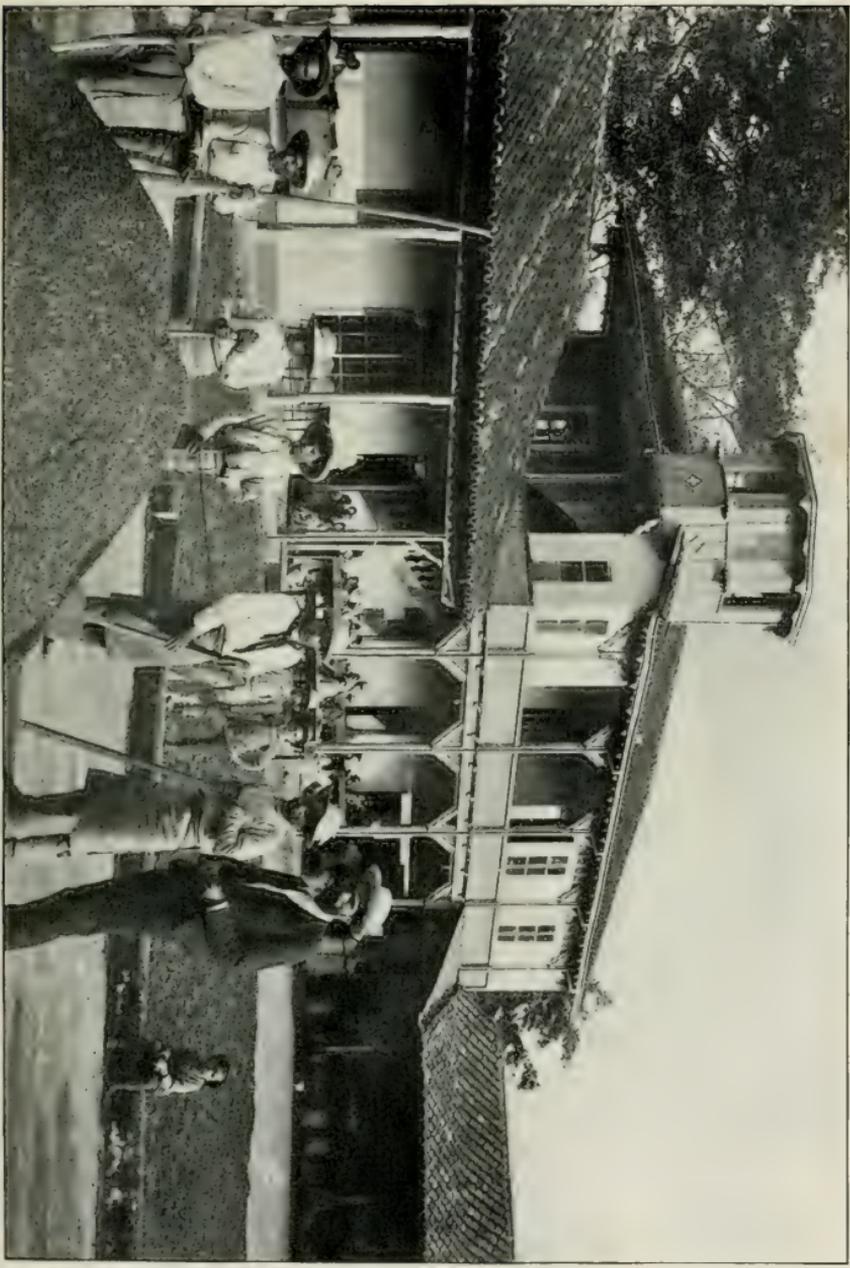
According to some botanists, there is but one genus of the Coffee plant,—*Coffea Arabica*,—others, again, contending that there are two separate and distinct species, classified as *Coffea Orientalis* and *Coffea Occidentalis*. While admitting but one genus, the difference in

size, appearance and product being attributed by them to a variation in soil, climate and methods of cultivation, there are three principal varieties, however, readily distinguished and recognized by those who have much to do with it, and are known to commerce as *Coffea Arabica*, *Coffea Liberica* and *Coffea Maragogipe*, lately discovered in Brazil, all of which or their transplants furnish the Coffees of commerce.



Coffea Arabica,

Or "Arabian Coffee plant," is the best-known species, being an evergreen, partaking more of the nature of



CORREA HACIENDA AND SHOWEN



a shrub, which, in a state of cultivation, varies in height from four to six feet, its foliage resembling that of Portuguese laurel. The trunk is erect and slender, averaging about three inches in diameter and covered with a whitish-brown bark, rather rough in appearance. The branches are numerous, ordinarily bending downwards when the plant begins to grow old, but when young and vigorous extend in a round form like an umbrella. The wood is very limber and pliable, so much so that the ends of the longest branches may be bent down to within three inches of the ground without snapping. The leaves are oval in form, dark green in color, shiny and sharp pointed as those of the citron tree, ranged on the branches opposite, but at a little distance from each other. The flowers or blossoms are also numerous, clustering with projecting antlers, snowy-white and very fragrant, but of short duration, disappearing quick, but rapidly followed by the fruit springing apparently from them. The fruit is a small berry, green at first, but assuming a rich scarlet as it ripens. From this species has been propagated the numerous varieties now known to commerce. The range of this species is at elevations of from 1,000 to 4,000 feet above sea-level between the latitudes of 15° north and 15° south, but its cultivation may be extended for commercial purposes to 36° north and 30° south in latitudes where the temperature does not fall below 55° ; still the most favorable climate for it would be where the temperature does not fall below 60° to 80° in the shade, and as to humidity there should be no month in the year entirely devoid of rain, the total of which should range from 100 to 150 inches per annum, that is, an absence of extremes of temperature with a constant supply of moisture. This species is cultivated chiefly in Arabia, India, Ceylon,

Natal, Java, Sumatra and other islands in the Malay Archipelago, as well as in Mexico, the West Indies, Central and South America and recently in Australasia, furnishing almost the whole of the coffees of commerce.



Coffea Liberica,

Or "Liberian Coffee plant," which has recently been brought forward as a rival to the Arabian variety, is an indigenous species found both in a wild and cultivated state on the west coast of Africa, and which in an adult cultivated state ranges in height from fifteen to twenty feet, being of tree-like habits. The trunk is thick, very erect, and covered with a dark-brown bark of a downy texture. The branches also differ from those of the Arabian species insomuch as they do not possess

the horizontal, drooping tendency so characteristic of the latter, being also hardier and more prolific. The leaves are proportionately large, varying in length from eight to fifteen inches and in many instances from four to five inches in width at their widest part. They are dark-green in color, leathery in texture, and instead of the wedge-shaped base, narrowing as it approaches the petiole or stalk; it more resembles the continuation of the extremity of the leaf itself. The flowers are also fewer, never more than six to eight in a cluster, are much larger, but devoid of fragrance. The fruit, as may be inferred from the tree-like habits of this species, is extremely large, averaging an inch to an inch and a quarter in length, ellipsoidal in form, and characteristically pointed at both ends. It lacks the bright red color of the Arabian variety, when ripe, being commonly of a dull red, approaching brown, becoming black as it dries. The pulp is also thicker, fibrous and more fleshy, but lacking in succulence, and cannot be eaten; the parchment being hard and brittle, dark-brown in color and never clear. The testa, or silver-skin, is much stronger, tougher, and more tightly rolled into the deep, narrow furrow on the face. The seed or bean is also extremely large in size, peculiar in form, what is known as "male" or "pea-berry" in form is dark-brown in color, solid and heavy in weight and exceedingly strong in flavor. Taken altogether, the wide divergence in the general appearance and habits of this variety, the culture of the leaves, lesser number of flowers, size, weight, color, peculiar formation, and other characteristics, stamp it as a distinct species of the genus *Coffea*.

Increasing attention is lately being devoted to this species. It is a native of Liberia, and is to be found growing wild in great abundance along the whole of the

Guinea coast and is to be distinguished from the ordinary shrub by much more vigorous growth, by affecting flat, low and coast lands as well as hill sides, by attaining greater size and withstanding greater extremes of climate. It also possesses the additional advantage in that it is capable of improvement by cultivation, and though as liable to disease as the Arabian plant, appears to be affected only in a minor degree, while on the other hand the product is much coarser flavored, which is considered no drawback to its being used for admixture with better sorts, by which means it yields a cheap, yet genuine beverage. Experiments have been lately tried in Ceylon of grafting the finer flavored Arabian on the stocks of this species, thus producing a hybrid from which great benefits are anticipated in the future. It is a species, moreover, which grows well in low altitudes, and would probably flourish in situations that have proved unsuitable for the Arabian plant, and should it come up to the sanguine expectations of the Java, Ceylon, Mexican, South American and other planters, to whom it has been submitted for experiment, there is no doubt but that it will prove a formidable rival to the species which have hitherto received the exclusive attention of planters generally.



Coffea Maragogipe,

Or "Brazilian Coffee plant," is a new and indigenous variety, recently discovered in the province of that name, in Brazil, much larger than the Arabian, but smaller than the Liberian. It grows with extraordinary vigor, coming into full bearing much sooner than either of the foregoing varieties, trees of two to three years attaining a height of eight to ten feet, being full of fruit at that age, the berry and product per acre being also larger. Planters who have adopted this variety are so well pleased with the results obtained that they are replacing the regular species with it, all agreeing that in size of

berry, style of bean, strength and flavor, it is a species to be recommended.

OTHER VARIETIES.

There are numerous other varieties of the Coffee plant, closely allied, but still markedly distinct from the foregoing species, inasmuch as they do not possess any valuable or intrinsic properties, being cultivated only for the sake of their foliage or flowers. Among which is that of:—

Coffea Mauritiana.—Found on the island of Mauritius, and evidently belonging to the Arabian species, yet claimed by LaMarche to be specifically distinct from it, on account of the difference in the size and form of its fruit. This eminent botanist must have been unaccountably negligent with respect to its specific character, having retained the description given by Linnæus of the Arabian plant, which is in the *Plantarium* described as entirely opposite to it.

Coffea Guinensis.—A native of Guinea, on the west coast of Africa, and a shrub from one to two feet high, with flowers quadrified, berries small and violet-colored, seeds two in number, cartilaginous and pointed at the ends; but found to be entirely devoid of the valuable or stimulating properties so characteristic of those of the true Coffee plant.

Coffea Panenlato.—Another species, also found on the Guinea coast, being a shrub having a large trunk, from seven to eight feet high, covered with a gray, cracked bark and yielding a fruit totally different from that of Coffee.

Coffea Racemora.—A species found in a wild state on the east coast of Africa, and in a state of cultivation

in the vicinity of Zanzibar. It is a small, upright, tree-like plant about six feet high, heavy in foliage and flowering, but devoid of fragrance and barren of fruit.

Coffea Trifora.—A shrub of about six feet high, found in Othahetai, foliaceous and flowery, but producing no fruit. This particular variety is also to be found in Jamaica, San Domingo, Martinique and other islands of the West Indies. Many other species such as the *Coffea Fambasena*, a native of the Friendly Islands, *Coffea Ghengalensis*, grown in Nepaul, *Coffea Opulina* and the *Cirdorata*, the latter being claimed to be analagous to the true Coffee plant, and is extensively grown on the island of Tamai, and many others cultivated principally for their seeds.

CHAPTER IV.

CULTIVATION AND PREPARATION.

THE principal points which determine the value of a location for the successful and profitable cultivation of Coffee are:—(1) Soil and climate; (2) Situation and aspect; (3) Temperature and rainfall; (4) Proximity to a river, and (5) Shelter from wind and wash. Most of which are necessarily subject to variation, according to country and locality, shelter from wind being perhaps of the most paramount importance, and which should not be sacrificed for a richer soil, as the latter can be artificially supplied much quicker than the former.

SOIL AND CLIMATE.

Soil and climate are subjects of primitive importance in the cultivation of Coffee. The soil of Coffee lands varies as widely almost as the different countries in which it is grown. In Africa, where the plant is indigenous, it is chiefly composed of a reddish clay on the West Coast, with a hard sandy subsoil, while on the East Coast it is found to be composed chiefly of a dark loamy earth. The Arabian soil, where the plant is exotic and where the finest Coffee is produced, is purely an artificial one, while in India it is successfully grown in five different kinds of soil, ranging from a dark chocolate clay to a deep jungle mould. The soil of Ceylon consisting of a

rich, dark earth, friable and mixed with blocks and small stones. On the island of Java, to the contrary, where some of the finest varieties are produced, the soil is principally composed of a black leaf-mould, intermixed with fine sand and small stones, whereas in the principal Coffee-growing countries of the American continent the best crops produced, as a general rule, are raised on rich, dark loamy lands, the subsoil of which are too rocky to be worked with a plow. The only exception to the rule being Brazil, where the soil varies to a great extent, a clay of *terra rocha* forming the chief upper and lower subsoil. The most suitable soil for Coffee cultivation, however, is that which grows soft timber, to be found on high quartzly ridges, where the land is of a dark chocolate color, mixed with small stones, and overspread here and there with boulders of granite, as where the soil is dark, loose and full of roots, it is sure to be rich in organic matter, and therefore good for Coffee, which is a hardy plant and not on the whole difficult to please in this matter; such a soil generally contains about 5 per cent. of its weight of organic matter in combination with other fertilizing substances. Looking at Coffee soil from an analyst's standpoint, it consists of an *organic* part, which when placed in the fire will burn away, and an *inorganic* or mineral part which will not burn. The constitution of the first is well known to planters, being formed of the remains of animals, insects, or minute visible and invisible organisms of various kinds, from the dung of animals, birds, caterpillars and worms, to that of roots, stems and leaves of decayed vegetable matter. The inorganic part, consisting of sand, clay, lime magnesia and the oxides of soda, potash and manganese, including carbonic, sulphuric and phosphoric acids. The preponderance of one or more of these natural divisions,

making the soil productive or unproductive as the case may be, while certain plants make certain calls upon one or more of these substances, and, consequently, such must be present and available in a soil that is to suit them. A rich soil for Coffee generally contains about five per cent., or one-twentieth of its weight, of organic matter in combination with other fertilizing substances. But as to the *best* soil for Coffee in particular the leading authorities differ, so that as a broad principle it may be laid down that the best soil is the *richest*, no matter what its color, whether it be the valley silt of Arabia, the volcanic mould of Java, the jungle soil of India and Ceylon, or the rich red earth of Brazil. But the deeper, freer and richer the soil, whatever it may be, the better as long as it is specially tested for phosphoric acid and potash. The latter is found in abundance wherever a large forest has been felled, burned grass-land being also considered good for this purpose, as it also contains those very requisite properties of Coffee soil.

If the soil be naturally light and poor and washed by every shower, the more soluble portions, together with the salts of the manure applied to the trees, is generally robbed by the heavy rains. In such a case it is next to impossible to keep a plantation in a high state of cultivation without an enormous expense in the constant application of manure. Many plantations are again subject to landslips, which are likewise produced by the violence of the rains; in such cases the destruction is most disastrous, and whenever landslips are frequent they may be taken as an evidence of a poor clay subsoil. The rain soaks through the surface, and not being able to percolate through the clay with sufficient rapidity, it lodges between the two strata, loosening the upper surface, which slides from the greasy clay, launched, as it

were, by its own gravity, into the valley below. This is the worst kind of soil for the coffee tree, whose long tap-root is ever seeking nourishment from beneath. On such a soil it is very common to see a young plantation giving great promise, but as the trees increase in growth the tap-root reaches the clay subsoil, and the plantation immediately falls off. The subsoil is of far more importance to the coffee tree than the upper surface, as the latter may be improved by manure, while if the former is bad there is no remedy. The first thing to be considered being the soil, and the planter being satisfied with its quality, there is another item of equal importance to be taken into consideration when choosing a locality for a coffee plantation. This is an extent of grazing land sufficient for the support of cattle that may be required for producing manure. In countries with large proportions of forests this is, however, not always practicable, the planter having recourse to artificial manure.

The subject of climate, though quite as important as that of soil, can yet be described with more accuracy. The extreme limits of coffee cultivation lie between the isothermal lines of the 25° north and the 30° south of the equator, but the best zone of latitude is that lying between the 20° north and south of the equator, one having a mean temperature of 65° to 75° Fahrenheit. A constant and uniform moisture, either natural or artificial, is especially requisite and indispensable to the free development of the trees, together with a rainfall of from 75 to 150 inches per annum, falling early in the season, but must be well distributed at the same time. The regions, however, found to be best adapted for the most successful and profitable cultivation of Coffee, are well-watered mountain slopes at an elevation ranging from 1,000 to 4,000 feet above sea-level, in latitudes

lying between 15° north and 15° south of the equator, although it is profitably grown at the present time from 25° north to 30° south of that line, but only in situations where the temperature does not fall below 55° at any time.

SELECTING LAND.

As a general rule, virgin forest land has been found the most suitable to break up for Coffee plantations, it having become naturally enriched by decayed vegetable matters, and the burning, to which it must first be subjected, frees it from all weeds and insects. But exceptional tracts of land, that have been once under cultivation and then allowed to run wild, also form good properties, and although the soil is rarely rich, it is generally exposed, and always entails great trouble and expense to keep down the weeds. A temperate climate within the tropics is to be preferred at all times, a certain degree of warmth and humidity combined being essential—in other words, an atmosphere resembling that of a northern hot-house produces the finest crops of Coffee, but, unfortunately, it is inimical to the unacclimated planter and favorable to weeds. The most suitable climate, under these circumstances, is precisely that which Americans prefer; frost, even though it be only at night and for a short period, is fatal, while the presence of water, preferably a running stream, is most essential for watering the young plants, as well as for the “pulping” process. In a wooded country the plantation may be laid out in blocks of fifty acres, encircled by natural belts of forest; but flat land must be avoided, as a wet soil is fatal to profitable coffee-growing, and flat lands also would entail great expenditure for drainage, while steep slopes, on the other hand, are also objectionable on account of the wash occasioned by

rains carrying away both soil and manure, thus exposing the roots of the shrubs. The top or surface-soil must be fairly good in all cases, the subsoil may be, but must never be, composed of stiff clay, the shrub being essentially a lateral feeder.

In opening a plantation, which is in all cases to be shaded by preserving a portion of the original forest trees, the first thing to be done is—after having ascertained the amount of land that can be conveniently planted in one season—to clear a wide road through the underwood from one end of the block of forest to the other, and as many at right angles to the line as may facilitate easy examination and of thoroughly inspecting the land to be cleared. The next thing to be done is to cut another wide line round the entire portion to be cleared, leaving a belt of from fifteen to twenty yards wide as a margin which is always to be kept uncleared, as this marginal belt will be found useful for shelter. The amount of shade must be regulated according to the value of the exposure as shown in the aspect. A great deal of shade being required on southern slopes, very little on northern ones, and only a moderate degree of shade being required for eastern and western slopes. The preliminary lines having been cleared, the whole of the underwood should then be cut down from one end to the other, and while it is yet green such portions of the larger trees as it may be difficult to remove by carting or dragging along the ground, should be cut up in pieces, but never burned, as is frequently the custom. This work should be completed by the end of December. The land being thus thoroughly cleared, lines of road should be laid out and the usual linings and pit diggings carried out, and the plants put down immediately after. The next point to be attended to is to plant out such trees as are particularly

suiting to coffee shading, and to remove any kinds which experience has proved to be injurious; these latter vary in the different countries. As the shade trees grow up, the same care must be taken of them as of the coffee tree, as regards pruning or topping, the lower branches being judiciously removed, the object being to grow a tree not only luxuriant but lofty, in order that it may throw a long shadow and so afford greater protection to the plants in its vicinity. Another point to be considered in the location of a successful Coffee plantation is situation, as regards shade, sun and wind, as a location and method of cultivation suited to one climate may be entirely unsuited to another. In sea-coast or moist climates planting without shade is generally the custom, while in dry arid climates shade is indispensable, as in wet or damp districts Coffee cannot be grown to advantage under the shade of the largest trees; the methods of cultivation therefore should be entirely different in the differing districts or localities. To be emphatic, *climate should regulate shade, that is, shade plantations thrive best in hot, dry climates, and unshaded in moist or humid ones.*

SITUATION AND ASPECT.

The Coffee-plant in most countries has been found to flourish best, and produce more abundantly, and reach a greater longevity on upland or mountain situations at altitudes ranging from one to four thousand feet above sea-level; but a mean elevation of three thousand feet has been found by experience to be best adapted for its most profitable culture. In the selection of a site for the establishment of a coffee plantation the same general rules are observed throughout all the coffee-growing countries; and, while an eastern or southern exposure

is preferable at all times, it is not essential under all conditions, this general principle being subject to modifications from such causes as local peculiarities of climate, abundance of forest shade and methods of special cultivation. Many plantations situated at sea-level are generally overshadowed by thickets of dense foliage, while those situated on mountain slopes are usually much exposed to winds and wash. In the older coffee-growing countries of the East an eastern aspect is considered the most desirable, a western exposure being generally selected on the American continent, as it loses less of its moisture. The opposite slope being more exposed to the vertical rays of the sun thereby preserves a more equal temperature.

Before clearing and burning the planter should take considerable pains to ascertain the values of the different aspects as regards sun and wind with the view of regulating the amount of shade accordingly, as it is impossible to exaggerate the importance of the various exposures. For the effects the sun's rays have on certain aspects in heating the soil and drying up the plant are such as would be extremely difficult to believe had the effects not been verified by competent observers and with the aid of a thermometer. And as regards sites, northern and southern slopes in particular, the difference between the one exposure and the other is just what constitutes the difference between green and dried grass, and between leaves luxuriously green and leaves dried and withered. The grass on the northern aspects being green and comparatively fresh, while even in a valley sheltered from drying winds the grass on the southern slopes is completely withered. An equally striking difference is observable in the coffee plants grown on these situations, those on the northern slopes being full of

health and life, while those situated on the southern are yellow, drooping and sickly; even in districts where coffee will not thrive without a considerable amount of shade the plants thrive well with little or even none on a northern bank, and look better than on a moderately shaded southern aspect. Nor in the nursery is the effect less of aspect, less striking, a nursery situated on a northern slope requiring less water and far less shade over the young plants than in a nursery sloping towards the south.

With regard to the aspect of wind the subject is an infinitely more difficult one than aspect as regards the sun's rays, the value of the latter being mathematically ascertained, for in countries full of hills and ravines one is constantly liable to be deceived as to the points that are exposed and those that are sheltered from the force of the wind; what is the right side of the hill for one planter is often the wrong side for another, whose plantation is perhaps only a few miles distant. While one planter may rail against the east wind, another will be equally loud against a west. The winds, however, that are most to be dreaded as being absolutely fatal to a coffee plantation are the fierce gales accompanied by torrents of rain. These winds are injurious in two ways: first, the plants are blown about, their hold on the soil weakened and the tender rootlets broken as fast as they are formed, and in the second case, the rain which accompanies such winds is driven into the hillsides with such force as to occasion a certain amount of wash, the particles of soil being lifted and valuable top soil swept away and utterly lost. The southwest winds are only fatally injurious on the first barrier; further inland their force is greatly modified, and to such an extent that little or no injury results from them.

In estimating the value and importance of exposures, planters and others of experience are frequently deceived; as aspects that one would naturally conclude are very much exposed often remain untouched by the wind, while on others apparently sheltered it has been known to burst with tremendous force. Of aspects as regards wind there are two points that may fairly be relied upon. The first is the appearance of the soil on the slopes, and the second the inclination of the forest trees. The soils on windy slopes will be found invariably to present a hardened and washed appearance, and are deficient in decayed vegetable matter on the surface. The inclination of the trees, also, and especially the extent to which their heads are bent, denotes how forcibly the wind strikes on these sites. In summing up on these important points of aspect it may be observed, as regards the sun's rays, it is patent that a northern aspect is the best, and a southern one the worst, because the latter is exactly twice as hot as the former. And as regards the eastern and western aspects there is not, as regards heat arising from the sun's rays, much to choose between them.

SHELTER AND SHADE.

The worst enemy of the Coffee shrub is wind, its effects becoming apparent in pinched and stunted growth or in lack of foliage. In situations where the soil is soft and yielding it does equal mischief by working the stems in the ground, so that in a short time a funnel is formed round the neck of the plant, and this being continually chafed the bark is worn off, the roots are loosened, and the plant dies of what is called "wind-wrung." Should it be rescued before the bark is entirely worn off the plant may live, but it will be extremely liable to attacks

from "lug worm" or any other blight that may be prevalent in the locality. Belts of jungle or forest land are sometimes left standing as a protection from wind, but opinions differ as to the advantage of this plan, some planters holding that more harm is likely to result from the wind being concentrated into eddies instead of taking its natural and more equitable course. This question can only be decided by the local surroundings in each case. Such belts being sure to form nurseries for weeds and vermin are not intended to be permanent, and should gradually give way to fruit or other useful trees. Sometimes artificial shelter is erected, but is considered too costly to find general favor; indeed, in moderately sheltered situations, staking, combined with low topping, ought to be sufficient to secure the stability of the plant. Where they are not, the situation has little to recommend it for successful Coffee culture.

Shade is also a consideration of great importance, and the opinion now generally adopted is that the wholesale felling of the forest in some sections has been altogether a mistake, and that plantations which are now extinct might still be flourishing had the forest shade been at least partially retained. The history of Coffee cultivation in the East proves that in hot climates, and where prolonged periods of drought may recur, Coffee will not flourish permanently, except under shade. In a state of nature the Coffee plant universally affects shade. This is the more remarkable, though the seeds are deposited by wild animals and birds as freely on open grass-lands as in forests. The suspicion that the "bover leaf disease," and other immediate causes of decay, are only induced by weakened state of the shrubs consequent upon their exposure to light and periods of drought, is supported by the fact that where shade trees are found standing

upon an abandoned plantation, they are still surrounded by a surviving remnant of Coffee bushes. The question as to where shade is necessary is, however, one of climate, as it has been proved that it is not universally beneficial. The advantages to be derived from it in very hot climates being: diminished exhaustion and consequently increased longevity of the plant, reduced cost of cultivation, a conservation of the nutritious properties of the soil, and an actual increase of them, as the cover given to the ground causes the surface vegetable matter to decay more rapidly. And provided the tree be a subsoil feeder, the shedding of the leaves will yield a positive gain of surface matter which the roots of the Coffee plant would otherwise never have reached. In addition to these there is the direct value of the timber grown on the estate. The only serious drawback to shade would seem to be a diminished yield of Coffee, but this is fully atoned for by the increased longevity of the plant.

CLEANING AND BURNING.

When forest land is taken for cultivation the first step is to effectually clear it of all timber and underwood, the latter being first cut by means of a "cattie" or machete, the large trees being felled from the top, and their branches lopped off so as to compact the pile, as otherwise the "burn" will only be partial. A fine day, after the night's dew has evaporated, is best for setting fire to the prostrate mass, the advantages of a thorough burn being that subsequent operations are greatly facilitated, and that the weeds and insects are thoroughly destroyed, while the disadvantage is that the upper soil is burnt and rendered unfit for filling into the holes. That injury may, to a great extent, be obviated by "lining and pitting" the land beforehand, by which means the surface

soil would be mostly covered over with the earth taken out of the pits, and thus be protected from the fire. On the other hand, the "lines" could not be marked out with accuracy or with any regularity, so that the estate would subsequently suffer to some extent in appearance, though it is an open question how far this drawback is worth considering in comparison with the other advantages gained. When there is not sufficient timber to make a good burn, the brush is felled and burnt in heaps, after which the ground is carefully gone over for the purpose of rooting up the tree stumps which remain, but these are sometimes so difficult to eradicate that they are left to decay, care being taken, however, to knock off shoots as fast as they appear. It is, however, a bad method and one seldom followed, as the rotting stumps harbor vermin of all kinds. After burning the wood the ashes should be scattered evenly over the ground as manure to enrich the soil.

LINING AND MARKING.

Immediately after the burn the plantation is "lined and marked out" for the reception of the plants, the two following methods being most in vogue among old and experienced planters: (1) A base line is laid down as nearly as possible straight up and down the slope, and a cross line is set off exactly at right angles to it; on this line stakes are driven into the ground at the distances determined upon for the final position of the young plants, to each stake a rope is fixed and stretched parallel with the base line, and as straight as possible, smaller stakes being provided along these lines, a rope is then finally held across them at succeeding stages of equal width as guided by measuring poles and the small

stakes, and the small stakes are put in where the movable rope crosses the fixed ones, each stake indicating the site of the plant. (2) A rope is furnished with bits of scarlet rag or flannel at the distances decided on between the plants and stretched across the plot, stakes being inserted at each rag, the rope is then moved forward a stage at a time, gauged by measuring rods. The first plan is the better, especially in broken ground, but is more laborious, the second being best available in even grassland, but the stretch of the rope must be estimated and allowed for, the great object being to have the lines perfectly regular, and instead of making any deviation where stumps or other obstacles occur, the rope is laid over them and the corresponding plant omitted.

ROADING AND DRAINING.

Efficient roads not only greatly facilitate the making of a Coffee plantation, but they should be so laid out as to serve the additional purpose of drainage. A cart road should pass through the centre of the plantation wherever it is possible to avoid a steeper gradient than one in fifteen, emerging upon the main highway. From this branch roads should be cut at right angles with as easy gradients as possible, and not more than from one hundred to one hundred and fifty feet apart; these branch roads should cross the lay of the ground so as to check, to the fullest extent, the effects of waste, and a boundary path encircling the estate is also useful for many reasons, but the main central road should be set out before pitting and planting. An excess of road accommodation as regards both the number and width of the paths is far preferable to insufficient roadway, despite the extra first outlay, and if the ground be such, it may cost a great deal to keep the roads clean and free from weeds. This, however,

may be greatly lessened by plowing them up and planting them with an annual crop until the land is exhausted, as not only will the roads be bounded by the plowing but weeds will not so readily grow.

Nothing is more important than the thorough drainage of a Coffee plantation, in order to carry away the excess of moisture during heavy rains without allowing the surface soil to be washed away. For this purpose continuous open trenches are cut in parallel lines across the face of the slope and at from ten to fifteen yards apart; their gradient, however, should never exceed one in twelve, one in twenty or even one in thirty will be still better, their width may be from fifteen to eighteen inches and their depth not less than one foot on the lower side. They will need constant cleaning out and repair, especially after a heavy shower, and must in all cases empty into a natural or artificial channel amply capable of carrying off the water; if furnished with breaks to catch the suspended or detached soil so much the better, as the latter can be collected and returned to the plantation as a dressing.

LAYING OUT THE NURSERY.

The Coffee plant is propagated in three different ways, by "Seeds," "Buddings," and "Cuttings," the two last being the most troublesome and objectionable, there being at the same time no branch of Coffee cultivation of more importance and none so frequently mismanaged or neglected as that of the production of the plant in the nursery, the greatest care and most constant watching being absolutely necessary to the attainment of success.

For this purpose should be selected a patch of gently sloping virgin soil, warm and dry, soft in nature and not

richer than that to which the plants are to be subsequently transferred, but close to water, running water, if possible. The seed-beds must be somewhat shaded, but not so as to entirely exclude the sun nor so that the shading plant may gather rain and send it in streams upon the beds; it must also be cleared of all the largest stumps and thoroughly dug to a depth of from nine to twelve inches and made very friable and at the same time slightly raised to promote drainage, and divided by paths into narrow strips. A deep trench is cut above the bed in an oblique direction to prevent damage by rain and wash. The seeds are sown in rows six to nine inches apart and about two feet deep and strewn about one inch apart in the holes, after which they are lightly covered with mould and shaded. A cheap and efficient shading may be secured by laying branches across a light framework of poles. All watering must be done in the morning or toward sunset. A bushel of coffee-seed should yield from 20,000 to 30,000 plants, the best seed being what is known as "parchment" coffee, picked when fully ripe, pulped by hand, unfermented, unwashed and dried in the shade. When the plants produce from two to four leaves, exclusive of the seed-leaves, they are carefully loosened and transferred, in damp, cloudy weather, from the seed-beds to the nurseries and placed there from nine to twelve inches apart. Great care must be taken meantime not to double up the tender tap-roots, but if the tap-root is very long, it is best shortened by an oblique cut, which soon shoots again. But when transplanting from seed-beds to nurseries is not practiced the plants are left in the seed-beds until they grow larger. Many planters, however, strongly recommend the former plan, as by checking the growth of the plants the young roots become hardened and better able, when finally planted out in

the field, to resist insects, disease and unfavorable weather. A practical suggestion for preventing young seedlings from being eaten off at the surface of the ground by grubs is to lightly wrap them with a piece of paper about three inches broad where the stem joins the roots when planting. The risk of having the young seedlings burnt up just after planting is best guarded against by various simple measures for shading them. In about a year, or when the plants have attained the height of about eighteen inches, they are ready for transfer to the permanent positions on the plantation which has been meantime prepared for their reception.

In selecting a plot for a nursery such a command of water as will facilitate the flooding of every bed so as to thoroughly saturate the soil, will be found indispensable, as it has been found by experience that it is much cheaper to carry soil to water than water to soil. If a good supply of water cannot be conveniently had on forest land by erecting a tank or directing a stream, the cheapest plan will be found to be to transport the soil already prepared and lay it down to the depth of a foot to eighteen inches on any land that has a good command of water. A couple of boys can effectually irrigate a large nursery by this means if the water be conducted to each bed, while twenty men will be required to carry water as many yards to a nursery of the same size, and even then the beds will be but one-half watered. But economy alone is not the only advantage to be gained by this method of flooding the beds, as this process can be carried on at any time of the day, while watering-pots cannot be used except early in the morning or late in the afternoon without scorching the leaves.

If the nursery is formed on forest land as, if possible, it should be, the timber should be felled, cut up and

carried or rolled off the ground—and not, as is too commonly the case, burnt on it—to obtain the best results. The former plan is the most expensive but will be found to pay better in the end, as the surface mould is not injured and the friable nature of the soil is preserved intact, whereas burning by consuming the vegetable matter on the surface renders the soil more tenacious and less suitable to the springing of the seed. The beds should never exceed five feet in breadth, and each bed should be sixteen in length. Between each row of beds shallow channels should be cut along which the water may be conducted to the head of each bed, and in these channels during the dry season water should be allowed to run continuously, penetrating by this means gradually into the land, keeping it cool and moist. During the extreme hot weather the longitudinal division between the beds should consist of earth heaped up to the height of three inches, which will not only render the flooding of the beds more complete, but will also prevent them drying up as rapidly as they otherwise would. But during any storm these divisions should be removed and each converted into a channel to convey away the superfluous rain-water.

As regards seed there is very little to be said, except that it should, as a matter of importance, be selected from the finest and healthiest trees, and consist only of the ripest and finest berries to be had. These precautions are seldom attended to, however, as it has never been ascertained definitely that plants from carefully selected seeds are any better than from those grown at random. Seeds have been sown from trees both native and imported—on some plantations, of all ages and in every kind of way—pulped by hand, pulpud by machinery, and not pulpud at all, sometimes fresh and as frequently

six months old. Yet no difference could be perceived in the way the seeds come up, or in the plants produced from them, but, as a matter of convenience, it is much preferable to separate the seeds from the pulp and put them down in drills. In the drills the seed should be planted at least a quarter of an inch apart, and between each drill should be left a space of from four to five inches. The seed should be planted in March or April, except where a crop of plants has been previously taken from the soil, when the seed should be put down a month earlier; in from fourteen to eighteen months excellent plants ought to be had, if the soil consists of virgin land. Many planters put down nursery seedlings that have sprung up under the old coffee trees, but this plan is not to be adopted when seed can be procured, and especially where the water is good.

An excellent soil for sowing the seed is prepared from an admixture of loam and leaf-mould, obtained from the decayed leaves of trees and vegetable matter, ground fine, well sifted and then mixed with an equal quantity of sand; while for the successful propagation of the young plants a manure composed of finest soil, cattle and sheep dung, dried, pulverized, sifted and then blended with proportionate quantities of a fine sandy loam has been found specially adapted for the purpose. The tap-roots of the young plants being extremely long and tender, an abundant supply of the latter will be found requisite, a good depth being very necessary to nourish and maintain them during the early period of growth. During the hot weather the young plants should be shaded, the most approved method of shading being to place posts about four feet high, with forked heads, driven into the ground at the corner of each bed, long sticks being then laid across them from post to post,

resting in the forks and also laterally, the whole being then covered with grass, reeds or other material. Some months before the plants are required this shade should be judiciously thinned, and ultimately removed altogether, in order to harden the plants gradually by exposure to the sun and air. The plants, too, at this period, should be allowed to grow nearly to the required size, stinted of water and brought to a stand-still, in order that the heads of the plants and the extremities of them may solidify, for if the plants be transferred to the plantation with newly-formed and tender shoots they run great risk of being nipped off by the scorching rays of the sun, which frequently makes its appearance when least expected in rainy or cloudy weather. And when the nursery is at all exposed to dry, east winds the rows and divisions between the row of beds should be thickly planted with rose and fruit trees, as these not only add to the appearance of the nursery, but are also extremely valuable as shelters.

The next branch of planting that demands special attention is that of transferring or transplanting the young shrubs or plants at the best possible distance from one another. Distances should be altered in accordance with the poorness or richness of the soil; the richer and stronger the land, the greater distance should they be planted apart; and the poorer the soil and more exposed the location, the closer and more thickly they should be grown. If roads are made across the slopes and about midway up them, it may be laid down as a general rule that the plants above the roads should be planted far closer than those in the richer soil below. Thus, if six feet by six feet be found a convenient distance in the best land, four and a half feet by five and a half feet will be found the best distance in the poorer and more exposed positions.

One prime object must always be borne in mind, *i. e.*, to cover the soil, in order the better to shade it, to keep down weeds, and at the same time leave sufficient room between the rows to allow of passing up and down the lines with ease, and for the pickers to get about without forcing their way and breaking the branches. Bearing these objects in mind, a planter should regulate his distances carefully in accordance with his soil, situation and climate. But on these points a planter must, in a great measure, rely upon his own judgment, and these suggestions are mainly intended to caution the planter against fixing on any arbitrary distance as being the best.

DISTANCES OF PLANTS.

Scarcely any two planters are agreed as to the best distances to allow between the plants, the question being governed to a great extent by the richness of the soil, as well as by climate and situation, the object in view must be that with the greatest convenient number of trees in a given space none shall interfere with or incommode its neighbor. In cold or exposed situations where the plants cannot obtain any great size, close planting is necessary, the reverse being the case where the climate is warm and humid and the soil is productive, and consequently likely to produce large bushes. In Java and the West Indies the space is often 10 x 12 feet, but other crops are there usually planted between the Coffee rows, while in India and Ceylon distances vary from four feet each way to eight feet, the best being perhaps seven feet between the rows and six feet between the plants. The number of trees contained in an acre planted 6 x 7 feet will be about 1,000; 6 x 6, 1,200; 6 x 5, 1,450; 5 x 5, 1,750; 5 x 4, 2,150; and 4 x 5, 2,700. The advantages to be gained in

wide planting are that field labor is facilitated and the shrubs grow larger, the disadvantage being that more room is left for weeds.

HOLING AND PITTING.

Around or beside each stake a hole is next dug, its size depending much upon the kind of soil; in stiff or poor land two feet each way is not too large, but in good light ground eighteen inches will suffice, but they had better be too deep than not deep enough. The implement commonly used for this purpose is a kind of grubbing-hoe or spade-bar. The earth thrown out is usually left to mellow until just before planting, after which the hole is filled in with the best of the mould, which must have been previously carefully freed from stones, roots and other extraneous matter, and mixed with a little manure. The filling-in must be done very lightly and the loose earth should rise in a heap above the hole. This operation is best performed while the ground is moist, but it is also a good plan to break down the sides somewhat, more especially if they are hardened.

PLANTING AND PICKING.

When the holes have been duly prepared the young plants are removed from the nursery with the same care as they are transplanted to the nursery from the seed-beds; for taking up the young plants an ordinary prong is much superior to the spade-bar, but hand-pulling must be rigidly guarded against. The fibrous roots of each plant as taken up are carefully pruned off to about four inches so that they may not be doubled up in the planting, the tap-root being also shortened to about nine inches by a clean sloping cut for the same reason, and a ball of earth should surround the roots and if the plants

are exposed to the air for more than a few minutes, the roots should be covered with wet moss or some other damp material. A dull, cloudy day should be chosen for this operation whenever possible, as in bright sunshine the plants would be all burnt up. The plants are carried in batches in wicker trays or baskets to the plantation and are placed in the ready prepared holes by hand, great care being taken that no roots are doubled up, that the plants are upright and that they are placed no deeper in the ground than they were before, and in treading the earth down around the plant every precaution is necessary to prevent leaving holes for the accumulation of water around the roots. The surface must also be made firm and level as possible, but on a steep slope the outer edge may be slightly higher than the inner, to check the effect of any wash that may occur, but in subsequent weeding it will be necessary to guard against exposing the lateral roots. There is some diversity of opinion as to the size and age most suitable for putting out nursery plants, but when dull, rainy weather can be depended on for some little time, nursery plants of the second year are the most satisfactory, plants of one season only being too tender for the operation, but under ordinary conditions and with due care no serious loss of plants should be incurred in this way. A novel plan, one which may be advantageously adopted on small plantations, is the one resembling the method of planting *Cinchona*. A number of calabashes are deprived of their small end and emptied of their contents, into these the seedlings are placed and gradually exposed to the sun as they grow and finally planted in the calabashes; the latter soon rot and form manure for the plants. A new plan that has been much followed is the substitution of "stumps" for nursery plants—that is, plants that have been in the

nursery for about three years are dug up and pruned back leaving only about six to eight inches of stem; they are hardier and safer in a general way than whole plants, more especially in uncertain weather, as they will strike readily, even without rainfall for some little time after being put in, provided the ground has become sufficiently moist to prevent their being burnt up, but they cannot be used in districts where a long period of drought may be expected to succeed to a wet season. The planting of stumps is performed in the usual way, the plants send up several shoots from the parent stem of these, the finest are retained to form the future tree and the rest are pulled off carefully. The shoot that is left grows rapidly, but from the way it springs from the stem it is liable to be accidentally broken off either by a high wind or by the weeders. The crookedness of the stump from native-grown seed renders them very inferior; the best size for stumps is the thickness of a common pencil.

DIBBLING AND STAKING.

When the land is very rich and friable holing may be replaced by the less expensive plan known as "dibbling," which is performed in two ways: (1) by the aid of the spade-bar is made a sufficiently deep hole into which the plant is dropped, and secured by treading the earth lightly around; (2) a patch of ground measuring about one foot each way is thoroughly loosened without the soil being taken out, in the disturbed earth a hole is made with the hand, the plant is then inserted and trodden around as before; the latter method is preferable. Dibbling is only practicable in exceptionable cases, and is, moreover, open to objection, as a hole is often left in which water may accumulate and rot the plant, and the roots are more liable to injury than in ordinary planting,

but, on the other hand, much labor is saved. When the plants are exposed to the wind they should be provided with supports as soon as they are ten to twelve inches high, and present a resisting surface. For the first season's plants lining pegs may be used, but larger plants will need strong, inflexible stakes, three to four feet long, entering the ground on the windward side at about six inches distant from the plant, and at such an angle as to meet the stem at about its middle. The plant is attached to the stake by a broad loop of some vegetable fibre, firmly tied to the stake but loose around the stem of the plant. If the plants have already been worked round by the wind they will need earthing up to five or six inches as well. The ties should be brushed with coal-tar, as a protection against theft, insects and decay.

SUPPLYING VACANCIES.

Every precaution should be taken to guard against failures, as "supplies," as they are called, will seldom, if ever, do as well as young plants put into virgin soil, but in new land failures can be entirely guarded against by care, and their number may subsequently be limited by keeping the ground free from weeds, and by good draining, manuring and pruning. A certain number of vacancies, however, will occur from time to time. And they must be filled up in the following manner: The original pit having been re-emptied should be enlarged an inch or two all around, but especially in depth, and this should be done in dry weather, the pit being left open for some time, and only filled in when the time for planting has arrived, but in most cases it will be desirable to refill the pit with the soil which has been taken out of it. Where the vacancy is in the midst of old trees a large pit is necessary to protect the new plant

from being interfered with by these roots, and it will be also well to isolate the young plant by surrounding it with a ring trench, six to eight inches wide and one foot deep. It is also desirable to put a basketful or so of new soil from the first into the pit near the top, but where this cannot be managed a few handfuls of manure should be mixed with surface mould, for only strong, healthy plants must be used for this purpose. Stumps are, by some planters, considered more suitable than nursery plants for supplying vacancies, as, being hardier, they throw out from three to four "suckers," the best of which are selected when they have attained a height of from six to nine inches, the others being carefully pulled off. Well-formed nursery plants, with three or four pairs of primaries and about twelve to fifteen inches high, put in just as they come from the beds with a good ball around the roots, are to be preferred when steady wet weather can be calculated on for some time, but in any case supplies ought to be put in early in the wet season, so as to give them every advantage; they should also be marked by a tall stake, and should be allowed to bear a maiden crop before being topped or pruned.

CATCH-CROPS.

Much has been said for and against the growing of other crops on the plantation among the Coffee shrubs. In Java and other Coffee-growing countries of the East it is grown between the rows. In Ceylon two catch-crops were long in vogue, but they appear now to have gone out of fashion, it being claimed that they exhausted the soil and produced too much there. While in Mexico, the West Indies, Central and South America, the culture of plantains, yams, cocoa and bananas was carried to

such an extreme on many plantations that the Coffee became, in fact, of only secondary importance, or was even entirely killed out. There is nothing, however, to object to in the simultaneous cultivation of several crops, so long as each has proper space and sufficient manure, and the plants are not antagonistic to each other, as many claim, and the failure of one crop may be compensated for by the success of the other. Rice and tobacco have been found to yield good returns as catch-crops, but they possess a disadvantage, in not affording any shade to the young Coffee plants. Cocoa, yams, bananas and plantains are perhaps even less advisable, and similar attempts with cotton have proved altogether failures, while maize, on the other hand, is highly recommended from experiences in Brazil and other countries. When adopted, it should be planted thinly in three rows, eighteen inches apart between the Coffee rows, and two plants apart in the Coffee rows between the Coffee plants. The seed should be sown immediately after the Coffee is planted. It grows very quickly and should early be thinned out to eighteen inches apart in the rows, and will soon be high enough to completely shelter and partially shade the Coffee, which will grow all the faster in consequence, the latter being also greatly benefitted by the extra working of the ground. In the fall a dressing of manure—the same manure will suit both Coffee and maize—is applied and the ground plowed or deeply hoed, preferably the former. The crops may also be repeated the following spring, reducing it, however, to two rows and one Coffee plant and repeating the manuring and plowing or hoeing, but this time the choice between the plow and hoe must be governed by the size of the Coffee shrubs; if too high, the latter is best.

MANURES AND MANURING.

It is commonly said that Coffee is an unusually exhaustive crop, but the exhaustion of the soil consequent upon Coffee culture is only the result of the peculiar conditions under which the industry is prosecuted rather than of the nature of the plant itself. Better than any amount of artificial manuring is the retention of the naturally rich surface soil by the effective prevention of wash as a secondary adjunct; however, judicious manuring will prove highly beneficial, and even necessary in almost all cases after the first or two. But it is impossible to lay down any hard and fast rule for manuring, the most that can be done is to indicate the essential elements of coffee soils, the best artificial substitutes and the best methods of applying these substitutes. The best coffee soils appear to contain about 15 per cent. of combined iron and alumina, the iron, if as red oxide may amount to about 20 or even 30 per cent. being a good absorbent of fertilizing constituents, but the alumina should not exceed 10 per cent. Lime is also an essential, which must be supplied, if wanting in the soil; this is too often overlooked in the anxiety to furnish stimulants. The percentage of organic matter may be too high, it should represent only about 0.2 to 0.3 per cent. of nitrogen, so that the best average manure for supplying nitrogen and potash is well-rotted dung, but its frequent application should be accompanied by a little lime unless the soil is already very rich in that constituent, for, without the presence of lime, the shrubs will not receive the full benefit of the nitrogenous principles, but its use in a tropical climate must be governed by caution. Thoroughly fermented coffee pulp is also a useful manure, but it is only half as valuable as dung and costs more to apply, it

should be kept covered as it is produced, and is best mixed with fermented dung, failing which it should be well-limed, while alone is of small benefit, but forms a good vehicle for concentrated fertilizers. Almost all coffee soils requires a constant renewal of phosphoric acid and lime, which are not supplied by the dung alone; these constituents are best furnished in the form of bones steamed and ground or by concentrated superphosphate containing from 40 to 45 per cent., while phosphate of lime. Nitrogenous manures alone are too stimulating and help only to produce premature exhaustion, therefore bones may with great advantage be added to the dung. Composts of pulp and cake are useful nitrogenous manures, but they must be accompanied by phosphates and lime. Potash seldom requires to be directly applied, but is very advantageous after attacks of leaf-disease, while magnesia seems to be a necessary constituent of all good coffee soils in the proportion of 0.5 to 2 per cent., but when wanting dolomite may be applied in its place. The great object of manuring is to apply all the constituents required and in a soluble form, but for coffee the nitrogen is better applied in an insoluble form—as in dung, cake and fish manure—than in a soluble form—as in guano, nitrate of soda or sulphate of ammonia. Phosphates are best supplied in bones, when a lasting effect is required, but high-grade superphosphates are always preferable for immediate effect as in cases of leaf-disease. Again in tropical countries, all manures are best applied frequently and in small quantities. Regular manuring after each crop would doubtless be most generally economical and advantageous, the quantity depending in local conditions, but should always be extra liberal after a full harvest. Artificial manures should be put out only in damp weather, dung may be applied at almost any time,

while lime must never be in a caustic state ; when applied its best forms are gas-lime and gypsum.

The manure most freely applied and most relied on in countries where it is available, is cattle dung, and with the view of keeping up a regular supply of it, many estates keep a considerable stock of cattle for this purpose alone, and which are, in many instances, stall-fed with grass and oil-cake. But in many of the coffee-growing countries this form, owing to a fatal obstacle in climate is not obtainable, for while, in some countries, grass can be readily grown all the year round, in others it is found impossible to provide any quantity of grass for even any part of the year, and cattle have to be grazed all day to support them at all. Besides the fatal objections to the foregoing kind of manure, there are others which serve to show that it is only under very favorable circumstances that cattle manure could be used with advantage. The first is the bulky nature of the manure and the consequent cost and labor of application, and the second, and by no means the least, is the great risk run of losing stock by disease. The latter consideration should be sufficient to deter the planter from depending on a manurial source which is liable to be suddenly cut off at any moment.

Another form of manure in use among planters is bone manure, the value of which for all crops and in all countries, combined with its extreme portability and cheapness of application, renders it by far the most important of fertilizers for coffee. This form, mixed with the pulp of the coffee is a popular one on many plantations. The pulp being moist prevents the bone dust from being blown away, and when heaped up before using, the heat that is thereby generated seems to exercise a considerable effect upon the bone dust. Still another excellent manure is made from alternate layers of farm

yard manure and bone dust, making a splendid compost. The former is generally composed of horse, cattle and sheep manure, wood ashes and general sweepings. The best results have been obtained from this latter form, and if sufficient quantities of the first substance could always be obtainable, readily and cheaply, it is without exception, the best yet discovered for coffee manure. Bone dust, when used alone fails, though valuable as a berry producer, to give that dark green leaf and growth of strong young wood which is absolutely necessary to produce abundantly.

The manner of applying manure is not the same in all countries or cases and no manure should be put more than one foot below the surface of the ground, nor less than eighteen inches from the stem of the coffee bush. On flat land, where there is no danger of wash, the manure may be spread over the surface and hoed into a depth of from nine to twelve inches, or, better still, a square hole may be cut between each four shrubs and the manure buried in it; while on slopes it is customary to dig a hole above each bush. For bulky manures it may be two feet long by one and a half feet wide and one foot deep, but for concentrated manures these dimensions must be considerably reduced. The holes should be filled up with any prunings of other vegetable matter at hand and then covered down firmly with the loose top-soil and the new earth from the hole should be spread around the stem of the neighboring tree to protect its roots. Ordinary manuring is sometimes supplemented by other methods of improving the soil, one of which is to loosen it by driving a long bar or a manure-fork deeply into the ground and then prying up the earth without turning it over. Another operation is that known as "mulching" or "ground thatching," which consists in simply covering

the ground under the bushes with a layer of long, hard grass six to nine inches thick, the effect of which in cold, wet soils is to keep the ground warm and throw off excessive moisture, while in hot, dry situations it is equally useful to retain moisture. But in any case weeds are kept down and wash is quite prevented, and when rotten the grass may be hoed or dug in as manure; this thatching has been found a perfect cure for black bug. A third operation, termed "trenching" or "water hoeing," is where trenches are made across the slope, which may be either opened or closed. In the former case holes three to four feet long, twelve to fifteen inches broad and from fifteen to eighteen inches deep are cut between each four trees, the soil taken from them is spread over the roots of the trees, while the holes are left open to act as catch drains and receptacles for wash, weeds, prunings and other vegetable refuse, being emptied twice a year and their contents spread around the roots of the shrubs. Closed trenches are ditches cut across the entire length of the coffee rows two feet wide and deep and filled with any vegetable rubbish at hand, they are then covered with earth and well trodden down, while the remaining soil is spread under the trees. The benefit of trenching is greatest in stiff soils. The refuse matter in the trenches should be well limed in all cases, in order to kill the grubs and other vermin for which it will otherwise form a nursery.

WEEDING AND PRUNING.

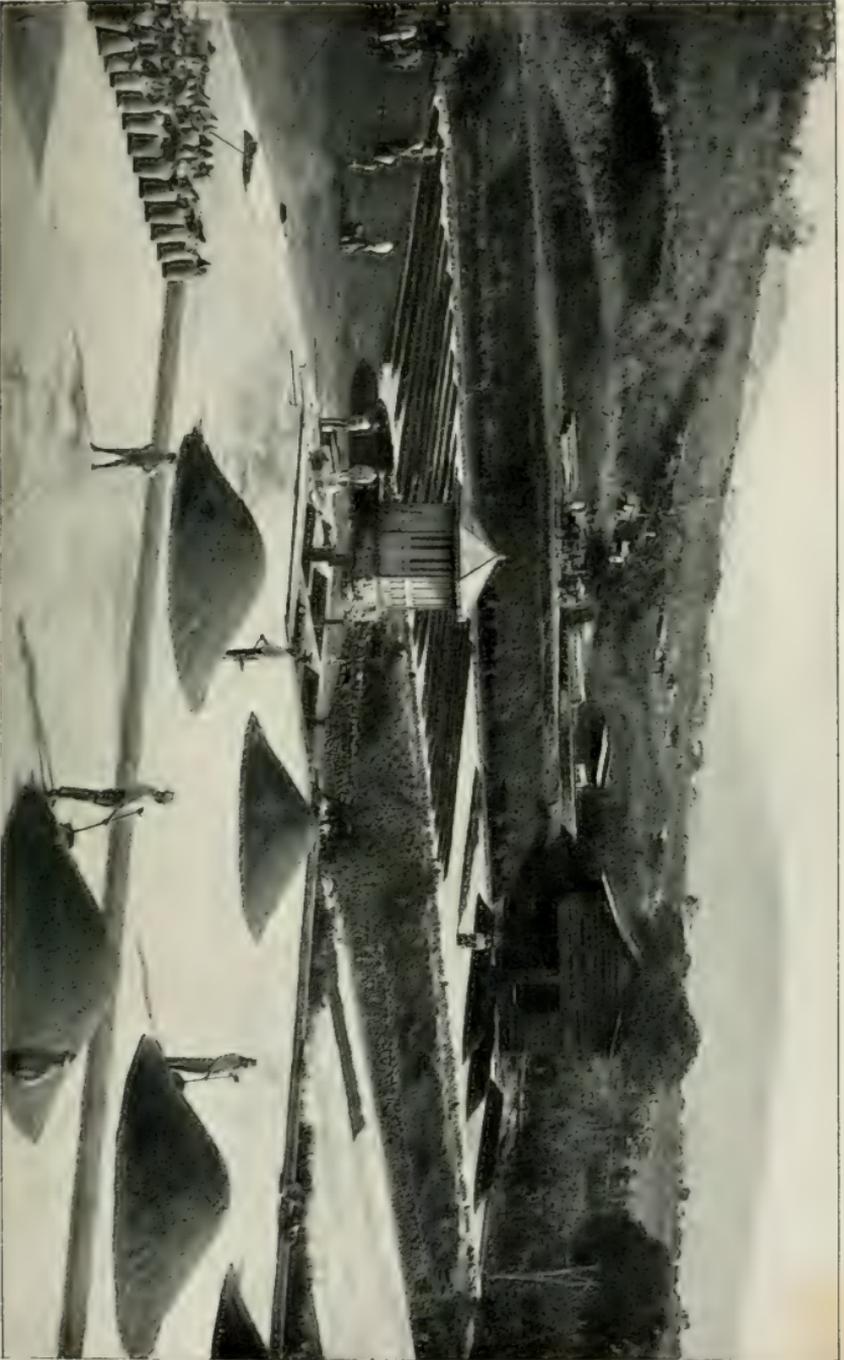
By "weeding," on a Coffee plantation, is meant the eradication of *every plant* which is not being intentionally cultivated. The operation is performed in different ways, according to the nature of the soil. On light soils and sloping situations hand-weeding is much the best. The laborer is provided with a pointed stick to help in getting

up obstinate roots, and carries at his waist a small bag, into which the weeds are at once thrust, and afterwards turned out of the bags into pits dug at convenient intervals, or are heaped up on the roads and finally buried or burned, the latter being the surer method of effectually destroying them. By weeding early and repeating the operation as often as necessary, the ground may be kept clean by hand alone. But when hand-weeding will not suffice, recourse must be had to "scraping" the ground, which is, however, attended with a serious drawback—the first inch or more of the best surface-mould is removed, at the same time thus robbing the plants of nourishment and exposing the earth to the full effects of the wash. On stiff clay soils, on level plantations and in damp, cool climates on the other hand, hoeing is not only necessary for the perfect eradication of the weeds, but is of itself exceedingly beneficial to the soil, and except during the dry season should be regularly done, whether weeds are present or not. When scraping or hoeing it is imperative that the operation should be conducted from the outside towards the trees, so that the roots may be kept well covered and the wash easily escape into the drains.

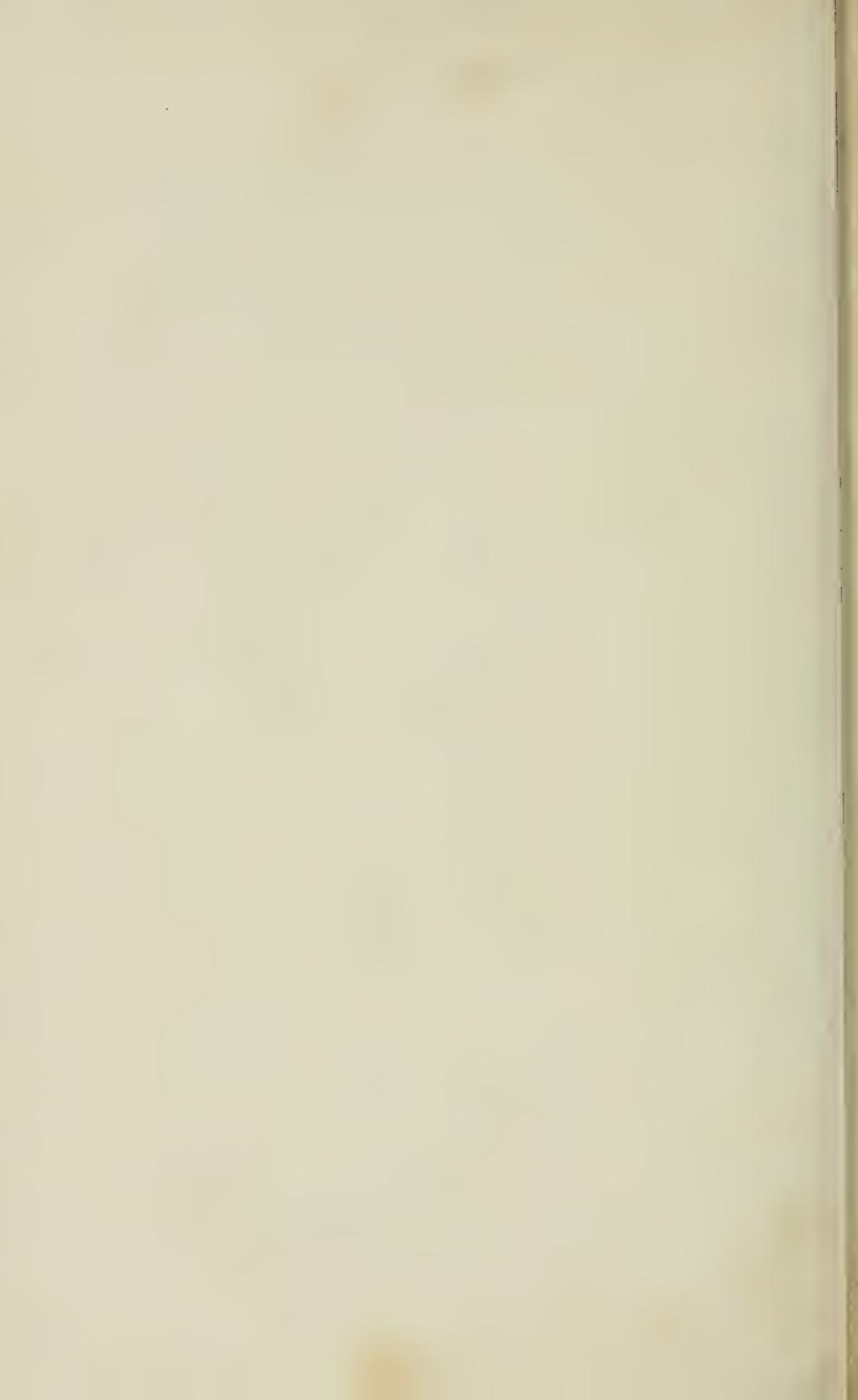
The coffee tree, if allowed to grow to its natural height, will commonly be found to measure from twelve to fifteen feet. But the most experienced planters reduce their shrubs to at the most four and a half feet, and sometimes as little as three feet, and in windy and exposed situations two and a half feet in some countries have been adopted as the best height. And here, as in distance, the planter should be guided by the nature of the soil and partly by the aspect as regards wind. In thoroughly sheltered situations and in the finest land a tree may be allowed four and a half to five feet with advantage, but in all medium situations, as regards soil and exposure.

four feet should be the limit, or even a few inches less; in very poor and much exposed situations three feet will be found ample for all purposes. The height being determined on, the next point is to consider the best time for topping or pruning them. By many planters the safest and most sensible time for performing this operation is considered to be when the tree has exceeded the height it is intended to keep it at, and when the bark has become brown and fully developed. Pruning should, if possible, be all completed before blossoming season, except when it is confined to the removal of plainly superfluous wood that is past bearing, or has, perhaps, only a berry or two on it, when pruning may be continued without injury or inconvenience until up to the commencement of May. When all these are removed it will generally be found that sufficient has been done; but on very luxuriant trees the shoots growing in the right direction will be still too numerous, and will require further thinning so as to reduce the number to two shoots at every point of the branch. If this process of handling be fully and regularly attended to there will be very little and very simple work for the knife to do, and the pruner will merely have to remove the very driest and oldest secondaries and shorten back such primaries as may be too long and whippy.

In the old neglected trees the process is more difficult, but may, with a little patience, be got into good order easy and cheaply. The first thing to be done with them is to cut out all secondary and tertiary branches that are past bearing, and to clear out the centre of the head of the trees. The removal of this superfluous wood will be followed by a sufficiently rapid growth of young wood which should be carefully handled, and after the next crop a fair proportion of cross branches may be cut out, but only to a slight extent, so as not to diminish the



FERMENTING COFFEE.



crop prospect. Others, again, contending that the proper time is immediately before or after the first blossoming season. In the former case it is claimed that topping before the blossoming season has a tendency to turn out a heavy crop on the pruning branches, while in the latter instance other planters boldly sacrifice the heavy yield in order to add to the permanent strength of the tree, invariably refraining from topping the plant until just after the blossoming period. By this latter method several pairs of branches, with their blossoms, are cut off and lost, but the sacrifice will be amply repaid by the increased strength added to the young tree, and also by the advantage of having a small crop on the primary branches below.

The style of pruning first required by Coffee bushes is that known as "topping," the age and height at which this operation is performed depending in a great measure upon local circumstances, this question also being a much-debated one. The object of "topping," or removing the top of the bush, is to restrain its upward growth within convenient limits, and, as a natural consequence, to strengthen and concentrate its lateral growth. In some countries of the East topping is commenced at the age of twelve to eighteen months, the maximum ordinary height being four feet, which is sometimes reduced to two feet, the operation being postponed until the shrubs have borne their maiden crop, even though extra staking is required to withstand the wind; the best plan being to remove the two primaries at the required height by a sloping outward cut close to the stem, and then to remove the top by an oblique cut so that the stumps resemble a cross, and a firm, natural knot remains to guard against the stem splitting down. But some planters contend that the plants should be topped as soon as they have

reached the required height, when the soft wood is easily severed by a pinch between the finger and thumb, as in the case of tea. In other countries the shrubs are topped either at their full height—four and one-half to five feet—or at three feet, allowing a “sucker” to grow up on the weather side, the latter plan being preferred. There is much advantage gained in limiting the height to five feet, as not only is the crop gathered more easily, and without damage to the tree, but it is actually heavier, and the shrubs are more readily made to cover the ground. The first result of “topping” is to induce the growth of a number of shoots, the removal of which is termed “handling” or “searching.” The first to appear are vertical “suckers” or “gormandizers,” from under the primary boughs; these are immediately rubbed off without injuring the bark. From the primaries spring secondary branches in pairs, and at very short intervals. All such appearing within six inches of the stem are removed at once, so that a passage of at least a foot high is left in the centre of the tree for the admission of the air and sun. The object of pruning is to divert the energies of the tree from forming *wood*, and to concentrate them upon forming *fruit*. The fruit of the Coffee tree is borne by young wood, and as the secondaries are reproduced when they are removed, they are cut off as soon as they have borne. A constant succession of young wood is thus secured. In order that this may be regular, and to avoid weakening the shrub, the secondaries that grow outside of the foot space are left on alternate sides of the primary, their opposites being removed each year in turn; thus one is growing while the other is bearing. The one point in view must be the equal development of the tree and the yearly growth of as much as it will bear, but no more. Branches must not be allowed to grow

into or cross each other, and if two or more secondaries spring from one spot the strongest only must be retained; where a gap occurs tertiaries may be trained to free it in the same way. When practicable, the bushes should be handled twice before the crop, and the pruning should be commenced immediately after the crop and finished before the blossom comes out, but should this be impossible, it must be suspended during the three or four days of blossom-time, and then be carried to completion. When it is evident that the crop on a tree will exhaust it if allowed to mature, a portion of it must be sacrificed by pruning. The loss thus occasioned is more apparent than real, as in every prolific season much fruit is wasted for lack of labor, and the trees are unreasonably overtaxed and bear poorly for some time afterwards. Everything should be done to insure regular and even crops; the cuttings should be trenched in among the plants as manure, and no branch should be allowed to bear more than two or three crops before removal. Regular and systematic pruning is one of the first essentials to successful and profitable Coffee culture. Where Coffee plantations have been neglected on this score they must be very gradually reduced to proper condition by sawing out the branches and opening up the centre of the trees in the first year, and trimming out about half the remaining wood in the second year.

ENEMIES AND REMEDIES.

The profits derived from healthy Coffee growing are so large that were it not for the many enemies which hamper the planter's struggles and stultify his best efforts, his occupation would be one of the most profitable in the world. But as it is he has to contend with numerous foes, and the more lowly and minute forms have proved

themselves the most difficult to combat in these long struggles which have been waged since Coffee cultivation first rose to its present importance in the various countries in which it is grown. From the mammalian kingdom he has not much to fear or is generally able to devise efficient remedies against their ravages. But besides the peculiar conditions of climate, aspect, drainage, shade, shelter and the many other drawbacks already alluded to, particular attention must be paid to the prevention or cure of certain maladies to which the Coffee shrub is specially liable. The number of these insect forms and and fungoid pests is considerable, but the only ones of sufficient importance to merit description are leaf-blight, fly, bug, borer and canker.

Leaf-blight.—Is a fungus known as *Homilica Vasatux*, allied to the moulds, and is present in some form or other all the year round, first attacking the under side of the leaves causing spots or blotches, at first yellow, but subsequently turning black. These blotches are covered with a pale orange-colored dust or powder, which easily rubs off; they gradually grow in size until at last they have one part of the former with three parts of the latter, thoroughly incubating them before use. A disease known as leaf-rot, rather prevalent in some countries, is distinguished from the above, and which is referred to as a fungus named *Pelicaalana Kolorga*, sometimes appears when the leaves of affected shrubs become covered with slimy, gelatinous matter, turn black and drop off, the clusters of berries also rotting and falling. There is every probability, however, that the sulphur and lime treatment will be effective in this case also, but the shed leaves and fruit should be collected and burned as a precaution.

The Coffee Borer.—This pest, formerly known as the “worm” and “coffee-fly,” is most troublesome in the East, where in former years it destroyed whole plantations. It has been identified as the *Xycotrechen quadripes*, and in its complete stage the insect appears as a winged beetle, having from one-half to three-quarters of an inch in length, rather finer in shape than a wasp, with hard, shiny coat, red and black in color, but in some cases yellow and black in alternate transverse lines, boring a passage into the stem of the coffee tree usually a few inches above the ground.

The Coffee-fly.—This disease has been known for many years in San Domingo and Brazil, having also spread to Venezuela, the Antilles, Porto Rico, Martinique, Mexico, and all down the Atlantic coast of South America. It is caused by the larvæ of a moth scarcely half an inch long, named *Comistana coffcalaun*, the color of the insect being dull-white or pale-gray, with a bar across the posterior end when quiet. Its motions are very active and it readily takes alarm. This insect prefers young and delicate leaves, and is most active about the commencement of the wet season, when demolition spread over the leaves, which then drop off, leaving the trees unable to produce any crop, or to bring to maturity that which may have already been produced. In districts affected by the northwest winds, the fungus generally exists as an external parasite, in the form of long, filamentous threads, covering every part of the back of the leaves, but so minute as to be invisible to the naked eye. Of the many remedies experimented with for the suppression of this disease, one only is invariably effective—that is a mixture of the best quality of flowers of sulphur and caustic lime.

The majority of the eggs are deposited, but are dormant during the wet season—that is, from March to May. The disease manifests itself by the appearance of large, discolored blotches on the leaves, causing their decay and fall. As a remedy, it has been stated that by picking the leaves at such a time, as to take the greatest number of the larvæ when about two weeks' old, it would be easy to destroy the pest, as the size of the blotches would then easily distinguish the diseased foliage. Again, each of these contains several hundred eggs undergoing incubation, and in a short time the whole of the green wood of the tree will become covered with the young insects and coated with a black, soot-like powder, which renders the tree easily discernible at a distance. The bug will soon spread over the whole plantation, entirely checking the growth of the trees, the fresh, young shoots being always first attacked, and such wood as is allowed to mature, produces hardly any crops; the berries, moreover, are in the earliest stages destroyed by these insects, which cut them off with the stalk. The measures recommended for checking this scourge are to dust the bushes with a mixture of powdered saltpetre and quicklime in equal parts, or to brush or sponge the affected parts with a mixture of soft-soap, tar, tobacco and spirits of turpentine, in about equal quantities. The white bug is a distinct species of insect, known as *Pseudococcus adombrum*, and is a small, flat, oval insect, about one-sixteenth of an inch long, covered with a white down or fur, having parallel ridges running across its back from side to side, like the wood-louse, though on a much smaller scale. It is found in various stages of development all the year round, and takes up its quarters on the roots of the Coffee trees, to start one part beneath the surface, at the

axils of the leaves, and among the stalks of the crop-clusters, which it cuts off wholesale, either during the blossoms' stage or just after the young berries have formed. In the latter case, its operations may be easily recognized by the large quantities of young, green berries with which the ground beneath the trees will be strewn, and is also discerned by a white, flour-like excretion, which it deposits around the axil-works where it has made its abode. The prescription alike recommended for black-bug will be here found equally efficacious, but in either case probably a decoction of common tobacco might be sufficient when much more evenly prepared.

The Coffee-bug.—The Coffee tree is attacked by various species of *coccida* in most countries, where they are known by different names, but careful cultivation has greatly reduced the evil. There are two distinct species of bug found in the Coffee-growing countries, called respectively the "black" or "scaling," and the "white" or "mealy." The former, *Lecanimum Coffea*, is a minute insect which attaches itself to the tenderest shoots of the plant, the females having the appearance of small scallop-shells, of a brown color, and adhering to the leaf or twig in the same manner as the scallop-shell to a rock; at first horizontal, soon takes an upward, spiral direction, and proceeds until a safe shoot is found in which the larvæ may be deposited. The tree soon droops and dies down to the point at which the entry has been effected, and where it can be easily broken off by a sharp pull at the upper part. The only course in this case is to break off the tree in this manner, and then burn the stem with the larvæ secreted in its centre. Young shoots will proceed from the stump, and one of these may be trained to succeed the original stem. The insect is very

susceptible to the effects of wood smoke, and may be easily driven off or destroyed by the smoke of ordinary wood or grass fires.

Canker, or Bark Disease.—Is a disease of the Coffee plant which has created great havoc in Africa and other countries of the East, and which causes an annual loss of about one per cent. of the trees of Jamaica and other West India Islands. The first symptoms is the withering of a secondary or tertiary branch, when it will be found that the bark under the primary branches is decayed and blue-mouldy, the blue mould gradually extending downwards over the whole stem; a tree once attacked never recovering, but dying in a few months. All soils and situations seem liable to this disease, the trees beginning to suffer when about six years old. Though the mould is the proximate cause of death, the ultimate cause is undoubtedly due to some unfavorable external condition.

The opinions of experienced planters as to what this may be are various, being generally attributed to neglect of cultivation, to instability of climate and to a want of sufficient depth of soil. All may be practically right, but the last seems the most probable, and is the reason given for it in many countries. Rot, grubs, rats and squirrels are accounted for in the following manner: "Rot," or the blacking and withering of the young leaves and shoots, is due to wet and cold, and may be cured by good drainage and mulching. Grubs of a large and yellow kind, destroy the tap-roots of the plants, cattle-manure being a fertile source of them, must be well-limed. Rats, squirrels, grasshoppers, ants and spiders collectively do considerable mischief, and should be exterminated whenever possible.

GATHERING AND HARVESTING.

The cluster of buds which duly make their appearance are at first little dark-green spikes, but as they grow they become straw-colored, then, under the influence of a few showers, almost white, and finally burst into snowy blossoms, and after a day or two the flowers turn brown and fade away, the more gradually the better; when the bloom is out, the rainfall is unwelcome, but after it is "set" the shower is beneficial. The pistils of the flowers now assume the form of berries, gradually growing and changing their color from dark-green to light-yellow, which finally dries out to red or crimson. As soon as a sprinkling of red berries is seen, picking should begin and continue as long as any berries ripen, that is to say, from one to three months, but the berries or "cherries" as they are more frequently called, must not be picked until they are fully ripe, which is best indicated by a deep, purplish-crimson color, and as the crop rarely or never ripens all at once, two to three pickings are required, the second being the principal one, the others being rather gleanings than pickings. Each mature berry should be picked separately off its stalk and never stripped off; the cherries as picked are dropped into a small bag about eighteen inches square, suspended from the neck of the picker, and the bags are then emptied into one or two bushel sacks or hampers placed at intervals on the paths of the pickers. If the berries are allowed to get over-ripe in wet weather, they will be liable to burst and drop the beans, or to fall off bodily, but if on clean ground much of them may be recovered, while in very hot weather they are more likely to dry up and hold on to trees. In order to convey the berries to the curing-houses in some countries a great saving is

effected in long distances, by running them with water down galvanized iron spouting, made in 8-inch lengths, laid with even gradients and curves duly secured. The berries are then despatched from the cisterns, to which a due proportion of water has been admitted, provision being made for collecting and utilizing the latter at the mills.

PULPING AND PREPARING.

The preparation of Coffee for market necessitates the erection of extensive buildings and machinery on large estates, for which no specific plans can be given, because much depends upon the size and situation of the estate, and as much upon the kind and degree of the preparation contemplated. But the site selected for the works should be as near the centre of the plantation as is compatible with securing a patch of open, airy ground to which a good stream of water can be brought. The first requisite building should be the "pulping-house," comprising three floors—the berry loft, the pulping platform and the cistern floor—and whenever possible it should be built against a shallow cliff or embankment, so that the berry coffee may be delivered into the loft without being hauled upstairs by hand, while the berry loft is usually placed immediately over the pulping platform.

The operation known as "pulping" consists in clearing the coffee "beans" from the pulp in which they are enveloped, which with ripe berries is most easily and effectively accomplished immediately after picking, efforts being usually made to complete the pulping of a day's picking during the same evening. If over-ripe or shriveled, but still comparatively moist inside, the berries should first be soaked in water for a few hours previous. A number of machines have been invented for this

purpose, the chief objects in all cases being to pulp rapidly, thoroughly and without injury to the bean, for if the inner or "silver-skin" of the bean be broken the latter is wasted.

But the latest and most simple form of "pulping-machine is what is known as the "Disc Pulper," in which the separation of the bean and the pulp is effected by means of rotating discs, covered with a thin sheet of copper, whose surface has been "knobbed," is raised into sort of oval knobs by the application of a blend punch. Pulpers of this class being portable and cheap, are most frequently used in the opening of distant estates. The "single" form is very light, and when driven by three plantation hands, it will pulp all the way from 20 to 25 bushels of berries an hour. The "double" form, which has two discs and which is furnished with a feeding-roller inside the hopper, requires from four to six hands to pulp 40 bushels an hour, but when driven by power, it will hull from 70 to 80 bushels in the same time. In the machine the discs are placed between "cushions" of smooth iron, set at such a distance that the berries cannot pass without being bruised. The cushions rest in a movable bed of iron, set so that no bean can pass downwards. When the disc revolves, the berries are driven forward and squeezed, the corrugations then catch the skins and drag them between the disc and bed. These small pulpers have an advantage over the larger ones, in that each can be set to suit the size of a portion of the crop—which always varies in size—and in that, with two or more machines, there is less likelihood of complete stoppage in case of accident. One disc pulper to every 30 or 40 acres—that is, about three to every 100 acres, two to be set alike for large size and one for smaller berries—should be ample in a fair-sized estate.

There are times, however, when it is impossible to pulp Coffee; the pulpers may get out of repair, or the weather may be so untoward that the berry does not ripen sufficiently, or become too dry for pulping. In these cases the berries must first be fermented. The best way to do this is to place them in one of the tanks, or if the quantity is too small to nearly fill a tank, in an old box or cask, and cover it with sacks or grass, and let it remain until it acquires a good warmth; then, when the berries in squeezing are no longer slippery, they may be taken out and spread in the sun to dry. For two or three nights it need not be housed, nor will rain hurt it. When dry, it may be stored for curing like parchment Coffee, but must not be mixed with it. To ferment the berries by leaving them in a heap on the ground is a bad plan for two reasons: First, when fermented in this manner it becomes very wet and collects dirt, which, in the after treatment, will affect the color of the Coffee. Second, because in a heap the fermentation cannot be equalized throughout the Coffee. Pulping may be performed whenever possible, as the increased trouble entailed by the latter process is not compensated for by the alleged improvement of the flavor and no better price is received for it.

FERMENTING AND DRYING.

The "parchment" coffee as it comes from the pulper is next submitted to a fermentation process for the purpose of removing the saccharine matter, without which the beans would not dry. This operation is performed in a series of tanks, whose capacity varies with the size of the estate, and which may be arranged in squares. The pulpers are placed on a platform above the tanks and in such a position that the pulped coffee can be run

by water into the tanks, which must also be so situated that the coffee will always advance by the aid of running water and may finally be conveniently conveyed to the drying ground, while the water and refuse run off. The amount of cistern accommodation necessary for a plantation may be based on the allowance of one cubic foot for each bushel of berries picked in one day. The tanks are seldom less than three in number—two receiving cisterns, each large enough for the greatest possible daily picking and a third for washing the parchment, nearly as large superficially, as the two others combined, that is, the “washing” tanks from twelve to fifteen feet long, two feet deep and separated by a causeway three and one-half feet wide, and the “fermenting” tanks eight by eighteen feet long and two and one-half feet deep. These tanks are usually made of brick-work, lined with cement or asphalt, but wood is much better because less cold, but all should have a slight incline in order to assist the drainage. The receiving tanks are provided at the lowest corner with a good-sized outlet, fitted with a plug and with a movable sieve of perforated zinc or woven-wire, fine enough to keep back the coffee when draining off the water, but not so fine as to choke with saccharine scum; the receiving cisterns being used alternately. All the coffee pulped in one day is allowed to remain in the receiving cistern until a slight fermentation has set in; this occurs in from twelve to eighteen hours in mild weather, but in cold weather it may take from thirty to forty hours and even more. There are two ways of conducting fermentation—the dry and the wet—the former consists in allowing the berries to be without water, the bottom of the tank being perforated so as to draw off the liquid, but by the latter process the tank remains full of water. The dry system, however, is

the better as long as care is taken to turn the mass so that the fermentation shall be equal throughout; the presence of water equalizes the fermentation but retards it and slightly injures the quality of the coffee. When fermentation is not sufficiently prolonged, the beans will assume a yellowish color—called “blankety”—and will be difficult to dry, becoming liable to absorb moisture at the same time. But when properly fermented the separation of the saccharine matters is easily effected in the washing tanks, to which the pulped beans and a good supply of water is admitted. The washing cistern is provided with a sluice door at the lowest corner, this door commonly measuring six inches wide by three inches deep. The coffee is meanwhile constantly agitated by a wooden scraper or rake, by which the light coffee and refuse matter float and may be skimmed off, the dirty water flowing off through a tall cistern provided with a grating to catch the skins and stray parchment, while the sound berries are placed in draining boxes to remove the excess of moisture and are then transferred to the drying ground with the least possible delay. But should the climate be uncertain it will be necessary to provide for the emergency of a succession of wet days, when drying cannot be proceeded with. Parchment coffee may be kept in the undried state for two weeks without injury by placing it in a cistern exposed to a continuous flow of cold water.

In drying, the berries to be dried are first spread out on a flat surface exposed to the heat of the sun. The material forming the *terrcino* (terrace) or drying ground varies greatly in the different coffee-producing countries, but most commonly the ground is leveled and then covered with a kind of concrete, sometimes asphalt is laid down, but, besides being expensive it is not sure

in hot climates to withstand the heat, and such a surface is liable to crack and give way if not carefully drained. A very good and much better plan is to lay down coir-matting on ground which has simply been made smooth and hard; the advantages of this plan are its cheapness, the ease with which extra ground can be requisitioned in case of need, and the use of the matting as a temporary covering in case of a sudden shower; modifications of this method are to stretch coir or gunny cloth across modern frames, or across trays with or without wheels. Shed accommodations must always be provided ready for the reception of the coffee at any moment, and the beans must be constantly turned over and over, either by light rakes or shovels. The drying must also be rendered equable and must not proceed too rapidly so as not to crack the parchment before the bean is quite dry, for this reason also, the coffee should not be exposed too long to a strong sun for the first day or so. During the drying it is gathered in each day when the sun is hot, but will then continue to dry under cover. Every care must be taken to prevent overheating, which may happen by prolonged drying in mild weather; rather than permit this the coffee should be returned to a tank, and kept washed with running water.

A new method, known as "artificial drying," has recently been adopted in Brazil and other countries, being much quicker and cheaper. An easy means of applying artificial heat is by passing an iron pipe, open at both ends, through a fire outside the stove and below the level of the floor, continuing it into the stove just beneath the floor; the heated air, by passing upwards through the coffee, will carry off much of the damp. Revolving drying machines are also in use; one of the best of these is one introduced originally for drying corn. It consists of

cylinders into which steam enters and agitators arranged so that the coffee is impelled forwards and caught up and rained down as the cylinder revolves. The central cylinder works in a steam packet, outside which is a light casing of sheet iron, perforated at one end so that the air may be drawn through by a fan to assist in the drying and carry off the liberated moisture; this machine obviates the necessity for respreading the coffee in the terraces before hulling. Three days' thorough sunning usually suffices to render the coffee quite dry and brittle, in which condition it is known as "parchment coffee," in which state, in many countries, it is sent to port, its further curing being left to the shippers, for not only is considerable expenditure in buildings and machinery necessary for the purpose, but the experience gained by manipulating various lots of coffee will enable those who make the subject a special study to bring the sample up to the best standard of appearance and keeping properties, but the coffee retains its color better if allowed to remain for several weeks in the parchment, and its quality continues to improve for months, even years, the process being known as "curing;" as, however, protracted curing causes great subsequent difficulty in removing, the "silver-skin" coffee is never kept in the parchment longer than is compulsory.

HULLING AND PEELING.

This operation consists in the removal of the "parchment" and the "silver-skin," after which the beans are again exposed to the sun for a period which is difficult to define. Some planters say that they should be dried till they resist pressure of the thumb-nail, but there is really no infallible test, as no two samples are exactly alike. It needs much experience to prevent loss of weight

by over-drying, or of color by under-drying, but they peel best while still warm. A variety of hullers have been tried, but preference is commonly given to the old-fashioned edge-runner mill, composed of a circular trough with two large wheels revolving in it and suspended about two inches from the bottom. The trough is one-half to two-thirds filled with beans, which remain until the grinding action of the revolving-wheels has separated their skins, when they are let out by a lateral aperture. A trough fifteen feet in diameter should turn out at least 1,200 pounds of marketable coffee an hour, four bushels of good parchment coffee yielding 100 pounds clean coffee. The appearance of the coffee immediately after hulling is very light colored, but it soon assumes a fern-green hue, which it will retain unless exposed to damp, when it becomes dingy or mottled-gray, and is classed as "country damaged."

WINNOWING AND SIZING.

The peeled Coffee as it comes from the huller in company with the detached skins is submitted to the influence of a fan whose force must be so adjusted that it will effectually remove the skins without carrying off the Coffee. When the Coffee has been cleaned from the skins, it is necessary to separate it into various sizes for market, chiefly with the object of rendering the subsequent roasting process more equable in effect. Formerly the sizing was performed by hand-picking, but it is now the custom to employ a machine called a "separator," which consists of an inclined, revolving cylindrical sieve formed of perforated sheet-iron or steel wires, and divided into sections of different meshes. The Coffee is fed in at the hopper, which is furnished with a regulator and an internal worm for the purpose of distributing it equally,

while a revolving brush prevents the meshes from being choked. Sand and dust pass through the first section and fall into the space while the small and broken beans are delivered below, the best and largest beans are caught up and the peaberry rolls freely out at the end.

BUILDINGS AND STORES.

Though there is no necessity for curing the Coffee, and it may be hulled at once if desired, the exigencies of climate render a properly constructed warehouse one of greatest *desiderata*. The characteristics of structure must be, first, dryness combined with security; hence, galvanized iron forms the best material. It is generally of two stories, the lower floor being sometimes boarded or asphalted, but the upper must always be so made so as to admit of free circulation of air through the Coffee placed in it. This object may best be obtained by laying wire gauze or coir matting over reapers about one inch apart. Abundant ventilation must also be provided, and it will be necessary to watch for any signs of heating. Immediately on its appearance the Coffee must be turned over rapidly. An improved form of Coffee structure is that built on what is termed the Clerichew principle, in which the floor of the upper story is constructed as in the former case, resting on joists running lengthwise in the building. A ceiling is provided for the lower story by tacking to the joists cloth which has been well soaked in boiled rice water and lime, to render it air-tight. Continuous air-passages are thus made beneath the floor. About ten feet of one end of the lower apartment are partitioned off, and its sides are made as nearly air-tight as possible, and it has no ceiling other than the floor above, so that the passages all open into it. In an opening in the wall of this chamber a pair of large revolving fans

are placed, their rapid vibrations drawing a continuous current of air from the inside, and therefore through the Coffee itself. In this manner dried parchment Coffee can be kept in perfect condition without any turning over, and by using heated air on the same principle as before Coffee may be housed while still only partially dry and yet not suffer from fermentation.

PACKING AND SHIPPING.

As soon as the Coffee is sized and graded it is ready for the market. Bags are most commonly used, but it is best packed in air-tight casks, made from wood, which is not likely to taint the Coffee in any way. In shipping Coffee great care is required to prevent its coming in contact with any merchandise that may communicate to it a foreign flavor or odor. Vessels engaged in the Coffee trade should have perforated ventilating tubes from the bottom of the hold, passing through the cargo, so as to allow the escape of all steam and gases generated during transit; without such an appliance the beans will be discolored and classed as "damaged," an injury which cannot be covered by insurance. In well-ventilated ships Coffee loses about one-half per cent. in weight but gains in quality during transit; while under bad ventilation there will be a gain of one-half per cent. in weight but a loss of color, and consequent depreciation in value.

COST AND PROFIT.

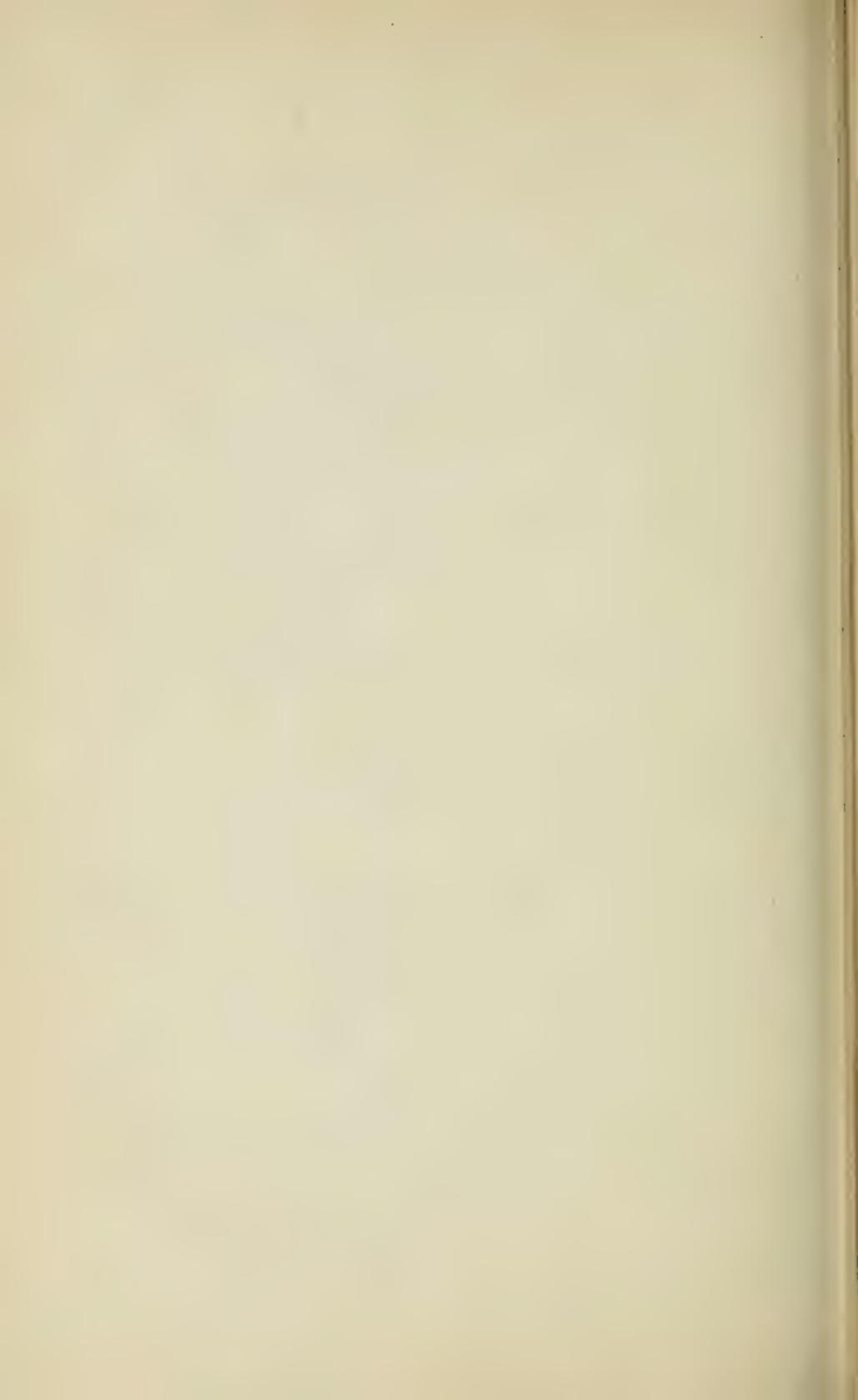
Here a few remarks on the cost, prospects and profits of coffee planting may not be out of place. How much does it require to start on safely is frequently asked. From ten to twenty thousand dollars may be considered a fair capital. As to what kind of a plantation that can

be had for these sums is a question that from the shifting nature of prices, and the varieties of climates, soils and situations, cannot be accurately answered, or with even an approximation to accuracy. With regard to the profits of coffee planting the investor may get a very large return, a moderate or a small one, and he may even suffer, as many who have tried it have done, a considerable loss. No reliance whatever can be placed on the estimates so often published, and though many of them may be accurate enough as far as they go, assuming that everything goes well, good soil, climate, cheap labor, good health, and good seasons must be taken into account, in the brilliant reports of the returns to be expected in the first few bearing years, usually terminating with the assertion that "the profits subsequently to be derived will be something fabulous."

Transport facilities are another important factor and deserving of much consideration. In many countries they exceed the cost of growing and preparing the crops for market, and it frequently occurs in the interior of Brazil, Mexico and other countries, that it does not pay to forward the coffee to the markets at the ports of shipment. But whatever may be the ascertained advantages in point of soil, temperature, moisture and situation, and however bountiful may be the yield of the plants, the speculation must always be estimated in connection with the cost and vicissitudes with which coffee planting as a business is unhappily associated. Anxiety must be inseparable from an undertaking exclusively dependent on native labor, and liable to be affected at the most critical moment by its capricious commercial fluctuations. The crops in most of the coffee-growing countries, when saved on the plantation, has either to encounter the risk incident to transportation by hand through mountain districts as yet unopened by roads, or the chances of

deterioration to which it is exposed in bullock carts during long journeys to the coast. The real facts being that the difficulties in the way of forming accurate agricultural statistics are in the coffee-producing countries almost insuperable, there being either a tendency to exaggerate or depreciate the yield, as it best serves the interests of the cultivators. And again as regards coffee in particular, there is no means whatever of estimating the product. A great deal being said, but very little known in the way a man generally requires to know that he may wish to publish as reasonably near the truth. So in going into coffee planting in any country it signifies little whether you know what certain plantations *have* yielded or what amount of profits *may* be expected. One fact may be relied on, however, that is, if an estate frequently changes hands, it is certainly a bad or indifferent one, if seldom it is sure the coffee growing pays well, and further it is not necessary to inquire, for hardly any landed investment pays so well as good sound coffee property, and the owners are therefore seldom inclined to part with it.

The extent of coffee plantations varies from 100 to 300 acres, the annual product ranging from 500 to 1,000 pounds per acre of prepared coffee, according to location and care bestowed on the plantation. The profits also vary with the ruling market price of the coffee at time of sale, of labor, transportation and the inscrutable effects of the season. But a cost of from \$350 to \$500 per 100 pounds may be considered a fair average; any yield under 300 per acre scarcely paying expenses, any over 700 paying a handsome profit.



CHAPTER V.

COMMERCIAL CLASSIFICATION AND DESCRIPTION.

COFFEE in commerce is the seed which grows in the pod or fruit of the coffee plant, like the pea or the bean. Geographically, it is divided into African, Asian, American and Polynesian coffees, and, topographically, into "Mountain," or upland, and "Plaingrown," or lowland Coffees, while commercially they are generally classified as "Mild" and "Strong," the former comprising in trade the product of all countries, with the exception of Brazil. Grown in so many different and widely separated countries, provinces, districts and situations, it is but natural that the different products should vary materially in size, style, color, form, flavor and character, and which also accounts for the almost innumerable commercial divisions and subdivisions of names, grades and values.

AFRICAN COFFEES.

Africa is the original home of coffee, it being indigenous to almost the entire Continent; but while it is to be found growing in a wild state almost all over the entire of tropical Africa, more particularly between the fifth and fifteenth parallels, its cultivation for commercial purposes on the "Dark Continent" is very light and partial at the

present time, although it affords a field of boundless development in the future. African Coffees are divided into West and East Coast, the former comprising Liberian, Loango, Angola, Benguelan, Congo and Natal; the latter including Abyssinian, Egyptian, Zanzibar, Mozambique, Nubian, Madagascar, Bourbon and Mauritius.

Liberian—Is produced in the Americanized colony known as the “Black Republic,” and is principally cultivated in the district of Mesurado, on the St. Paul river. It is an extremely large dark-brown bean, possessing very marked peculiarities, being “concave-convex”—technically termed “Male or pea-berry”—in form; that is, round on top, with long, deep furrow extending longitudinally down the face, tightly rolled or “folded” in appearance and very hard and solid in texture. When roasted and infused the liquor is dark in color, heavy in body and from 30 to 40 per cent. stronger in flavor than that of any other variety grown, and is considered too strong to use alone, but when blended in the proportion of about one to three parts of some of the milder growths it makes a fairly smooth and rich drinking coffee. The annual production is limited—about 10,000,000 pounds—put up in large, coarse bags, averaging 200 pounds, and is principally exported to England and the continent of Europe, where it is used principally, on account of its ultra strength, for mixing with chicory, and sold chiefly in the form of ground coffee.

Loango—Also an indigenous variety, is grown in the interior province of Encougé, deriving its trade name from the port of shipment. It closely resembles Liberian in form and color, but is much smaller in size and greatly inferior in quality, and is sometimes termed “African

pea-berry." The raw or natural bean is dark-brown in color, light or "chaffy" in weight, very brittle and poorly prepared, while the liquor is almost black and insipid, if not actually rank or nauseous, in flavor, the decoction tasting more like an infusion of char-bones than anything else it may be likened to. It is principally shipped to Spain, Portugal and other European countries, very little, fortunately, ever reaching the United States.

Angola—Produced in the Portuguese colony of that name, is medium in size, concave in form, light-brown in color, strong and pungent in flavor, but lacking in smoothness and aroma. Not being regularly cultivated, its production is limited, that grown by the settlers on the uplands of the interior being much superior to the wild or native sorts.

Benguelan—Is another variety of Angola, grown in the adjoining province to the south and closely resembles it in size, color and general character. Being also limited in supply, it is rarely if ever shipped to this country, what is not retained for home consumption being forwarded to Lisbon, Madrid and the Canaries.

Congo—Is a medium-sized, heavy bean, strong and rich in the cup, and, taken altogether, a desirable sort.

Natal Coffee—Is a large light-brown bean, closely resembling the Liberian product, being grown from that species, but greatly modified in body and strength. Coffee culture in Natal is struggling against adverse conditions, owing to the spread of the bark disease in that colony and for which no cure has been found. This is much to be regretted, as the quality of the product is very fair, the demand for the article continually growing.

Some Coffees are also grown in the States of Senegal, Gambia, Sierra Leone, St. Helena and the Cape of Good Hope, but, being limited in supply and unknown to commerce, do not need description here.

Abyssinian.—The Coffee plant and its product have been known in Abyssinia from time immemorial, its fruit being used there in a *roasted state*, but in *solid form*, for centuries before its introduction to the civilized world, receiving its now universal name from the district of Kaffa or Caffa, in the southeastern part of that country, and becoming the parent-plant of all the numerous varieties now to be found on the Red Sea littoral. At the present time it is grown there in all its native luxuriance and primitive abundance, from the borders of Narla to the banks of the Nile, forming the chief wood of the country. It is also cultivated there in almost all situations, on plateaus and table-lands, mountain and valley, hill and plain, growing as luxuriantly and producing as prolifically on low as on upland sites. The bean is small in comparison with the average coffee of commerce, but long and narrow in shape, hard and “flinty” in texture, and varying in color from a translucent green to a yellowish hue, according to its age. In body and flavor it ranks next to Mocha, to which coffee it is analogous, and is by many connoisseurs preferred to it as being smoother and less heating in effect. It is little known to commerce under its true name, being principally shipped from Massowah to Aden and Alexandria, where it loses its identity, masquerading under the head of “Long-berry Mocha,” and going principally to the Mediterranean and other European markets. The annual crop is large and the yield excellent, but communication and transport facilities being difficult and crude, the bulk of the product does

not reach the outside world. It is to be hoped, however, that whenever this rich country which produces coffee in such wild abundance shall be permitted, by civilized man, to enjoy its fertility it will rapidly become an article of extensive cultivation and commerce.

Egyptian—Comprises the product of the Upper Nile region, and that grown around Berber and the Soudan, very little being produced in the country itself. Being the product of different districts, they vary in size and quality, ranging from small to medium, are palish-green in color, flat or regular in shape, and possess superior drinking properties; so much so that many of the smaller bean varieties are put up in Mocha bales at Alexandria and sold under the name of "Short-berry Mocha," being shipped principally to France and England, where they are known to the initiated as "Alexandrian or Egyptian Mochas."

Nubian—Is a small-bean coffee, hard and flinty in texture, oval in shape, pale-green in color, heavy in body, and unusually rich in flavor. This variety is usually forwarded to Alexandria for conversion into a so-called Mocha, seldom finding its way into the American or European markets under its legitimate name.

Zanzibar—Is medium in size, regular in appearance, full in body and pleasing in flavor, but also very limited in quantity. Increased effort is now being made, however, by the French, German and Italian colonists to increase and extend its cultivation in that country.

Mozambique—The product is fairly good, ranking with the average of mild coffees, medium in size, greenish in color, heavy and mellow in the cup.

Madagascar—Grown on the immense island of that name, to the east, is a small-bean variety, solid and firm, but shorter and rounder than the latter. It is of a pea-green color when first picked, but gradually assumes that of a silver-gray as it matures; in body it is round and full, in flavor rich and fragrant. The supply of this variety is very small when compared with the extent of area that may be utilized for its profitable culture in that island, the entire product being chiefly retained for home consumption, only small lots occasionally reaching the outer world.

Bourbon—Is a small, hard and flinty bean, being chiefly mountain grown, pale-yellow in color and closely resembling the Arabian product, for which coffee it is extensively substituted, large quantities of the smaller beans being annually shipped to Aden to be repacked in the inimitable Mocha bales and sold as “genuine Aden Mocha.” The larger beans are usually exported to France and the continent, where it is held in high esteem for its rich, fragrant flavor and aroma, but rarely found in the American market unless specially ordered.

Mauritius—Like Bourbon is also an island coffee, the average bean being medium-sized, heavy and well developed, light-green in color, full in body and mellow in flavor, the liquor, in general, comparing favorably with that of finest of the mild grades. The smaller beans are separated and sold for shipment to Aden for the purpose of adulterating, or, what is worse, substituting for Mocha, where it sinks its identity, reappearing in the European market as “Short-berry” Mocha coffee.

More or less Coffee is also produced in Sofala, Somali, and the Soudan, in Usumbara, the Zambesi, Nyassa,

Nyanza, and other districts as far west as the base of the Killimanjaro mountains, the total yield of which, however, so far as its influence on the world's supply is considered, is insignificant, the export capacity of the whole not exceeding 150,000 pounds annually. The entire product of the Eastern provinces of Africa taken in connection with the comparatively small crops raised on the West coast makes that country contribute only between 5,000 to 6,000 tons to the world's supply, this amount including all coffees grown in Egypt and the interior countries of the continent of Africa.

ASIAN COFFEES

Comprise Arabian, East Indian, Ceylon, Malayan and all coffees grown in the Straits Settlements.

ARABIAN COFFEE

Is universally but erroneously known to trade as the far-famed "Mocha," as no coffee is or ever was grown there. Mocha itself, being comparatively a modern town, which rose with the coffee trade to a short-lived prosperity, the term "Mocha" as applied to Arabian coffee, being derived solely from the shipment of its product from there in former times. The internal disorders of Arabia and the efforts of Mohamed Ali to make the coffee trade pass through India accelerated its decline, the place being now nothing more than a mere village. The shipment of coffee is no longer carried on there, being transferred further south to the ports of Aden and Hodeida, yet, although, still known to trade as "Mocha," and notwithstanding the fact that Arabian coffee has been popularly and commercially known for centuries as Mocha, it never produced any coffee, being situated as it is in a sterile plain. Seeing that Arabia is the

parent soil of most of the coffees of commerce, and comparatively little known as a coffee-producing country, it may be interesting to transcribe some particulars of the cultivation and trade in the article in that country. The Coffee plant is claimed by some authorities to be indigenous to Arabia, and by others to be simply exotic, and as having been introduced there from Abyssinia, but at what period of the world's history has never been definitely decided. The plant or its product is not mentioned in the Koran, was certainly unknown to Mahomet, and his contemporaries make no reference to it up to the seventh century, although the many commodities and beverages in use among his followers in Mecca and Medina during his Calyphate are accurately and minutely detailed by his biographers, both Arab and Christian. But while to Abyssinia belongs the honor of its first discovery, it is to Arabia that the civilized world is indebted, not only for the first knowledge of the plant and its virtues, but also for the first plants from which it is now so extensively propagated as well as for the first knowledge of preparing it in liquid form. Yet, although exotic to Arabia, it has been cultivated there for centuries, attaining its most extensive distribution and highest standard of production in the province of Yemen, a highland country formed by a labyrinth of precipitant hills and fertile valleys, the air being pure, and even cold in some parts. These mountains are well supplied with water, but no considerable rivers find their way from them to the sea, tropical evaporation, coupled with the light and porous quality of the soil, drying up the torrent beds: nor do any natural lakes exist there. Artificial pools and reservoirs have, however, been constructed, in which water is preserved all the year round, and are numerous in the district.

In the province of Yemen, where the best Mocha coffees are produced, the plant is cultivated in both situations, upland and lowland, that raised on the latter being greatly inferior to that cultivated on the former sites. The best being that grown on the mountain slopes under the greatest difficulties and natural disadvantages of climate, soil and site, the small gardens, for they cannot be called plantations, being situated on terraces ranged one above the other, forming an amphitheatre on the mountain slope and literally covering its sides from almost base to apex. The plant is cultivated throughout more than half these upland districts, the finest qualities of the berry being produced on the western slopes of the mountains in the neighborhood of Bulgosa and Sanaar, the capital of the province, at elevations estimated at 5,000 feet above sea-level. The soil in these situations is composed chiefly of basaltic columns, the detached rocks forming grand objects of landscape, especially where cascades of water rush from their summits. Indications of volcanic action, long since extant, abound; basalt formations comprising a considerable portion of the soil in the most favored gardens of the coffee-bearing districts, while in others it is composed of jurassic rock, basalt-granite patches also occurring in many of them. The basalts are of great utility to the inhabitants of this region, the columns, which are usually separated, serving as steps where the ascent is difficult, and as walls to support the gardens of coffee trees, which are principally situated on the steep declivities of the mountain sides, and although requiring the well-diffused heat of an equatorial climate and a rich soil for its most successful and profitable growth, it is in this region and under these great disadvantages and peculiarities of soil, climate and situation—hot, sandy and stony—that the far-famed

Mocha coffee obtains its finest, richest and most valuable developments, and to which its superior excellence is attributed.

The gardens are arranged on rocky terraces, situated one above the other, the slopes being densely covered and close together and are watered from large reservoirs built upon the heights above them, into which spring water is collected and sprinkled in a novel and ingenious manner, being first conducted to the top terrace and then allowed to fall gradually from one terrace to another, where the plant and shade grow so thick together that the sun's rays can hardly penetrate among the branches. The plants yield ripe fruit twice a year and frequently a third crop is gathered; the produce of the latter is, however, greatly inferior to that of the previous ones. The cultivation and preparation of coffee in Arabia are also of the simplest and most primitive kind. When the berries have been gathered they are carefully and assiduously picked over and separated by hand by experienced pickers and sorters. So constant and frequent is this selecting and separating process carried on, that a graduation almost as regular as the degrees upon a map may be discerned in the grades and qualities of Mocha coffee. The operations of hulling and cleaning being performed with the utmost seriousness and scrupulous exactness, reminding one of the diligence ascribed to diamond searchers and gold hunters, when sorting the torrent sands for the minute but precious treasure.

The coffee is dispatched by caravan from the interior to the ports of Aden and Hodeida at almost every season of the year, but principally in February, March and April, the export consisting of crude and prepared beans; the former is dried in the husk, and is termed by the Arabs "Jaffal coffee." The dealers are chiefly

Arabs, who frequently barter English manufactured goods for the article, the producers seldom attending the seaport markets. The principal coffee dealers at the shipping ports being Arabs from Hadramant, Syrians, Armenians, Bhuddists, Brahmins and Musselmans from Hindustan, who also trade in drapery and other English goods, which they send through their agents in the interior to pursue the aforesaid system of barter for the coffee. There are, however, three or four Anglo-Indian firms in Hodeida, and one or two American houses in Aden, who deal in coffee on their own account. Before reaching the harbor of Aden, from which port the coffee intended for the aristocracy of Alexandria and Constantinople is chiefly shipped, the beans are sifted and re-sifted by the Arab merchants *en route*, the best being retained for their own use; the less generous, flattened, opaque and whitish beans alone reaching their destination, the last stage seldom conveying the genuine article except on rare occasions, and only then by previous arrangement, personal influence or interest. That intended for the Syrian and Persian markets is forwarded by caravan from Jaffa and Beyrouth under the same conditions, as whenever mere sale and traffic is concerned, substitution of an inferior quality or an adulteration equivalent to a substitution is frequently resorted to in the storehouses of Aden, and the other points from which it is forwarded, until whatever Mocha coffee intended for the general European or American markets is no more the real offspring of the Yemen plant than the logwood preparations of a fourth-rate wine resembles the pure libation of an Oporto vineyard.

Arabian coffee, like that of all other countries, though one in name is manifold in fact. Geographically they

are classified as Yemen and Tehama, but are known to trade almost universally as "Mocha" coffee, from being at one time all shipped from that port; but since the opening of the Suez Canal, the bulk of the crop is now shipped from the ports of Aden and Hodeida.

Yemen Mocha—Is grown on the mountain slopes surrounding the towns of Bulgosa, Sanaar and the valley of the Oudien, and constitutes the true Mocha coffee, which is rarely if ever exported, being consumed chiefly within the limits of Arabia itself; very little, so little, indeed, of this variety finds its way west of Constantinople that it is almost inappreciable. Nor, indeed, do the latter always get the best or purest, Arabia, Syria, Persia and Egypt consuming over two-thirds of the limited product of the Yemen hills, the remainder being reserved for the Turkish and Armenian æosophagi, from which fact it is sometimes termed the "Aristocrat of Coffees."

The true "Mocha" or Yemen bean is exceedingly small, hard, round, and symmetrical in form, regular and uniform in general appearance, of a translucent, olive-green color when new, but assuming a rich semi-transparent yellowish hue with age. It is perfectly clean, being entirely free from stems, stones, chaff and all other extraneous matter. When fresh roasted it exhales a pleasing if not delicious odor, not even approached by that of any other variety grown or known; the liquor is heavier in body than that of Java, but creamy and rich, and the flavor fragrant and aromatic to an eminent degree. The superior excellence attributed to this particular variety of Mocha coffee is said to be due to two causes, first to the extreme dryness of the climate, hard granitic nature of the soil, and second to the fact that the berries

are never picked, but allowed to fall from the trees of their own accord when ripe, and then allowed to dry naturally, after which they are gathered and hulled by the simplest and most primitive methods, which process of drying cannot be pursued in countries where the rainfall is great, as sudden showers spoil the crop if left unprotected. While others claim that the high reputation which it so long held in the European markets, is not to be ascribed to either superior cultivation or improved stock, but to the fact that the coffee was formerly shipped to India, and thence by circuitous routes to Europe, so that it was generally two to three years old when it reached its destination, all coffees improving with age and keeping. Still growing as it does high up on the sandy terraces of the Yemen hills, sparse of leaves, gaunt and stunted, as becomes a plant of the desert as well as from its condensed vitality, it appears difficult to understand the aromatic pungency of its small berries, a quality that has never been even approached by any achievement of scientific cultivation.

Tehama Coffee—Is grown in the low, level sandy plain of that name, extending from the Red sea littoral to the base of the Yemen hills, formed by the arc of their curve, and reaching from the province of Hejaz in the north down as far as Aden on the southern extremity of the peninsula. As might be expected from its geographical situation towards the coast, it is an exceedingly hot, dry and sandy region, being only of moderate fertility, the soil being composed of an agglomeration of coral debris. The rains are periodical, sometimes flooding the plantations, and hardly drying up through the year, the coast being indented with several small harbors. The coffee produced in this district—like all plain-grown

or lowland coffees—is greatly inferior to the mountain product of Yemen. The bean is small, irregular, immature and chaffy, having a gnarled or shriveled appearance, greenish in color when new but assuming a yellowish hue as it dries. Being only imperfectly cured it frequently contains fragments of hull, fibre and small stones. It is invariably “quakery” when roasted, and in body and flavor is inferior to the average run of what are known in trade as “mild coffees.” Yet, though not a palatable coffee when drunk alone, it makes a fairly fragrant infusion when combined with a Preanger or other good Java. It is principally shipped from Hodeida, now the second considerable port in the Red sea, from which it is known to trade as “Hodeida Mocha,” and in contradistinction to that shipped from Aden, and known as “Aden Mocha.” At Hodeida the coffee is sold in the custom house, whither it is brought from the interior. The Hodeida dealers also receiving large quantities of Malabar, Bourbon and other small-bean varieties to mix with or substitute for the original sort.

OTHER VARIETIES.

There are several other varieties known to trade and sold as Mocha coffee, but having little or no relation to it. Among these are:—

Lechia.—Shipped from a small port to the north of Hodeida and from which it derives its trade name. It is very inferior in quality, roasting and drinking poorly, and on the whole not a desirable sort.

Djebelli.—Which is imported into Aden from the African coast, and is a mountain-grown coffee possessing valuable cup qualities.

Berberah.—Also an African coffee recognized by its large and tapering bean, heavy body and rich infusion, and used principally for mixing with or substituting for genuine Mocha coffee.

Havar.—Another variety of Mocha coffee known to trade as “Havar” or “Hazar,” which comes from the south African coast of the Red sea, is being recently shipped from Aden. The bean is long and pointed, greenish in cast, and solid in structure; it roasts and drinks exceedingly well, being preferred by many connoisseurs to the true Mocha bean.

Mussowah—Is an Abyssinian variety, previously described, deriving its trade name from being shipped from that port on the African coast of the Red sea.

Egyptian Mocha.—In Alexandria, Mocha coffee is imitated by the substitution of small-bean African varieties, principally produced in Berber, Nubia, Somali and the interior of the Soudan, which are carefully picked over and assorted by hand, the larger beans being separated from the smaller, the better to adapt them to their respective markets, being usually shipped to France and other continental European countries.

Arabian or “Mocha” Coffee is put up in large grass-mat bales—containing two smaller packages termed “quarters” or four termed “eights”—distinctive in shape and material, being made of a coarse, grassy substance and sewn with a fibrous ligature that becomes excessively hard and tough as it seasons. The exports, the amount of which it is difficult to determine owing to the fact that there is no real custom-house control in the country, consists of about 8,000,000 to 10,000,000 pounds only, about half of which only is pure Mocha, the product being so badly manipulated and so extensively substituted with other coffees of foreign origin and inferior quality.

EAST-INDIAN COFFEES.

Unlike tea, coffee was not introduced into India by European enterprise, and even in the present day its cultivation there is largely followed by the natives only. The Malabar coast has always enjoyed a direct commerce with Arabia, and at an early date in the world's history gave many converts to Islam, one of whom, Baba Bouden by name, is said to have gone on a pilgrimage to Mecca and to have brought back with him "seven coffee-berries," which he planted on the hill range of Mysore and which is still called after him, and which, according to local tradition, occurred about two centuries ago. The shrubs thus said to be sown lived on, but their systematic cultivation did not spread until the beginning of the present century. While another account states that the coffee-plant was first introduced into India, on the Malabar coast, by the Arabs themselves, as far back as 1740, yet no official mention is made of the plant or its product in that country up to 1822, when its cultivation as a curiosity was first began in the Wynaad district, another plantation being formed later in the adjoining district of Manjarabad. The Baba Bouden range, in the State of Mysore, also witnessed the first opening of a coffee plantation by an English planter in 1840, the success of this experiment leading to the extension of coffee cultivation in the neighboring districts of Madras and Malabar. In 1840, a plantation was also started in Manautoddy, and in 1842 it was found growing well in Belgaum. From 1842 to 1860, however, the enterprise made but slow progress, but since the latter date it has spread with great rapidity along the whole line of the Western Ghauts, clearing away the primeval forest and opening up a new era of

prosperity to the laboring classes in that country, its cultivation for commercial uses increasing at a most remarkable rate.

Coffee at the present time in India is grown all along the summits and slopes of the Western Ghauts from the northern limits of Kanura south to Cape Comorin, the chief centres of production being located in the Presidencies of Madras, Mysore, Malabar, Coorg and Travancore, attempts being also made to introduce the plant into the Bengal district of Chittagong and the northern districts of Nepal, the Punjaub and British Burmah, the cultivation extending within the past few years to the Shevaroy hills in the Salem district as well as to the Neilgherry and Pulmery mountains in Madras, the slopes adjacent to Octacamund being literally covered with coffee plantations on every side. In India, after the berries, or "cherries," as they are called there, have been harvested, they are cured in one of two ways, one of which is to pulp them in the soft state, the coffee being known as "Cherry-dried," while by the other they are dried first and the pulp removed by a huller. Where the latter method is adopted, they are spread upon terraces and there kept until complete desiccation takes place, the coffee prepared in this manner being known as "thick-hull" or "sun-dried" coffee. They are classified in trade as "Malabar," "Mysore," "Wynaad," "Tellicherry," "Coorg," "Neilgherry" and "Travancore," grading commercially in the order named.

Malabar—Produced on the western slopes of the Ghaut mountains, is a small, hard, whitish bean, closely resembling a Bourbon, being frequently shipped to Aden for substitution or conversion into Mocha coffee. It is

full in body, high in color and rich in flavor, particularly when old, ranking high commercially in the European markets, where it is principally disposed of.

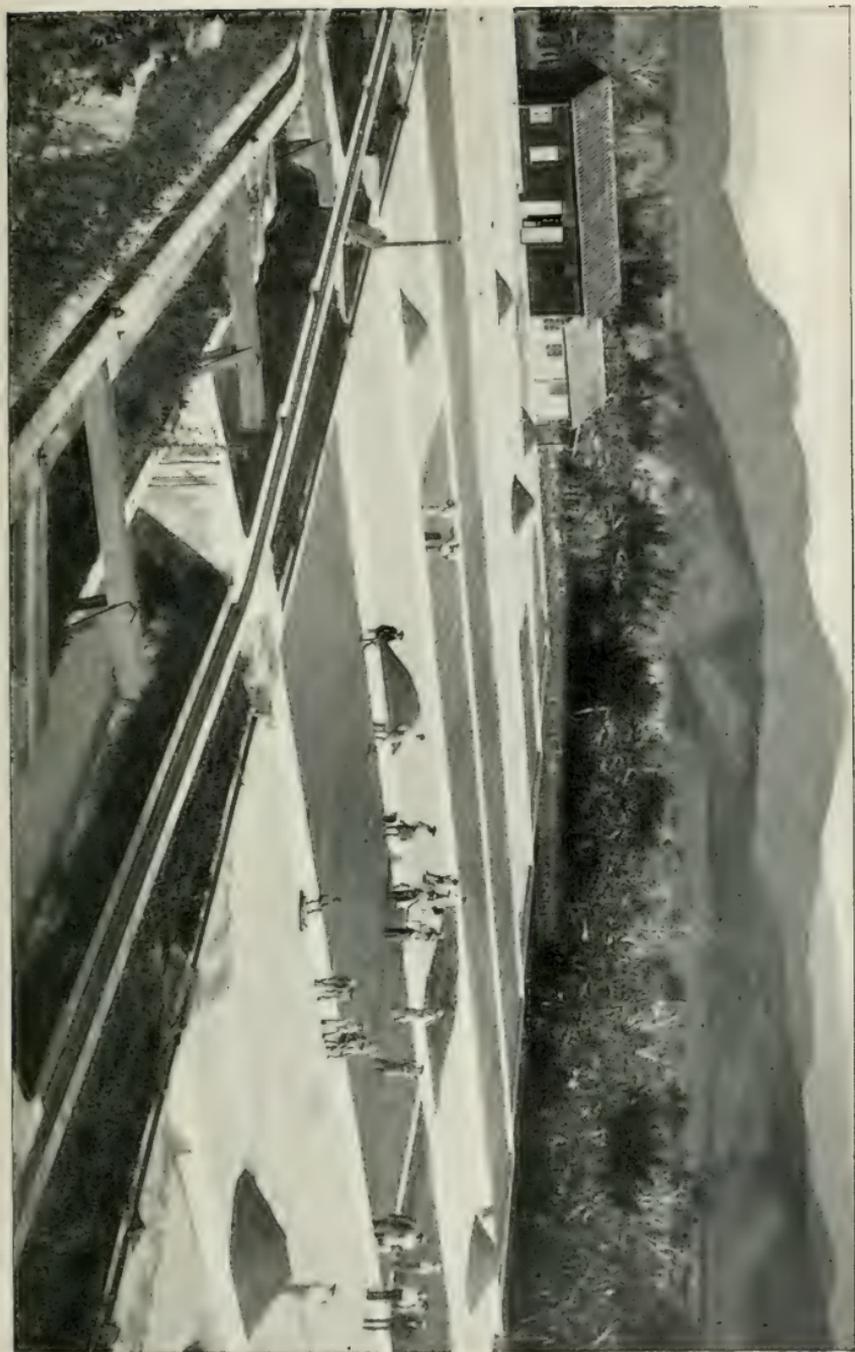
Mysore—Is a mountain coffee grown on the slopes of the Eastern Ghauts, and, like all mountain-grown coffees, is large or bold in style, bluish-green in color, hard and solid in texture, heavy in body, but apt to be somewhat “grassy” in flavor when new, mellowing considerably, however, with age. It commands a higher price in the English market than Java, not on account of its intrinsic worth, but from the fact that English merchants favor the products of their own colonies to the prejudice of all others.

Wynaad—Is simply a Malabar coffee, grown in the interior of that province, and deriving its trade-name from the district of growth, and possessing the same intrinsic qualities of body, color and flavor, being heavy, rich and fragrant in the cup.

Tellicherry—Is another variety of Malabar, deriving its commercial cognomen from the port of shipment, but is generally conveyed to the coast for curing, and is classed commercially with it, being used for the same purpose of mixing or substituting for Mocha.

Coorg—Is a plain-grown or lowland coffee, large and flat in appearance, dark-greenish when new, but becoming a dull-white with age, and while regular and uniform in the roasted state is apt to be “quakery.” The liquor is thin and flat in the cup, while the flavor is somewhat “mawkish” to the taste.

Neilgherry—Although a mountain coffee, seems to be an exception to the general character of this variety, for while the bean is fairly large in size and uniform in





appearance, it is usually moist and soft in substance, losing heavily in the roast, and yielding a flat, almost insipid liquor.

Travancore—Grown in the extreme south, is a low-land variety having an average-sized, flat, but whitish bean, soft or “spongy” when new, but becoming light and brittle as it dries. It is invariably “quakery” in the roast, thin and watery in the cup, and lacking in even an approach to fragrance.

Burmah Coffee—Is a comparatively new variety to commerce, being only recently introduced, and very limited in supply to the present. The bean is fairly large and regular in form, greenish in color and soft in texture in the natural state, tough or “leathery” when roasted, and wild or “grassy” in the infusion—defects due to its newness, which may, however disappear in the later crops. A very large portion of the surface of Burmah is admirably adapted for the cultivation of fine coffees, but it still remains in its primeval state of unproductive jungle, owing to the entire absence of natural energy on the part of the natives, who have been described as the laziest under the sun. At the present time, however, the government is making liberal offers to Europeans and others who understand the art of coffee-planting in order to develop the industry in that country; such settlers being offered free grants of land in the celebrated Tavoy district, the only conditions being the cost of survey and demarcation.

India coffees are classed in the English market as “Bold,” “Middling” and “Small,” the bulk of the small-bean Mysore, Malabar and Wynaad being shipped to Aden and Alexandria, where they are repacked and sold as Mocha. The average quantity and value of the coffee product of India is about 40,000,000 pounds,

valued at \$75,000,000, fully one-half of which is retained for home consumption, the balance being shipped to England and France, which are the two next largest consumers of India coffee, although in both countries it is subject to excessively heavy duties. The average product per acre is only about 350 pounds, but the drought having affected the plantations would of itself sufficiently account for the diminished exports if the leaf disease and borer did not also help to keep down the yield.

CEYLON COFFEES.

The history of coffee cultivation in the island of Ceylon is one fraught with interest and full of instructive lessons, which, since the year 1845, has assumed a position of great and ever-increasing importance. Although coffee is claimed to have been an article of growth and export from Ceylon even as far back as the time of the Portuguese, it only grew wild there without any attempt at cultivation. Small patches of it were to be found around the Kandyan villages, growing in wild luxuriance, the berries being gathered before they were ripe and imperfectly cured, seldom possessed much flavor, they were but lightly esteemed as an article of commerce. Its systematic cultivation was first commenced in 1824, by Sir E. Barnes, the then governor, who hoped by his example to introduce coffee planting by Europeans into the island. Up to 1834, however, public attention does not seem to have been occupied with the industry, but in that year the falling off in supplies from other countries brought capitalists into the field, and when, in 1836, the duty in England was reduced to six pence per pound, a great impulse was given to coffee planting in Ceylon. During that and the following year about 7,000 acres of the

finest lands were purchased for the purpose, until, at the end of a few years, it became a matter of notoriety that the soil and climate of Ceylon were capable of producing coffee equal in value to most kinds then grown, when the influx of capital from England for investment in this new branch of industry became simply enormous. In 1840, nearly 10,000 acres of mountain forest were felled and planted in coffee, and in an exceedingly short space of time the sale of crown-lands for coffee culture averaged 40,000 acres per annum. The mountain ranges on all sides of the district of Kandy became speedily covered with plantations, the great valleys of Ambo-gamao, Doombera, Kotmalie and Pusilawa were occupied by speculators, others settling in the steep passes of Neuraila and penetrating the Ouvah and Badulla districts, coffee-trees quickly blooming on every solitary hill, even up to and around the very base of Adam's peak. The first ardent adventurers pioneering their way through pathless woods, living in log-cabins whilst felling the forest and making their preliminary preparations for planting, until, in a few years, the paths by which they came were converted into roadways and their cabins replaced by comfortable "bungalows." The coffee cultivation mania in Ceylon, however, reached its climax in 1845, when the governor, council, military, judges, civil servants, and even the clergy penetrated the hills in their mad haste to become purchasers of crown lands for coffee growing. The East India Company's officers crowded to Ceylon to invest their savings in coffee lands, capitalists from England at the same time arriving by every vessel, the bulk of the emigrants as a class being more than ordinarily aristocratic, and who, if not already opulent, were still in haste to become more so. So dazzling was the prospect that expenditure

was unlimited, its profusion being only equalled by the ignorance and inexperience of those to whom it was intrusted; five millions sterling being sunk in the "Coffee craze" in less than as many years. The rush for coffee lands at this period in Ceylon was only paralleled by the movement towards the gold mines of California and Australia, but with this painful difference, that the wild enthusiasts in Ceylon instead of thronging to disinter were hurrying to bury their gold, for in the very midst of their visions of riches a crash suddenly came which awakened the victims to the reality of their ruin. The financial panic of 1845 in England rapidly extended its destructive influences to Ceylon; remittances ceased, credit failed, prices fell, and the first announcement on the subsidence of the turmoil was the doom of protection and the withdrawal of the distinctive duty which had so long screened the British coffee plantations from competition with those of Java and Brazil. The consternation thus produced in Ceylon was proportionate to the extravagance and hopes that were blasted, coffee plantations being forced into the market, and many sold off for a twentieth part of the outlay incurred in forming them, while others that could not be sacrificed at any price were abandoned and allowed to return to their natural jungle. For over three years the enterprise appeared paralyzed, the ruined disappeared and the timid retreated, but those who, combining judgment with capital, persevered, succeeded eventually, not alone in restoring energy to the enterprise, but in imparting to it the prudence and experience gleaned from former similar disasters. Still, the crisis, had it not been precipitated by the calamities of 1845, must have ensued eventually, from the indiscretion of the previous period; and the healthy condition which coffee planting appears to

have attained at the present day in Ceylon results from the correction of the errors then committed; and it is no exaggeration to state that there is not a single well-established principle now governing the management of the plantations and the conduct of the proprietors that was not preceded by a directly opposite policy in 1845.

Since the explosion of this second edition of the "South-sea bubble" in Ceylon, the island has made rapid strides in coffee growing, the mountain forests have been replaced by extensive plantations, of which there are at the present day no less than 1,000 under cultivation, yielding an average annual crop of nearly 80,000,000 pounds exclusive of that raised by the natives. Observation has also since discerned the true tests of soil, climate and aspect, former delusions as to high altitudes have been exploded, unprofitable districts avoided and unproductive localities abandoned. And in lieu of the belief that the coffee tree, once rooted, would continue ever after to bear crops without further attention or manure, and flourish perennially in defiance of weeds and neglect, every plantation is now tended like a garden, and the soil enriched artificially in proportion to the produce it bears, expenditures also being reduced within the bounds of discretion. An acre of forest land can now be purchased for one-tenth of what it cost in 1844, and though the extravagant prices and the still more extravagant expectations of that period have been entirely dissipated, coffee planting at the present day in Ceylon under careful supervision, promises as sound an investment as moderate enterprise can hope for. Systematic coffee cultivation is almost exclusively confined to the hill region, which embraces the districts of Kandy, Pusilawa, Doombera, Kotmalie and Ambogama,

although irregular native gardens are to be found everywhere in the southwestern portion of the island, even close to the seashore. The favorite and most productive elevation is, however, between 3,000 and 4,000 feet above sea-level, but in a few exceptional cases plantations descend almost to the foot of the hills, others being situated nearly 6,000 feet above. While native gardens, sometimes bearing good crops, may be met with along the coast actually at sea-level; in such instances, however, the gardens are limited in extent, and are generally richly manured and well watered during the dry season.

The principal coffee-producing zone of Ceylon of the present day is chiefly situated in what is known as the Gampola district, in which the scientific cultivation of coffee was first attempted, and the point at which the great roads converge connecting the rich coffee districts of Doombera, Kotmalie and Pusilawa with the ports of Kandy and Colombo. The soil and situation of the Gampola district have proved so favorable to the growth of the coffee-plant that there is hardly one of the magnificent hills seen from it that has not been taken possession of by planters, the plantations being situated chiefly in the mountain ranges on all sides of it. Ceylon coffees are classified commercially as "Native," "Plantation," "Liberian" and "Mountain" or "Mocha," the latter being nothing more than a small-bean plantation coffee usually separated.

Native.—What is known to commerce as "Native Ceylon" is principally produced in the district of Ouvalh by native growers, from which fact it derives its trade-name. Being a plain-grown or lowland coffee, the bean is large and flat in style, greenish, moist and "flabby" when first picked, but becoming almost white, broken

and "chaffy" as it dries. It is a poor "roaster," being invariably "quakery," weak and thin in the infusion, and devoid of any distinctive flavor or aroma in the cup.

Plantation—Derives its trade-name from its being systematically cultivated in regularly-laid-out plantations, by scientific methods under intelligent management, and is without doubt one of the finest varieties grown, ranking high commercially for its intrinsic value. The raw or natural bean is large, bold, symmetrical and exceedingly well developed, of a light bluish or translucent-green tint or cast, very regular and invariably uniform in general appearance. It roasts even and handsomely, as fine, if not more so, than any variety known, while in the infusion it is rich and strong, but smooth and creamy in body, fragrant and aromatic in flavor; an equal quantity of this variety yielding a heavier-bodied and richer liquor than that of the finest Java, but will not be quite as high in flavor.

Liberian-Ceylon—Is produced from a transplant of the Liberian species, which, owing to the destruction caused by the "leaf disease" on the Ceylon plantations, has been introduced to that island, on account of its being considered much stronger, hardier and better able to withstand disease than the native trees, but while it was found specially adapted to the plains and low-lying situations, it would not bear so well on the upland or mountain slopes. A hybrid species was at length evolved, the product of which is known to trade as "Ceylon-Liberian," the bean of which in the natural state is not quite as large as that of the parent plant, not as convex in shape, the color being paler, bordering on a rich yellow instead of brown, while the infusion though not as

heavy in body or dark in color, is much smoother and more palatable, the too-heavy properties of the original being greatly modified by climatic and other causes.

Ceylon-Mocha—Is a small bean, mountain-grown, coffee, very even and uniform, usually separated from the regular plantation variety. The raw or unroasted bean is of a steel-blue or silvery-grey color, according to age, exceedingly rich in liquor and fragrant in flavor, and considered by some experts to be equal in drinking qualities to any variety grown, being frequently shipped to Aden for substitution or mixing with Mocha coffee.

Ceylon coffees are usually packed in casks and in hogsheads (except Native, which is put up in bags), the former weighing 400 and the latter 1,000 pounds, and shipped to England, where it commands a high price, relatively, and where they are graded as No. 1 (largest); 2 (medium); 3 (small), and "Triage," or common, but generally as "Plantation" and "Native" in the American market. In 1880 it was estimated that the capital invested in coffee culture amounted to over \$70,000,000, a notable increase having taken place since that year, there being at the present time some forty districts on the island in which coffee culture is carried on for commercial uses. While the native product is usually calculated to extend over 50,000 acres, which, however, varies very much, according to the character of the season, the prices obtained, and the cheapness of money. The annual exports are about 80,000,000 pounds, giving an average yield from old and new plantations of a little over 400 pounds per acre.

MALAYAN COFFEES

Include the products of the islands of Java, Sumatra, Celebes, the Sunda and many other of the smaller islands of the Malayan Archipelago.

JAVA COFFEES.

Java is a generic term applied to all coffees grown in the Eastern Archipelago, and is almost a synonym for coffee. While the coffee plant, which is only known in Java by its European appellation and its intimate relation with European despotism, was first introduced into that island by the Dutch at the close of the seventeenth century, and has ever since remained one of their chief articles of exclusive monopoly. The labor by which it is planted and its produce collected is included among the oppressions or "forced services" of the natives at inadequate rates. Previous to the year 1808 the cultivation of coffee in Java was principally confined to the Sunda districts, there being, up to that year, but few plantations comparatively in the eastern districts, the product of which they were capable of yielding not amounting to one-tenth of the whole. But under the rapacious administration of the Dutch East India Company and government the cultivation of coffee has usurped the soil of almost the entire island, otherwise destined for yielding the subsistence of the people, the cultivation of all other products being made subservient to it and the withering effects of a government monopoly, extending their influence indiscriminately throughout every province and district in the island. In the Sunda districts particularly each native family is compelled to care for 1,000 coffee plants, and in the eastern districts, where new and extensive plantations are being formed from time to time in soils and situations in many instances by no means favorable to its profitable culture, 650 plants is the prescribed allotment. No negligence can be practised in the performance of this duty, the whole operations of planting, picking and pulping being

conducted under the immediate superintendence of the government officials, who select the sites where the new plantations are to be formed, seeing that they are preserved from weeds and rank grasses and overseeing its selection and removal to the "go-downs" or warehouses when prepared. Under this system the Sunda districts are estimated to yield an annual produce of 100,000 piculs, and it was at one time calculated that the young plantations of the eastern districts, when they should come into full bearing, would produce an equal quantity, but in the latter section many of the plantations had been formed on ill-judged sites, the natives being also averse to the new and additional burden which this increase of cultivation imposed upon their labor. Had the system been persevered in or enforced by a despotic authority, it is questionable whether the quantity anticipated in the above estimate, or even one-half of it, would have been obtained from the eastern districts. The Sundas living in an island and mountainous country, and having been long accustomed to the hardships of coffee culture, are less sensible of its pressure than the rest of their countrymen, time and habit having reconciled them to a system of servitude, which was at first revolting to them, and a state of slavery, which the philanthropist laments as degrading, is scarcely felt to be even a grievance by themselves. Instances, however, are not wanting in which the usual measure of exaction having been surpassed they have been awakened to a sense of their wretchedness, a government of colonial monopolists, eager only for profit, and heedless of the sources from which it is derived, subjecting its native subjects to privations and distresses, the recital of which shock the ear of humanity. In brief, the system of coffee culture in the island of Java has sometimes been so severely exacted

that, together with the other constant and heavy demands made upon them by the government authority on the native labor of the country, that they deprived the unfortunate peasants of the time necessary to raise food for their own support, many thus perishing by famine, while others fled to the mountains, where, raising a scanty subsistence in patches, or often dependent for it upon the roots of the forest, they congratulated themselves on their escape from the reach of their oppressors; numbers of these people, with their descendants, remaining in these haunts to the present time. In their annual migrations they frequently pass over the richest lands, which still remain uncultivated, awaiting their return to till it, but they prefer their wild independence and precarious subsistence to the horrors of being again subjected to forced servitude and forced deliveries at inadequate compensation.

In the Java highlands the tree yields fruit for a period of twenty years, while on the plains or lowlands it seldom attains a greater age than nine or ten, bearing only during six or seven of these, the fruit being larger comparatively, but the flavor less as a general rule. About the end of the rainy season such plants as have not thriven are replaced by others and the plantations cleared, this latter operation in well-managed plantations being generally performed from three to four times in the year, the tree being never topped or pruned, but universally allowed to grow in all its native luxuriance. In this state it often, in favored situations, reaches a height of sixteen feet, and plants eight inches broad have been frequently procured from the trunks. The average product of a coffee tree in Java is not estimated at much more than $1\frac{1}{4}$ pounds, but there are instances on record where as much as from twenty to thirty pounds have been yielded by a single

plant in a season. Again, in Java there does not appear to be any fixed or certain season for the plant to arrive at maturity, as in the Western countries, the gathering usually commencing in June or July, and it is not until late in the following April that the entire crop is delivered to the go-downs. The picking season in general, however, consists of three pickings or crops of which the first or "roor-pluk," which is small, begins in February, the second or "main-pluk" in May or June, when the heaviest portion is gathered. It is also termed the "full-pluk," from being the most abundant of the season the third or "after-pluk," being what is left to open on the trees, may be considered more of a glean- ing, as it is merely a general sweep of the fallen berries. When the berries become of a dark crimson color they are plucked off one by one with the assistance of a light bamboo ladder, the greatest care being taken not to shake off the blossoms which still remain on the tree or to pluck the unripe fruit. The women and children of the country usually do the picking, the men attending to the heavier work around the plantations. Attached to every village near which there are coffee plantations of any extent, there is a "drying-house," to which the newly-gathered coffee is carried and where it is placed on hurdles about four feet from the floor, under which a slow wood-fire is kept up during the night; the roof is opened in the mornings and evenings to admit the air, the berries being frequently stirred meanwhile to prevent fermentation. As the excessive heat of the sun is considered prejudicial, the roof of the "drying-house" is closed during mid-day, this operation being continued until the husk is thoroughly dried. The coffee dried in this manner is generally small, sea-green or grayish in color and is supposed to acquire a peculiar flavor

from the smoke, although it does not appear that any particular kind of wood is used as fuel. On the other hand, when the coffee is dried in the sun the bean becomes of a pale yellowish color, is larger in size, specifically lighter in weight and more pungent in flavor than the former. The most common method of pulping in Java among the natives is to pound the berries when dried in a bag made of buffalo hide, care being taken not to break or mutilate the beans. A mill of the most elementary construction is, however, sometimes used for the purpose, but is said not to answer as well. When the operations of pulping and cleaning are completed the coffee is then put in bags and baskets and stood on raised platforms until the period of delivery arrives, when it is carried to the "go-downs" or store-houses, sometimes by men but more generally on the backs of buffaloes and mules in strings of from 1,500 to 2,000 at a time. In the Sunda district there are three principal depots for receiving the coffee from the cultivators—Chikan, Karang and Buitzenorg. From Buitzenorg it is either sent direct to Batavia by land in carts or by way of Linkong, whence it is forwarded in boats by the Chidana river, while from Chikan the coffee is sent in boats down the river Chitaram and thence along the sea-coast to Batavia, where it is received into extensive warehouses and from which it is in turn generally exported to the European and American markets.

Up to a very recent period almost all coffee in Java was cultivated by the natives under supervision of the Dutch government, which had a monopoly of the product, deriving an enormous revenue from its cultivation. Under this system, each family was compelled to cultivate, pick, dry, hull and deliver the coffee at the nearest government warehouse for transport to the port

of shipment, the natives being allowed but a small percentage of the crop as compensation for their labor in many instances, but more generally the government placing a figure so low as to enable it to sell the coffee at an enormous profit, and also deducting again a heavy duty from the gross price paid to the growers, thereby deriving an almost fabulous revenue from this system of cultivation.

It is difficult to state what recompense the native cultivator of coffee receives in Java for his services and his product, the complicated system of accounts which prevails there seem only calculated to puzzle or mystify the investigator and allow the Dutch commissary to derive an income of from eighty to one hundred thousand dollars per annum at the expense of the government by whom he is employed, on the one hand, and that of the natives whom he oppresses, on the other. Latterly, however, it has been directed that the cultivators should receive, on delivery at the government storehouses, "three rix-dollars (copper) for each "mountain" picul (225 pounds) of coffee, being very little more than one dollar per hundred, while this same coffee has frequently been sold in Batavia, within fifty miles of the spot where it was raised, at twenty dollars per hundred, and has been seldom sold in the European or American markets at less than twenty cents per pound. It is, also, difficult to fix the exact rate at which the coffee might be produced under the free system, but that it can be raised for exportation at ten dollars per hundred with profit is beyond doubt. The price paid the natives, however, is deemed liberal by the Dutch government, though in many cases it has to be transported over sixty miles of an almost impassible country, where two men are required to carry a hundred pounds of coffee on their shoulders

and at an expense of labor which one would suppose at least equal to the remuneration.

All the available mountain slopes on the island of Java are literally covered with coffee plantations, owned and operated by the Dutch government, which assigns to each Javanese family the cultivation and care of from 600 to 1,000 trees under severe penalties, the natives being compelled to deliver their crops, hulled and cleaned, to the nearest government stores at the end of the harvest, accepting in return whatever price the government is pleased to put on it. Considerable coffee is, however, cultivated by the natives themselves, independently of that raised directly for the government, being chiefly grown along the borders of the government plantations and other unused patches, as well as along the fences around their farms, being generally raised in the shade; the berry of some of this coffee attains a high excellence rivalling if not actually excelling the government product in many instances.

A considerable portion of the peasantry having — as already observed — been long accustomed to the cultivation of coffee, it is owing to their skill and experience that the coffee owes its excellence as much as to any direct knowledge, superintendence or interference of the Dutch officials, who derive their information from the natives, having little more to do than occasionally ride around the plantations with a pompous suite, keep the accounts and examine the coffee, as it is received from the cultivators. The plantations are generally laid out in squares, the distances between the plants varying according to the fertility of the soil, that is, in a soil not considered fertile, a distance of six feet is preserved, and in each interval is planted a "dadap" tree for the purpose of affording shade to the plants; while in a rich soil where

the plant grows more luxuriantly, fewer shade trees are required and the plants are placed at greater distances from each other. But in Java, a certain degree of shade appears to be necessary at all times to the health of the coffee plant, especially during its earlier stages, and in low situations, for which purpose the dadap tree is found to be better calculated for affording this protection than any other kind in the country, it being a common saying on that island that "where the dadap flourishes, there also will flourish coffee." But it must not be inferred from this that they are always constant or even necessary companions, for in the highlands many of the most flourishing plantations are to be observed with but very few dadaps in the vicinity.

Coffee is cultivated for commercial use in all of the twenty-two residencies into which the island is divided, including Bantam, Batavia, Bezoeki, Bagelen, Banjoewanjie and Banjoemas, Cheribon, Japara, Kadoe, Kediri and Krawang, Madioen, Rembang, Preanger, Probolingo, Passoeren and Pekalongan, Soerabaya, Soerakarta and Djokjakarta, Bali, Timour, Malang and Samarang, each of which residencies or districts containing from five to fifty plantations, by which they are further distinguished. In trade they are generally divided into "Government" and "Free Coffees," the free cultivation being now permitted in the residencies of Bantam, Cheribon and many other of the Eastern districts. And, as with the coffees of all other countries, the product of the different districts of Java varies considerably in quality and value, many of them possessing a richness and mellowness not approached by that of any other country; others, again, being so inferior that were it not for the fact of being grown on that island they would not be deserving of the name.

Bantam and Batavia—Are medium-sized, yellowish in color, regular and uniform in appearance, roasting and drinking exceeding well, being generally clean and free from quakers.

Bagalen and Bezoeki—Are rather bold and plump in style, rich yellow in color, solid and compact in form, full in body and fragrant in flavor, ranking with the best of the Java growths.

Banjoewanjie and Banjoemas—While not plentiful sorts, rarely coming to this market, being principally shipped to Holland, where they are much appreciated for their great strength and rich flavor, are medium-sized, heavy and round in body, creamy and fragrant in the cup.

Cheribon and Japara—Are rather light in weight and color, inclined to be “chaffy” in the natural state and “quakery” in the roasted, but nevertheless yield a pleasing and palatable liquor on infusion.

Kadoe and Kediri.—Are small, hard-bean coffees, approaching brown, and usually good drinkers, being a favorite in the European market, where they rank high commercially.

Rembang and Krawang.—Rank next to Kadoe in general cup qualities, but are somewhat irregular in the raw state, roasting and drinking well, however.

Preanger and Probolingo.—The soil of these districts being pre-eminently adapted for the cultivation of fine coffees, they are noted for their products. The bean is round, full and well developed, high-yellow in color, but assuming a rich-brown with age, firm and regular in style, rich, mellow and creamy in liquor, fragrant and aromatic in flavor, rivalling the best product of Arabia itself.

Passoeren and Pekalongen—Rank next to Preanger, being usually brown, regular and uniform, full in body, round in flavor and as a general rule very fragrant, particularly when the crop is good.

Madioen and Soerabaya—Belong to the yellow-bean class, and are rather light in weight and body but pleasing and agreeable in the cup, approximating to a fine Cucuta Maracaibo in form, liquor and general characteristics.

Soerakarta and Djokjakarta—Are among the best of the Java growths, large, heavy and well-developed in bean, handsome and attractive in the roasted state, yielding a rich golden-yellow liquor, creamy in body and aromatic in flavor.

Bali and Timoor—Are grown on the small islands to the south of Java, and though fair in size and quite brown in color, are nevertheless deceptive in roasting and drinking qualities.

Malang and Samarang—Are light in weight and in color, somewhat chaffy in the natural state and “quakery” in the roasted, thin, flat and flavorless in liquor.

OTHER VARIETIES.

Old Government Java—Is a trade term applied to coffee grown and stored under the supervision of the officers of the Dutch government, and in contradistinction to that raised by the natives, but is now an almost obsolete term. It is produced principally in the Preanger district, where the greatest care and attention is bestowed on its cultivation and curing, its cultivation never being entirely entrusted to the natives; the primary object of the government officials being to improve

the berry and enhance its value to the exclusion of increased quantity. After being picked and cured, it is stored in "go-downs" or storehouses for a number of years, frequently seven, before being offered for sale, the go-downs being erected expressly for the purpose, being open at the sides so as to admit the sun and air in order to mature and season the coffee, which, like wine, improves with age, the bean assuming with time a dark-brown color and the flavor becoming richer and more mellow by the development of the volatile or essential oil contained in the beans. By prolonged keeping in the raw state it is found that the richness of any seeds in this peculiar oil is increased, and with increased aroma the coffee yields a blander and more mellow beverage. Stored coffees, for this reason, loses weight at first with great rapidity, sometimes as much as 8 per cent. having been found to dissipate in the first year of keeping, 5 per cent. in the second and 2 per cent. in the third; but such loss of weight is more than compensated for by the improvement in quality and consequent enhancement of value. Old Government Java is for this reason celebrated for its superior excellence, and justly deserving of its high repute. Latterly, however, the term has been indiscriminately used and applied to all Java coffees of a brown color, irrespective of age, grade or district of production and has thereby ceased to possess any real significance as implying any extra merit or superiority over the average run of Java coffees. The natural bean of the true Old Government Java Coffee is large, round and well developed, of a rich brown color, exceedingly regular and uniform in general appearance and entirely free from defects of any kind, while the infusion is round and heavy in body, creamy, mellow and fragrant in flavor, surpassing in general "cup qualities" that of any other variety grown.

All coffees raised under the supervision of the government are disposed of through the agency of the "Netherlands' Maatschappij," or Trading Company, at the periodical (quarterly) auction sales held in Batavia or Amsterdam, the sales occurring in the months of March, June, September and December. It is offered for sale only in limited quantities—from one to two hundred picul lots—no purchaser being permitted to buy more at a single bidding, the prices varying at each sale, being regulated by the quantity offered and the number of orders received by the agents or brokers to buy, so that parties purchasing two or more lots cannot calculate what the average cost will be until the sale is ended.

Plantation—Or "Private Growth Javas," are so termed from being grown on plantations owned and operated by private or individual planters, and in contradistinction to that raised under government supervision. Being grown from selected seed, under the best agricultural conditions and scientific cultivation, it produces a quality of coffee that cannot be surpassed for size, style, color, regularity and general intrinsic merit. It is also marketed differently from the government system, being disposed of by contract or tender, that is, as soon as the quantity and quality of the crop can be estimated, the planters issue a circular letter or note to the principal firms of Batavia and to the representatives of European and American houses, informing them of the facts and soliciting bids for the entire crop. Proposals are received and the coffee sold to the highest bidder; but if, according to the planter's views, the offers are too low, he claims the right to reject them and hold the coffee for a better market. If accepted the coffee is carefully picked over, assorted and transported to the shipping

port by the planter and delivered in bulk, the purchaser furnishing his own bags and marks, the coffees being of such high repute and quality they sell high, there being great competition to obtain them. Many of these plantations were in existence prior to the introduction of the government monopoly system, or are situated on the estates of the native princes, who have been permitted to retain some portion of their sovereign privileges.

Liberian-Java—Is the product of a transplant of the Liberian species introduced into the island about ten years ago, where it was found to prosper well and vigorously; a great demand springing up for its seed, the cultivation increasing and yielding a bean much larger than that produced by the parent plant, full and well developed, yellow to brown in color, concave in form and closely resembling "Padang" in liquor and flavor.

W. I. P.—Or "West India Prepared" Java is so termed from being pulped and prepared by the "Washed" or West India process, being also known to trade as "Blue-bean Java." The raw bean is bold, regular and bluish-green in color, hard and solid in substance, heavy, rich and flavory in liquor. Some authorities, however, contend that this new process is detrimental to the coffee, claiming that by the old or "dry-hulled" method the bean retained all the properties of the coffee to a much greater degree, whereas by the new process, considerable of the active principle (caffeine) is carried off in the washing.

Loeke or "Tiger-cat Java"—Is a variety of Java coffee highly prized for the intrinsic merits imparted to it by a peculiar process. It is composed simply of the undigested beans which have passed through the intestinal canal of the "Loeke," a small species of tiger found

in Java, which, climbing the trees, selects the ripest and richest of the berries, feeds on them, swallowing both pulp and beans, the latter being left in the jungle and afterwards collected by the natives. It is analogous to the "Monkey coffee" of Brazil and the "Jackal coffee" of India, the excellent qualities of which is due to the chemical process which the beans undergo in the stomach of the animal that has stolen them, the appreciation of such stercoraceously deposited beans by the natives being an undoubted fact. The bean is large and bold, but whitish in color, heavy, round and creamy in body, exceedingly fragrant and aromatic in flavor and not excelled by that of any coffee grown or known to commerce.

At the time of shipment all Java coffees are of a light-green shade unless—as in the case of government and other coffees—they have been previously stored for the purpose of seasoning or to await a better market. During the long voyage through the tropics the bean gradually changes to a deep-yellow, and finally to a dark-brown, particularly if the voyage be materially lengthened, as it frequently is; the darker the color becomes the more valuable the coffee on arrival. This distinctive feature being characteristic of Java coffees only, no other variety acquiring this color except by artificial means. Color is the standard of value and the principal consideration in appraising its price in the American market, there being a wide difference made in the values of "Pale," "Yellow" and "Brown" Java coffees in favor of the latter. As stated before, by being stored for a certain length of time, Java coffees improve in quality, the bean becoming browner and the flavor more mellow, probably in the same manner as wine. The moisture evaporates from the bean and the acidulous, astringent taste of the young, new bean is

entirely dissipated and lost by the process, which, by becoming thoroughly dry and seasoned, enhances its value commercially. Yet color cannot always be taken as an indication of age or genuineness, as much of the coffee offered under the head of Brown Java at the present time is nothing more than Malang and other varieties "sweated," and colored by a steaming process or artificially faced with a preparation of kaolin or soapstone. Again if this feature of turning brown with time, were always an indication of age, it may be taken for granted that "Brown Javas," possessed finer roasting and drinking qualities, than the "Light" or Yellow-bean varieties, but it is an acknowledged fact that this brown color, even when natural, neither adds or detracts from its value in the cup. Practically the demand for "Brown Java" coffee is but an American caprice, enhancing its commercial value from two to three cents per pound beyond its intrinsic worth; this caprice being also directly responsible for the immense amount of other so-called Java coffees that are annually sweated and colored to imitate or counterfeit the naturally colored and genuine kinds. While in Europe the yellow-colored coffees are preferred to the brown, being quite as good, if not superior, to them, and less liable to manipulation.

Java coffees are packed for export in bags containing one picul (133 pounds) when intended for the European markets, and in mats of one-half picul for the American, the latter style being preferred in this country. In the European markets they are classed as "Green," "Pale-green," "Greenish" and "Extra-green" when new, but as "Yellow," "Dark-yellow," "Light-brown" and "Brown" when old, grading in the order named. While in the United States they are generally classed as "Light," "Yellow" and "Brown," according to color, the

packages being usually marked with the initials of the importer, underneath which is a letter or letters denoting the district or plantation where grown. The average annual production is about 100,000,000 pounds, of which 30,000,000 pounds is produced on private plantations.

SUMATRA COFFEES.

Sumatra known to the Arabians as *Srimata* ("the happy"), lies to the northwest of Java, being separated only from it by the narrow Sunda strait, and is much richer in products than the latter island. The coffee-plant was first introduced into Sumatra from Java, by the Dutch, in the latter part of the eighteenth century, but its cultivation made little or no progress on that island until about the year 1800, when measures were taken by the government to promote and stimulate its production there, since which period there has been a rapid increase in its output. The system of coffee cultivation is nearly identical with that in Java, each native family being furnished with seed by the government on condition that they keep in good bearing order not less than 650 trees, the crop, "if up to standard," being purchased by the government, that is, *taken*, at an arbitrarily *fixed* price. The coffee, after being inspected and accepted, is stored in go-downs or warehouses adjacent to the districts of growth, until a sufficient quantity has been collected, when it is transported to the ports of Padang or Benkoolen, where, after being duly advertised, it is sold at auction, under the immediate supervision of the officers of the Dutch government, the sales being held quarterly during the months of March, June, September and December, as in Batavia and Amsterdam. Latterly, however, the cultivation of coffee in Sumatra has been further encouraged by the government leasing or selling

coffee-lands to independent planters, the product of such plantations being termed "Free coffee," in contradistinction to that raised with restrictions by the natives, such coffees being sold only by tenders, as in Java.

Like Java, Sumatra is geographically divided into a number of districts politically termed "Residencies," under Dutch control, the coffee-producing districts comprising Painan, Padang, Palembang, Ankola, Ayerbanjies and Mandheling, grading relatively in the order named.

Painan—Is a medium-sized bean brownish in color, hard, solid and regular in appearance, generally clean and well prepared, and though fairly heavy in body and pungent in flavor is yet devoid of the mellowness and fragrance which characterize Sumatra sorts in general, but is still superior in many respects to a number of the Java growths.

Padang—Known to trade generally as "Interior" from being raised in a somewhat desultory manner by the natives on government lands, in the Padang plateau or highlands of the interior, which furnishes the largest quantity. Padang or Interior coffees are not, as a rule, as stylish or uniform as the other district growths, owing to careless cultivation and the primitive methods of preparation in use by the natives. Yet, notwithstanding these drawbacks, Interior coffees frequently comprise invoices rivalling in roasting and drinking qualities many of the regularly cultivated district coffees, and at all times far outrank the average of the Java product. The raw bean as a rule is of fair proportions, but very irregular in general appearance, fairly uniform, and though lacking in the style and finer qualities of the plantation grades, is nevertheless strong, rich and fragrant in the cup, possessing a characteristic flavor entirely their own.

Palembang—Differs from Padang both in size, style, color and drink, being smaller in bean, lighter in color, but stronger and more pungent in liquor, and not, as a general rule, as highly valued, except when the crop is good.

Ankola—Ranks among the finest of the Sumatra sorts in point of size, color and general character, the natural bean being round, full and firm, rich dark-brown in color, bright and mellow in liquor, and very fragrant if not aromatic in flavor, and much superior in every respect to the best of the Java growths, excepting alone that produced in the Preanger district.

Ayerbanjies—Is closely allied to Ankola in all its leading features of size, color, structure and character, being classed commercially as on an entire parity with it, commanding the same price, and frequently substituted for it when the former is scarce or difficult to obtain.

Mandheling—Is without exception the finest of the Sumatra products, and is valued high commercially, not alone for its undisputed intrinsic merits, but also on account of the comparatively small amount produced, forming only about ten per cent. of the entire product of the island. The bean is much larger, almost as large as Liberian, of a rich dark, natural-brown color, round, full, well developed and symmetrical in form, very stylish and attractive in the roasted state, and equalling, if not positively surpassing, the much-vaunted Old Government Java itself.

Lahat—Is another of the Sumatra varieties, but not deserving of being classed with them. Being of lowland growth, the bean, while large, is flat in shape, whitish in color, and chaffy in substance, approaching a Malang in

general contour. It is invariably "quakery" in the roast, flat in liquor, insipid in flavor, or more correctly, almost devoid of "cup" qualities.

Sumatra coffees, in general, possess a peculiarly characteristic flavor in the raw or natural state, described by some dealers as "musty," but claimed to be acquired in transit through the tropics, the coffee sweating in the hold of the vessel during the long voyage. Certain it is, however, that this mustiness, or whatever it may be termed, enhances rather than detracts from the value or flavor of the coffee. And, more singular to add, Sumatra forms nine-tenths of the coffee imported and sold in the United States under the head of Java, being preferred to the latter by the American dealers in general, on account of its usually dark-brown color and distinctive "musty" flavor. The annual product, like that of all other countries, varies materially from various and obvious causes, both in quantity and quality, the average annual export being about 20,000,000 pounds, of which the United States takes upwards of 75 per cent., the product of "Free" or private plantation coffee forming about one-fifth of the annual yield. It is packed in grass mats, and shipped from the port of Padang, when purchased for account in the United States, and from Benkoolen, in the north, when intended for the European market.

CELEBES COFFEES

Are grown in the Dutch island of that name, situated to the northeast of Java, the coffee plant being introduced there from Java as far back as 1750, but except where Dutch influence was felt little or no attention was paid to it by the native races until about 1822, when it was discovered by the Dutch rulers that the soil of the mountain sides was admirably adapted to the cultivation

of fine coffees and a system established which stimulated the native chiefs to foster the industry and undertake the management of coffee plantations. A law was subsequently enacted by the Dutch government, however, compelling the native princes to direct the total annihilation of the cultivation of coffee in their dominions and to secure by treaty with them the destruction and confiscation of all coffee found in the hands of the natives. The island is divided into thirteen districts, in nearly all of which more or less coffee is produced. The principal coffees being known to commerce as Menado, Bonthyne and Macassar.

Menado—Produced in the district of Minnahassa situated in the extreme north of the island, is not only the finest grown on that island, but, also excels the best products of both Java and Sumatra. The bean is uniformly large and regular, of a rich dark-yellow color, solid and heavy in weight, magnificent in the roast, creamy and aromatic to a high degree in the cup. It is claimed to possess the “highest standard of excellence,” no other variety containing the same all-round qualities of size, style, color, liquor, flavor and aroma to the same extent. The supply, however, is very limited, and is generally shipped to Holland, where it commands a price in accordance with its merits, but rarely reaching the United States.

Bonthyne—Is medium in size, flat in form, reddish in color, inferior in roast and flavor, and not a desirable sort by any means.

Macassar—Is the poorest of the Celebes sorts, closely resembling Lahat and Malang, and on a parity with them in appearance, character and value.

Singapore Javas.—What are known to commerce as “Singapore Java Coffees” are not produced on that island, which, although lying directly in the coffee zone, produces little or no coffee, except small quantities of the Liberian species, which has recently been introduced there. 90 per cent. of the coffee shipped from Singapore is chiefly composed of the products of Bali, Timour, the Mollucas and smaller Sunda islands, its position making it the only *entrepot* for the commerce of the entire archipelago. The coffees are usually small in size, reddish in color, irregular in grade and inferior in quality, being generally produced from wild or carelessly cultivated plants, and also possessing a peculiar spicy or “peppery” flavor, said to be contracted from being imported with cargoes of pepper, but more probably from being grown in the vicinity of pepper plantations in the Spice islands. Formerly these coffees were marketed under their true titles, but as their character became known they were palmed off as Padang and other district Javas, to the detriment of the latter.

The systematic cultivation of the Liberian species of coffee was commenced about ten years ago in Siam, Malacca and many of the smaller islands of Malaysia, where it was found to prosper so well at first that the demand for Liberian seed became very great. But after a fair trial it does not seem to have been a great success, what little is produced in these new districts being generally classed as “Jahore Liberian” coffee.

POLYNESIAN COFFEES

Embrace Phillipine, Borneo, Guinea, Fijian, Samoan, Hawaiian, Australian, New Zealand, and other islands in the South Pacific Ocean.

Phillipine Coffees.—Opinions differ as to whether the coffee plant is indigenous to the Phillipine Islands or only exotic there, some authorities declaring that it was first brought there by Spanish priests from the Malay. Others again claiming that the plant was found in a wild state in the island of Luzon prior to its introduction, but that the natives, being ignorant of its properties, allowed the fruit to decay on the trees. Be this as it may, coffee thrives there remarkably well, the product possessing a peculiarly rich flavor, for which it is highly esteemed on the continent of Europe, and, although it is by no means well prepared or uniform, the worst grades bring a higher price there than the Java growths, the value on the spot exceeding the current rates for the latter in the foreign markets, and is generally classed as “Luzon,” “Manilla” and “Zamboango,” from the ports of shipment.

Luzon—Is a small-bean variety, hard and flinty in texture, rich and aromatic in the infusion, but poorly or indifferently cleaned or prepared, for which causes it is not as well appreciated as it deserves.

Manilla—Is principally produced on the islands of Indan, Laguna, Batangas and Cavité, its price on the spot varying from twenty to twenty-two dollars per picul. The bean is medium in size, regular in form, and pale-green in color, perfect in roast and aromatic in flavor.

Zamboango—Comes chiefly from Mindano and the southern islands generally. The bean is much larger than that of Manilla, yellowish-white in color, but somewhat flabby in texture, and containing much extraneous matter, being poorly prepared, while the liquor is thin, flat and apt to be wild or “grassy” in flavor.

Recently the natives have planted patches of coffee in the islands of Cebu and Bohol, small quantities of which have appeared in the European markets, some also being secured from the islands of Yligan and Amboyana. The area of land under coffee cultivation in the Phillipines, and the amount of coffee raised annually is not definitely known, as the plantations are widely scattered over the islands of the archipelago, but is usually estimated at about 10,000,000 pounds. The largest plantations are situated in the province of Batangas in the island of Luzon, but considerable coffee is also produced independently by the natives in small plots which they sell to speculators, who hold it until they make up a fair-sized shipment, collected in this manner, from the neighboring islands. The increase in production, however, has been marked during the past five years, from about 10,000,000 pounds in 1888, to over 16,000,000 pounds in 1893, about 6,000,000 pounds coming direct to this country, the remainder being taken by Spain, France and Continental Europe generally.

Borneo Coffee.—The Liberian plant has been recently introduced into Borneo on a small scale, where it has been found to thrive well but producing a bean greatly modified in size, color and flavor of the original species. It is much smaller, not as convex or brown, but smoother and more pleasing, if anything, in the drink.

Guinea Coffee.—Rapid strides are being made in the cultivation of coffee in New Guinea, the product ranking with the average of the mild grades of the older countries.

Samoa Coffee.—The coffee plant has been in existence here for some years, and though thriving luxuriantly, and the soil and climate being well adapted, it

has never been scientifically treated, and as a consequence is not as yet an article of commerce.

Fijian Coffee.—Some coffee of fair quality was exported from these islands as early as 1877, the industry making but little progress there since that time, notwithstanding the fact that the islands possess abundant facilities for the production of a superior variety. Several of the most wealthy and enterprising planters are now, however, engaged in its cultivation, and it is expected soon to become one of the chief exports of those islands. The bean is medium sized, green in color, as with all new coffees, and, owing to improper curing, somewhat grassy in flavor.

Hawaiian Coffee—Coffee has been cultivated in Hawaii and other islands of that group with considerable success for many years past, although the production has varied greatly there. The first plantations formed in the island were only a few feet above sea-level, to which fact is attributed the failure or rather slow progress of the industry there. New plantations at higher elevations have recently been established, from which better returns are expected. They are classified, and known to trade as Puna, Hilo, Kona and Hamakua, of which Kona is the finest, the others varying in size, color and flavor. The exports have declined from 415,000 pounds in 1870, which in 1885 fell to as low as 1,675 pounds, but for 1892 it had again increased to 13,000 pounds, the total exports since 1881 amounting to 215,782 pounds.

Australian Coffee.—Coffee has been found to prosper well in Queensland, a yield of over 600 pounds per acre being obtained there so far and selling in Brisbane at twenty cents per pound, the smaller farmers

finding it paying better than corn or potatoes. Efforts are also being made to introduce the industry into New Zealand and other of the Antipodean colonies. This list does not by any means exhaust the possible spots or sections in Polynesia where coffee is or may be grown with the greatest advantage, touching only the chief centres of the industry, and as suggesting some eligible sites for the extension of the planting enterprise. Fair quantities of coffee being also produced in the Hebrides, Society, Friendly and many other of the island groups in the South Pacific Ocean.

AMERICAN COFFEES.

As previously stated, the history of the first introduction of the coffee plant into the American continent is as romantic as it is interesting. In 1714 the magistrates of Amsterdam presented to Louis XIV a specimen of the coffee tree, which was carefully nursed in one of the botanic gardens of Paris, until it eventually yielded fruit. In 1717 the French king sent several of the shoots from it to the island of Martinique in care of one De Clieux, an officer in the French naval service. The voyage being long and stormy, the ship's crew were reduced to a short allowance of water; for lack of which essential all but one of the young plants died. De Clieux to save this remaining slip shared with it his own scanty allowance, eventually succeeding in bringing it safely to its destination. From this single plant thus heroically preserved, according to De Tour, was propagated the numerous varieties now to be found in the West Indies, Mexico, Central, and the northern countries of South America. And where, notwithstanding the fact that Coffee is indigenous to the Old World it has evidently found its true habitat in the New, its production at the present being many

times greater than in the East; its cultivation also constantly and immensely increasing there.

The climatic and topographic conditions of the American continent are pre-eminently adapted to the cultivation of fine coffees, the great mass of coffee lands, consisting of an elevated plateau formed by an expansion of the Cordilleras from which terraced slopes descend with a more or less rapid inclination towards both the Atlantic and Pacific oceans. This vast tract comprises one of the richest and most varied zones of the world, for while its geographical position secures to it a tropical vegetation, the rapid differences of elevation which characterize it afford it the advantages of more temperate climates, thus combining within its borders an almost unparalleled exuberance and multiplicity of natural products, lands favorable to the cultivation of coffee being found not only on the entire Andean range but also on its sea and land slopes from Mexico to Paraguay. While in addition to these immense stretches of mountain range, the plant is also found to flourish in the numerous valleys and plains of the interior of the continent, and wherever the great tablelands of the Cordilleras are sufficiently depressed to reach the level of tropical vegetation.

American Coffees are geographically divided into Mexican, West Indian, Central and South American, and, as with the products of the Old World, the commercial divisions and subdivisions of the numerous varieties are based rather on the districts of production and the ports of export than upon any great material difference in the appearance or even quality of the various kinds produced.

MEXICAN COFFEES.

It is also a fact not generally known to Americans that at our very doors there exists the climatic conditions

and capacity for the production of all the coffee that is required for consumption in the United States, the area adapted to the cultivation of coffee in Mexico being almost illimitable, and bounded only by the extent of land brought under cultivation. Its suitability as a coffee-producing country has been tested by more than fifty years of experience, and that it has not heretofore assumed first place in point of production, exportation, and the rank to which the merit of its product entitles it, is to be attributed to the same causes that have so long retarded its other agricultural and commercial developments. But while coffee is chiefly produced for export only in the States of Vera Cruz, Oaxaca, Michacoan, Colima, Chiapas, Jalisco and Tabasco, excellent coffee is also grown on the plains of the interior as far north as Sinaloa, as well as in the coast States from Yucatan to Tamaulipas. They are commercially classified as Oaxaca, Cordova, Urupuan, Tepic, Tabasco, Soconusco and Caracolillo, varying materially in size, style and quality.

Oaxaca—Is a “Sierra,” or mountain coffee, large, bold and blue when new, but bleaching with time. It is one of the best of the Mexican varieties, being regular in roast, heavy in body, strong and rich in flavor and aroma.

Cordova.—Grown in the State of Vera Cruz, is usually a large yellow-bean coffee, from which fact it is sometimes termed “Mexican Java.” It makes a handsome roast, yielding a round, full liquor, approaching to that of a fine Maracaibo or medium Java.

Urupuan—Produced in the State of Michacoan is also a mountain grade, rather small in size, greenish-blue in color but somewhat irregular in appearance, not

being well prepared. In flavor it is, however, high and fragrant, approximating most to that of a Plantation Ceylon.

Tepic,—or “Mexican Mocha,” grown in the State of Jalisco is claimed to be a transplant of the Arabian berry, which has by careful and scientific cultivation been so improved in flavor and aroma as to rival, if not actually excel, the product of the parent plant. The natural bean is exceedingly small, hard and “flinty” in texture, steel-blue in color, faultless in roast, rich and creamy in body and highly aromatic in flavor. The supply being limited it is rarely exported, being principally consumed in the district of production, where it commands a very high price, selling on the spot for as much as one dollar per pound.

Tabasco—Is a coast-grown coffee cultivated in the hot, moist low-lands of the Campeachy gulf, and is the poorest of the Mexican varieties. The bean is of a sickly-green hue, medium in size, and moist or “spongy” in substance, bitter and astringent in flavor, and taken altogether a most undesirable sort for any purpose.

Soconusco—Produced in Chiapas, close to the rich coffee lands of Guatemala is another high-grade coffee, ranking among the finest of the Mexican varieties. It is a large, mature bean, varying in color, according to age, from a bluish-green to a pale-yellow, full and round in body, ripe and mellow in flavor as a rule.

Colima—Raised on the west coast is a medium-sized bean, flat in form, fairly solid, but varying in color from greenish to pale, even in roast, rather round in liquor and pleasing in flavor, and generally shipped to the Pacific States.

Caracolillo—or “Mexican pea-berry,” is a concave-convex bean, grown on the new wood at the end of branches of trees that are pruned year after year; but though not confined to any particular species, such trees yield almost entirely male or pea-berry coffee, being the only instance on record, and is considered the fanciest grade grown in Mexico.

Mexico possesses more and better coffee lands than many other countries where it is now extensively grown, a small proportion of which only are under cultivation. The popularity of the product increases as it becomes better known, besides being the nearest and most accessible coffee producing country to the United States, the largest and best coffee market in the world. More attention is now being directed to the cultivation of coffee in Mexico, however, by both natives and foreigners than has ever before been given to the industry in that country. Native Mexicans are quietly, but steadily laying out new coffee plantations or enlarging and reviving old ones and many large tracts of land adapted to the growth of coffee have recently been purchased there by foreigners with that object. But while Mexico practically has no limit to her production of coffee, yet the average annual exports amounts only to about 10,000,000 pounds, the bulk of which is shipped to France, where it is graded as “Verde,” or Green, and “Blanco,” or White, the United States receiving the largest proportion of the remainder.

WEST INDIAN COFFEES.

The West India Islands at the beginning of the present century were noted for the extensive quantity and excellent quality of their coffee product, ranking at that period with the largest coffee-growing countries of the world.

Its cultivation has rapidly and materially declined there in recent years, still continuing to do so at a disproportionate rate; the decrease since the emancipation of the negroes almost amounting to abandonment. But while commonly attributed in a great measure to the ravages of the blight, already described, it is more evidently traceable to social influences and a faulty system of cultivation. Latterly, however, attempts are being made to restore the industry to something like its former importance by new and improved methods of culture, so that it remains to be seen what art can do to combat the difficulty. They are classified in trade as Cuban, Jamaica, Haytian, San Domingo, Porto Rico, Trinidad, Dominica, Martinique and Guadeloupe.

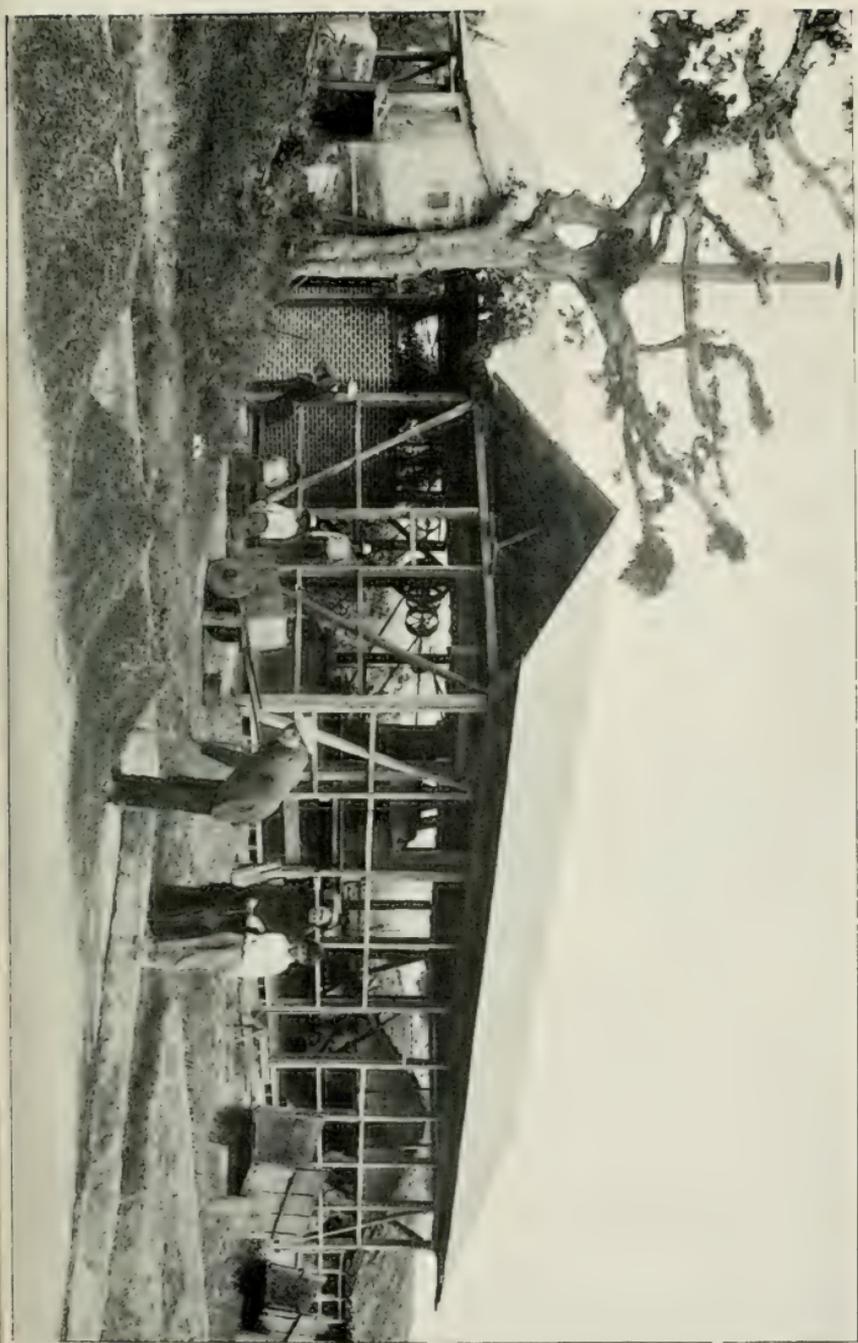
Cuban—Though at one period one of the largest coffee-producing countries in proportion to its size, yielding nearly 50,000,000 pounds annually, Cuba now ranks lowest in the scale, not raising sufficient to supply the home demand, its cultivation being replaced in that island by that of sugar and tobacco. The districts most noted for the richness and excellence of their coffees are situated on the Sierra Maistra range, in the vicinity of Vuelta Abajo, as well as in the districts of Alquizar and San Marcos, and from the fact that these latter are among the oldest coffee-producing sections on the island, their product bears a high reputation for fragrance and excellence. But the coffee grown in the mountain district of Guantanamo is now considered the finest, its cultivation there being on the increase, while decreasing rapidly in the former districts. The bean of what little is produced on that island is large in size, whitish in color and peculiar in form, somewhat resembling a "male" or pea-berry. In roast and drink it is superior to many of the mild grades, with which it is usually ranked.

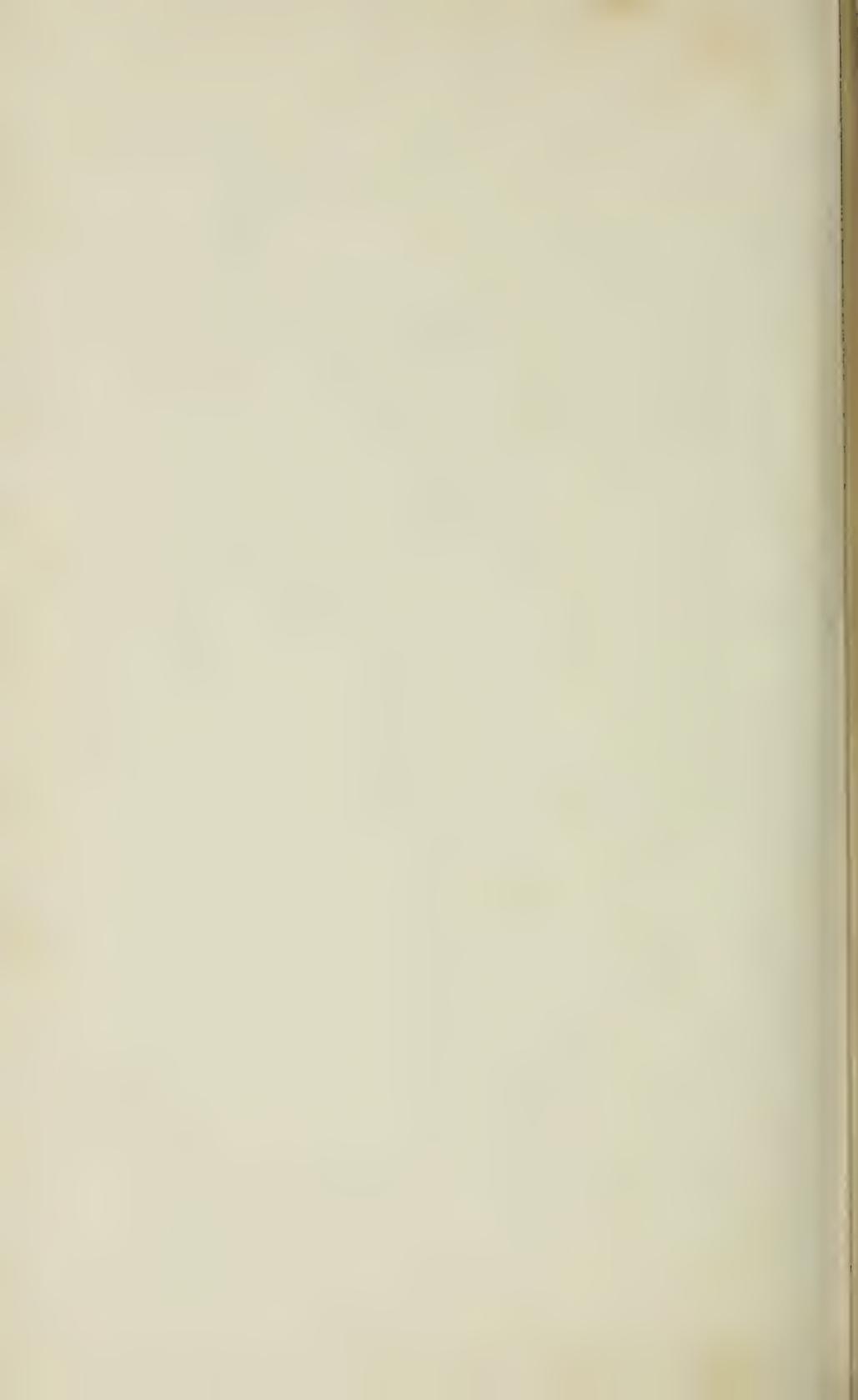
Jamaica—The coffee plant was first introduced into Jamaica in 1730, a special act of Parliament being passed in that year to encourage and foster its cultivation. The island is famous for the production of fine coffees, those grown on the regularly conducted plantations rivalling the best products of any country. It is divided into two kinds, "Blue Mountain" and "Plain-grown," the latter being graded commercially as "Ordinary" in contradistinction to the former, which is always choice. "Blue Mountain Jamaica" is a bold, well-developed bean, bluish almost translucent in cast, very solid and attractive in style and appearance, and developing a characteristic peculiarity, that of opening and exposing a whitish hull or silver-skin down the furrow when roasted, while the liquor is heavy, round, full and rich, fragrant and aromatic to a high degree. It is packed for export in barrels and large casks, the bulk of the choicer grades being compulsorily exported to England, where it commands a higher figure relatively than Java and other equally fine coffees. Nearly all the coffee plantations on the Island of Jamaica being mortgaged to London brokers and dealers, the contracts containing a clause or stipulation compelling the planter to dispose of their crops through the holders, who, by the harsh terms of the contract, not only secure the best of the product and the interest on the money advanced but also the commissions or profits on its sale.

"Ordinary" or plain-grown Jamaica is a large, whitish, flat and broken-bean coffee, moist or spongy in the raw state, and invariably stony and hully, being imperfectly cleaned. The roast is usually either "quakery" or "nig-gery," the liquor is strong, almost to rankness, and apt to be "wild" or "grassy" in flavor, more particularly when new, approximating close to a Travancore or

Native Ceylon, to which coffees it bears a striking resemblance in character and value. It is put up in large coarse bags, averaging about 200 pounds, and shipped principally to the United States.

Haytian Coffees.—Coffee is claimed to have been first introduced into this island by wild fowl, being steriocraceously deposited there after the manner of Monkey, Jackal and Tiger-cat coffees. Its systematic cultivation was first begun there about 1740 by the French, the industry flourishing during the French *régime*, but rapidly declining after the island passed under native rule. It is cultivated there now by natives exclusively, principally in the districts of Jeremie, Jacmel and Gonaives, by which terms it is more familiarly known to commerce. They are generally large, flat, white and broken in appearance, invariably stony and stemy, being but crudely cultivated and prepared for market. Yet, notwithstanding these defects, they are elegant roasters, yielding an excellent liquor, full of snap and rich in flavor, but owing to its indifferent treatment its commercial value is reduced far below its intrinsic worth. The coffee itself being mild and pleasant, added to its low price, would commend it to many consumers were it but properly cleaned and graded. Usually all of it received into this country is reshipped to France, Belgium and Germany, where it is picked over by hand, the consumers in these countries not being as exacting as regards cleaning and grading as in this country. The production of coffee in Hayti has fallen from over 80,000,000 pounds in 1789 to less than 50,000,000 at the present time, although the island offers an excellent and extensive field for the industry, which, it is hoped, will be taken advantage of as soon as the country devotes its energies more closely to the improvement of its internal affairs and the encouragement of capital.





San Domingo—Known to trade as “Cape,” is grown on the same island to the west of Hayti, and approximates very closely in size, style and color to ordinary Jamaica—so much so that it is frequently substituted and sold in lieu of it. Its cultivation being also principally conducted by natives, who are so indifferent to its proper preparation for market—machinery being employed only to a very limited extent—that most of the product is shipped in a stony and otherwise dirty condition, thus reducing its value commercially far below its intrinsic worth.

Porto Rico—Is grown chiefly in the province of Ponce, small quantities being also produced in the districts of Arecibo, Mayaguez and Aguadilla. The bean is regular and well formed, but varying in color from yellow to greenish, the quality is fairly good, and though, not well known in the American market is much valued in Spain and the European markets generally.

Dominica—Known to trade as “Souffriere,” from the district of growth, is a peculiarly shaped bean, said to be produced from Mocha seed, but much inferior to the product of the parent plant. From the effects of Negro emancipation and the coffee blight, the annual production of Dominica has fallen from over 2,000,000 pounds to almost nominal.

Trinidad—The coffee export from Trinidad is only about 25,000 pounds yearly, yet there is scarcely any part of the island where coffee culture may not be profitably undertaken, particularly in the districts of Aripo and Maracas, where the conditions are unsurpassed. Both the Arabian and Liberian species are grown there, the product being commercially divided into “Large” and “Small” and generally shipped to Spain.

Martinique.—Although originally introduced into the New World through Martinique, which island was for a long time celebrated for the quantity and quality of its coffee, it produces very little comparatively at the present day. In fact, barely sufficient to supply the home demand, the excess going to France, where it is highly esteemed for its intrinsic merits. The bean is exceedingly small, hard and flinty, somewhat resembling that of a Mocha, bluish-gray in color, heavy and round in body, pungent and piquant in flavor, and grading with the finest of the milder sorts.

Guadeloupe.—More or less coffee is produced in Guadeloupe and other of the smaller islands of the Antilles, but chiefly to supply the home demand, and, with the exception of the former, are almost entirely unknown to commerce. It is grown principally in the districts of Bonfleur and Hatrant, what little is exported being shipped to France, where it is valued high commercially for its superior drinking qualities. A century ago the island exported nearly 8,000,000 pounds, being now reduced to less than 500,000. The total annual production of the entire West India Islands not exceeding 90,000,000 pounds at the present time, but strenuous efforts are being made to increase the product.

CENTRAL AMERICAN COFFEES.

Coffee forms the principal staple of the Central American States, the soil and climate being eminently adapted to the cultivation of fine coffees, but, as in all other countries, the best grades are produced on the upland or mountain slopes. In some of these countries, however, the most primitive system of cultivation and elementary methods of preparing are still in use, while in others,

notably Guatemala, the most improved modern machinery is employed. They embrace Guatemala, Nicaragua, San Salvador, Honduras and Costa Rica coffees.

Guatemala—Produces the finest, ranking in intrinsic merit with that of any variety grown—more particularly that grown in the now famous Coban district, in Vera Paz, which rivals, if it does not actually excel, all other varieties in size, style, roasting and drinking qualities. The average bean is large, bold and symmetrical in form, of a translucent blue cast, and exceedingly handsome in general appearance, making a perfect roast, yielding a rich brown liquor, sparkling and aromatic in the cup. The next best coffees in Guatemala are those grown in the “Costa Chica” and “Costa Grande,” a prolongation of the chain of mountains crossing the southern boundary of Mexico. The production of coffee has more than doubled in Guatemala in the past ten years, the price during the same period being more than quadrupled. The total product for 1892 was over 700,000 quintals, representing a total value of 16,000,000 dollars. The extraordinary high price of coffee now ruling has led to a transformation of the country, small land-owners who heretofore realized from their crops scarcely sufficient for working expenses, now find themselves with considerable capital, with which they improve and enlarge their plantations. These results have led to unbridled speculation, large companies being formed there for still increasing the area and yield of coffee, every speculator and small trader who has been enabled to save a little money, abandoning his former occupation, turning his attention to coffee growing. This condition may last as long as the present high prices of coffee continues, but a reaction may occur at any time, when complete ruin will be

the natural consequence to the suddenly increased number of producers, of which the reflex cannot be but felt in the economic conditions of the country. Land which was but a few years ago uninhabited, has been suddenly converted into smiling and well-cultivated coffee plantations, towns and villages long in decay have risen around them as if by magic and are steadily increasing in wealth. New roads to facilitate transportation to the ports are being constructed, commercial transactions are multiplied, the revenue of the country is increasing, public credits re-established on a sounder basis, and what was but a short time ago a poor, declining and almost ruined State has been suddenly, by the cultivation of coffee, converted into a rich and prosperous commonwealth.

Nicaragua—Is a medium-sized regular-formed bean, solid and heavy in the hand, greyish-yellow in color, what is technically termed “foxy,” and a smooth roaster. The drinking qualities, however, are only fair, the liquor, while heavy, being devoid of snap and fragrance, approximating more to a Rio in flavor.

Salvador—Is allied to Nicaragua in appearance and character, and classed the same, but possesses much finer roasting and drinking properties. The natural bean of the finer grades is, if anything, better developed and more uniform, while the poorer ones are very uneven, broken and “mottled” in appearance; the liquor thin in body and lacking aroma.

Honduras—Is a yellowish, heavy-bean coffee, assuming a rich straw color with age, and having an attractive appearance in the hand. As a general rule it roasts even and smooth, becoming a rich brown color when parched;

the liquor, while thin, gives out a pleasant odor, resembling that exhaled by cocoa or chocolate, said to be acquired from being grown in close proximity to cocoa plantations.

Costa Rica—Is one of the most deceptive coffees grown, the raw bean being large and bold in style, a rich pea-green in color, uniform and shapely; but is invariably what is termed "hidey," which is in reality due to the soil in which it is grown, and, while it makes an almost perfect roast, is "grassy" and bitter in the infusion, particularly when roasted for any length of time, it becomes sour and unpalatable, making its purchase at all times risky.

SOUTH AMERICAN COFFEES

Comprise Venezuelan, Colombian, Equador, Bolivian, Guiana, Peruvian, Paraguayan and Brazilian, small quantities being also produced in Chili and Argentina.

VENEZUELAN COFFEES.

The chief coffee-producing districts of Venezuela lie in a central division, having Caracas and Valencia as a base, with the ports of La Guayra and Puerto Cabello as shipping points, the district surrounding the Lake of Valencia being one of the most productive coffee countries in the world in the quantity and quality of its product. They include La Guayra, Caracas, Maracaibo, Curaçoa and Angostura coffees.

La Guayra—Also known as "Coro" and "Port," or Puerto Cabello, from the ports of shipment, varies in size from small to medium, and from a pale to a dark-green in color. It is usually graded on a parity with Rio, to which coffee it most approximates in roast and drink, it being frequently polished and sold as such,

particularly when Rios are scarce, and, although classed as a "Mild coffee," develops more or less of a Rio flavor in the cup.

Caracas—Is of two kinds—*Trilliado* Milled or "dry-hulled" and *Descerasado* (Washed) or "wet-hulled"—from the different methods employed in pulping and preparing for market. The former is a yellowish, medium-sized bean, regular and uniform in the natural state, but apt to be "quakery" in the roasted, and only fair in the drink. While "Washed Caracas," on the other hand, is bold and bluish in color, opening at the furrow when roasted like a Mountain Jamaica or Plantation Ceylon, exceedingly heavy and rich in body and fragrant in flavor, and may be classed as one of the best varieties grown.

Maracaibos—Consist of five different varieties or grades—Cucuta, Merida, Bocono, Tovar and Trujillo—district terms, ranking in the order named, "Cucuta" being, when the season is favorable, one of the best coffees grown, grading with many of the products of Java itself. The raw or natural bean of the finer grades is large, round and solid in substance, deep, rich-yellow in color, approximating to that of the best yellow-bean Java sorts in style, appearance and drink. While "Merida" is a mountain-grown coffee, large, bold and bluish in color, frequently excelling "Cucuta," particularly when the crop is good, and possessing a full ripe liquor with round full body and distinctive flavor very pleasing to the average consumer.

"Bocono," "Tovar" and "Trujillo," are inferior grades to the above, small and gnarled in the natural state, generally stony and broken, "quakery" and shriveled when roasted, light in liquor, but smooth and

pleasing in flavor withal, making good useful coffees for blending purposes. Maracaibo coffees are packed in Sisal-hemp bags averaging 130 pounds, and principally shipped to the United States, where they are held in high esteem for their many excellent qualities, the regular grades of Cucuta being marked "C" under the importers' initials, and the choicer grades "C C." Merida is indicated by the letter "M" in the same manner, Bocono by "B," Tovar by "T" and Trujillo by "To." But owing to the too common practice of substituting and repacking indulged in by unscrupulous dealers, these distinguishing marks cannot always be relied on with any certainty.

Curagoa—Is a small, yellowish, shriveled or shrunken bean coffee, evidently immature or blighted in growth from some unknown cause. It is generally "quakery" in the roast, but yields a not disagreeable liquor in the cup, making a valuable variety in combination to reduce cost.

Angostura—Is a large, flabby, yellowish bean variety, shapely in form but light and "chaffy" in substance, and invariably "quakery" when roasted, the liquor being thin, watery and almost flavorless.

Venezuela supplies about one-tenth of all the coffee consumed in the United States, the total imports being in round numbers about 60,000,000 pounds per annum, and growing steadily.

COLOMBIAN COFFEES.

The coffee-producing districts in Colombia are situated chiefly in the departments of Boyaca, Santander and Cundamarca, these three departments having an area of over 160,000 square miles, of which nearly one-half is

adapted to the cultivation of some of the finest varieties of coffee grown. The possibility of this extensive area promises a future supply of almost six times the amount consumed in the United States; in fact, coffee-growing in Colombia, like Mexico, has no limit except that caused by the lack of labor and capital to work it. They are known in trade as Ocana, Bogota, Panama, Savanilla and Bucaramanga.

Ocana.—While bold in bean and regular in form, inclining to a yellowish in color, is still light in weight and thin in body, approaching that of a Trujillo Maracaibo in flavor, with which coffee it is usually graded.

Bogota—Is a mountain-grown coffee, raised on the western slopes of the Andes. It is usually a large and well-developed bean, bluish-green and very uniform in general appearance, solid, compact, and faultless in the roast. The liquor is heavy, full, round and fragrant in flavor, comparing favorably with Caracas, Jamaica, Guatemala and Plantation Ceylon in general style and character.

Savanilla—Is a large, light and “spongy” bean coffee, brittle and chaffy in the roast, devoid of body and almost flavorless. It closely approximates to a Native Ceylon or Angostura in appearance and character, with which coffees it is commercially classed.

Panama—Is comparatively a new variety, recently produced on the isthmus, and like all new productions immature in appearance. It is of the average size, greenish in color, but moist and spongy in the natural state, and as yet but poorly prepared. The liquor is heavy and strong almost to rankness, possessing a grassy or uncooked taste, defects, it is claimed, that will be

overcome in time when its cultivation and preparation is better understood there.

Bucaramanga—Known to trade as “Bucaramanga Maracaibo,” ranks among the finest of the South American varieties, being large and bold in style, solid and weighty in substance, perfect in roast, heavy, round and full in liquor, fragrant and aromatic in flavor, the finest grades being superior to many of the Java sorts. The department of Chinqui in the interior of Colombia also offers a good field for coffee culture, the fine lands along the slopes of the mountain ranges being admirably adapted for the purpose. The annual product is about 20,000,000 pounds, going chiefly to the United States and France.

Equador Coffees—Include Cuenca, Tacunga and Machala, but are generally classed under the name of “Guayquil,” being shipped from that port and consumed principally on the Pacific coast, but are limited in production, little being left for export after the home demand has been supplied. They range from medium to large in size, are somewhat bold in style, hard and flinty in texture, pale to greenish in color, and only fairly uniform, being rather imperfectly prepared, but roast and drink well, nevertheless, yielding a light-brown liquor, full in body and fairly fragrant in flavor. Increasing attention is being given to coffee cultivation in Equador, the produce of the new districts being of good quality. The exports from Guayquil average about 1,000,000 pounds per annum, but in some years the crop is entirely spoilt by heavy rains, the yield being inferior in quality and so low in quantity as not to suffice for local needs.

Bolivian Coffees—Are comparatively new to commerce and bid fair to become popular sorts in time,

when their cultivation and methods of properly preparing are better understood in that country. They are produced principally in the provinces of Yungas and Mapin, small quantities being also grown in the other provinces. The finest kind is that cultivated in the valley of Yungas, which though small in size and pale in color possesses a peculiarly rich and delicate flavor, commanding a very high price relatively. The product, however, is limited, only about 300,000 pounds per annum, or equal to one-fourth the entire supply. The product of Mapin is much larger in size, greenish in color, but not near as rich in flavor, bringing a much less price, the annual product being three times greater. Bolivian coffees in general produce an intoxicating effect, this peculiar action being as yet unaccounted for, but is claimed by some authorities to be acquired from being grown in the immediate vicinity of the cactus plant, from which *pulque* is distilled, the coffee plant being of such a sensitive and absorbent nature that it readily acquires any foreign flavor within range. Whether this claim is correct or not has not as yet been ascertained, but certain it is that what is known as Singapore coffee usually tastes of spices, Honduras of cocoa and Costa Rica of what is called, for want of a more applicable term, "hide," but which is in reality due to the presence of oxide of iron in the soil.

Guiana Coffees.—Known to trade as "Surinam," "Demerara" and "Cayenne," from the ports of shipment, are produced in the French and Dutch colonies of South America. But although the cultivation of coffee was introduced into these countries about the same period as to Martinique, its cultivation there has made but little progress, the total production being limited in supply, and going chiefly to the mother countries.

Peruvian Coffee.—Coffee grows luxuriantly on the mountain slopes of Peru, the crops often being so heavy as to necessitate artificial support for the branches, yet the export from Mollendo, the shipping port, amounts only to about 16,000 pounds per annum. It ranges in size from medium to bold, varying in color from bluish to yellow, roasting and drinking with the average of other South American sorts.

Paraguayan Coffee.—The total production of coffee in Paraguay is exceedingly small in comparison with what might be grown there under more favorable circumstances, little or no attention being given to its cultivation, owing to lack of labor and capital, and notwithstanding that it offers a fine field for its more extensive growth.

BRAZILIAN COFFEES.

Brazil being the most extensive coffee-growing country in South America and the largest producer of coffee in point of quantity of any country in the world needs more than a passing notice in this work. The gigantic extent to which its production has been carried there, the enormous, almost fabulous, amount of capital invested in its cultivation, the multitude of people employed in its preparation and handling, including the quantity of shipping employed in its transportation invests it with great importance. One must have been an eye-witness of the immense bustle occasioned by the coffee trade of Rio and Santos, must have observed the feverish excitement and the unprecedented rapidity with which it is prepared, transported, bagged, unbagged, mixed, rebagged, loaded, marketed and shipped before he can form any conception of the extent of the coffee industry in Brazil.

In 1718 the Dutch colony of Surinam began to introduce and cultivate coffee in Guiana from plants received from

Java, and in 1722 De la Motte, the French Governor of the adjoining colony of Cayenne, having business in Surinam, contrived by an artifice to bring away with him from there a small coffee plant, which in 1725 had produced many thousands which were distributed among all the French colonies on the mainland, its propagation extending to Para in 1732, the first coffee plantation formed in Brazil being commenced in that province a few years later. Its cultivation, however, made but little progress there until about 1767, when its cultivation was still further extended to the province of Maranhao, where it soon increased rapidly under a more careful and systematic management. In 1774 a Belgian monk named Molke procured some coffee plants from a prosperous plantation in Maranhao, which had previously been obtained from Surinam, and planted them in the garden of the Capucin monastery of Adjuda, then situated in what is now the centre of the city of Rio de Janeiro. The plants prospered so well, and he becoming convinced of their importance as a valuable acquisition to the industries of the country that he established a plantation in the vicinity for its more systematic cultivation. Joachim Bruneo, the then Bishop of Rio de Janeiro, perceiving the valuable benefits that would result from its more extensive cultivation, distributed seeds and plants raised on Molke's plantation among the religious institutions and planters of the country, recommending and encouraging its cultivation among them, but it was not until 1800 that Brazilian coffee came to be so highly valued in the markets of the world. In that year a planter named Dr. Lecesne, expelled by the revolution from San Domingo, settled near Rio and introduced the latest improved methods of cultivating the coffee plant into that country. From these simple and unostentatious beginnings has grown the now

enormous coffee industry of Brazil, which at present produces more coffee than all the other countries in the world combined; it being calculated that upwards of 1,500,000 acres of land are under coffee culture there, containing nearly 600,000,000 trees, hundreds of millions of dollars of capital being invested in its culture, sale and transport. The cultivation of coffee in Brazil now extends from the banks of the Amazon to the southern province of Sao Paulo, and from the coast to the western limits of the country, the plant seeming to find the requisite conditions of soil and climate in almost every part of this vast region, and nearly everywhere giving an abundant yield. Its chief zone of production for commercial purposes, however, is chiefly confined to the coast provinces of Bahia, Ceara, Rio Janeiro, Sao Paulo, Minas Geraes and Espiritu Santo.

In Brazil it was formerly the custom to propagate the coffee plant by slips or "shoots" cut from the older plants on the plantations, but at present it is more generally grown from the seed, as in the Eastern countries. The seeds are sown in nurseries planted with advanced stalks of the mandioca, which serve to shade the sprouts while young and tender from the extremes of heat and cold alike, but are gradually thinned out as the growth of the young plants advance, the nursery at this period resembling a young plum thicket. When the plants have reached a height of from eighteen to twenty-four inches, they are transferred to the plantations and planted from six to ten feet apart, according to the district and conditions. As a general rule a crop is not expected until four years after setting out the young plants, unless when the plants are from eighteen months to two years old before transplanting, in which case a partial crop is obtained at the end of the third year. Nearly all over the Brazilian coffee zone the

plantations extend with the greatest regularity, as far as the eye can reach, presenting a most attractive and pleasing effect, some *fazendas* (plantations) having as many as 350,000 trees, others again having as low as 30,000, but all averaging from 500 to 800 trees to the half *fane-gadu* (acre), the average annual produce of each tree ranging from one to seven pounds of prepared coffee, or about one to one and a half pounds per picking of cleaned coffee. The plantations situated on high lands and exposed to the east being the most productive, but prospering equally well in the lowland districts, although the product is much inferior in quality and flavor. The trees are grown in lines and squares, the face of the country in the coffee-growing districts being undulating and hilly, a plantation of coffee being at every season of the year an object of beauty and interest. The leaves are perennially bright and polished, resembling those of the laurel when in full bloom, but of a much darker green in color, the flowers or blossoms of the purest white, growing in tufts along the top of the branches, and blooming so suddenly that in the morning the trees look as if snow had fallen on them in flaky wreaths during the night, their jasmine-like perfume being powerful enough to be oppressive, but lasting only for a single day, being succeeded immediately by branches of immature green and the dark-crimson hull of the ripe berries—resembling cherries in their brilliancy and size—and following each other in quick succession, which added to the thick foliage of the trees presents altogether a magnificent spectacle.

In Brazil the coffee trees continue to bear from fifteen to twenty years, but it is found necessary to the healthy development of the plants to keep the ground in good condition, and when the interspaces are not cultivated

with other plants—principally corn and beans—as is usually the custom, it is annually cleared around the roots, a compost of dead leaves and coffee-hulls being placed about them. In some districts—notably Sao Paulo—many of the trees have been producing continuously for twenty-five years, still presenting a vigorous appearance and yielding an average each year, while others that had attained an age of thirty-five years were cut off within eighteen inches of the ground, and two years later put forth new branches, presenting all the appearance of thriving trees, bearing fruit like much younger trees. This is a new and interesting feature in the management of the old trunks of coffee trees, one having the advantage of new growth being secured in one-half the time it could be obtained from seedlings, as even should these stumps require to be dug around and manured frequently, it is much more preferable and profitable to the trouble, expense and uncertainty connected with the raising of new plants from seed, and certainly presents greater advantages over the latter method. In Brazil the picking is latterly—since the abolishment of slavery—done by contract with the *fazendon*, or proprietor, who only requires the services of the pickers to gather the berries from the trees, for which labor they are paid what is considered to be one-half the value of the crude coffee that is gathered by them. The estimate placed upon an *alquerie* (bushel) of crude berries being about seventy-five cents, which, unless the crop is good, ordinary hands do not gather more than two bushels per diem; yet, again, when the crops are large, an industrious and skillful picker can average from five to eight bushels without effort. The berries are picked by hand, the ground being raked clean under the trees previous to picking, an immense, broad, flat receptacle of

bamboo being placed underneath the trees, the berries that fail to fall into this being carefully swept up from the clean, smooth ground and emptied into it until filled, when it is carried to a point convenient to the roadside and emptied in piles, from which the coffee is afterwards hauled in ox-carts to a large building known as the *terreiro* or drying-yard. Picking commences in April, and is continued almost uninterruptedly until November, and after the coffee is gathered it is carted just as it comes from the plantations, mixed with leaves, stalks and stones to the drying-house and spread out on the terraces, large smooth, concrete pavements, to dry in the sun until the berries become black and crisp, after which they are "hulled" or cleaned by one of two methods: one the old or "Monjola process," and the other the new or "Despolpodor" process.

Brazilian coffees are known to commerce as Bahia, Ceara, Capatinea, Rios, Santos and Maragogipi.

Bahia—Is a small, uneven greenish bean, very inferior in style and appearance, usually "stemmy" and stony and thickly interspersed with black or immature beans, and is usually branded "S" or "S S." The roast is poor, irregular and quakery, the liquor thin and grassy or unripe in flavor.

Ceara—Resembles Bahia somewhat in general character, being poorly prepared and very unsightly in the natural state, the body and flavor being still more inferior.

Capatinea—Grown in the province of Espiritu Santo, but also known to trade as "Victoria" from the port of shipment, is a large whitish, soft and flabby bean coffee, quakery in the roast and watery and flavorless in the cup.

Rio Coffees—Are almost too well known to need description; the bean, however, varies widely in size and color, ranging from small to large, and from dark green to light yellow, being known to trade as “Light,” “Dark” and “Golden.” They are heavy in body, possessing a flavor and aroma peculiarly distinct from that of all other coffees, and which is so marked in degree as to be readily detected by the most inexpert, excepting “Golden Rio” which, aside from its rich color, possesses a markedly pungent liquor and pleasing flavor.

Pole-cat Rio—Is a very dark, almost black bean coffee, which, although muddy and dark in liquor, is nevertheless much appreciated by many coffee drinkers.

Liberian Rio—Grown from Liberian plants in Brazil, is little thought of, producing little, and that irregularly. The fruit also requires special machinery to prepare it, the husk being too thick and leathery to pass through the regular machines.

Rio Hache—Though frequently classed with Rio coffees, as a matter of fact is not grown in that country, but in Colombia. The bean is yellowish-brown in color, light in weight and liquor, and somewhat mawkish in flavor. Like all other coffees, Rios improve with age, and with time loses their harsh flavor, which becomes greatly modified by storing, disappearing altogether in from three to four years, particularly when kept in an even temperature.

Santos Coffees—Produced in the adjoining province of Sao Paulo, but deriving its trade-name from the port of shipment, ranges from small to large in size and from green and yellow to a full white in color according to its maturity, it is an immensely popular sort among American consumers as well as in Europe, having more than

doubled in consumption in recent years. It is fast supplanting the milder growths of other countries, the finer grades being frequently substituted for Maracaibo, and even Java, by unprincipled dealers. While many of them roast "quakery," they are nevertheless almost invariably smooth and pleasing in liquor and flavor.

Red-bean Santos—Grown in the Campinas district, is medium in size and reddish in color—a peculiarity derived from the soil, which is composed of *terra rocha* (red earth)—and is claimed to be richer and more flavory than either the white or yellow bean varieties.

Mocha-seed Santos—Is a small-bean variety, grown from Bourbon seed or transplants, and is fast becoming a very popular sort. It is shipped principally to France, where it masquerades under the name of Mocha, thereby diminishing the demand for this favorite sort in proportion to the amount distributed.

Maragogipi—Which was discovered in the province of Bahia some years since, is claimed to be an indigenous variety and is called after the district where it was first found. The bean is as large as Liberian, but flat in form and varies in color from a very light to a dark-green, but while heavy and full in body and fair in quality, it is yet lacking in all the essentials of a fine coffee, disappointing the great expectations at one time formed of it.

OTHER BRAZILIAN VARIETIES.

Cafe des Aguas—Is so termed from blossoming in the rainy season, and which has the effect of stunting and deforming the beans. The bean is oblong in shape and imperfectly formed, while the liquor is thin and watery and devoid of flavor.

Cafe Vermelho—Is the regular “Red-berry” species, and is so named to distinguish it from a new variety said to have been recently discovered and termed

Cafe Amarello—Or “Yellow-berry,” recently found in the district of Botucatu, and is so called because the ripe berry is yellow instead of red. It is superior to the ordinary sort, not on account of any difference in the size of the bean, but according to the chemical analysis of experts, who claim that it is much richer in caffeine.

Brazilian Java.—Extensive plantations of Java coffee plants have lately been formed in Brazil as an experiment, but does not produce such heavy and regular crops as in the original soil.

Goyaz Coffee—Is a wild species, discovered a few years ago in the province of Goyaz, but is little thought of by planters or dealers, being wild and grassy in flavor.

In Brazil the planters generally forward their crops to a *Commissario* or factor at the shipping port, who acts as their agent, the coffee being received in varying lots and conditions from different growers, no uniformity being observed in the kind of bag or quantity. The commissarios again disposes of it to the *Ensaccadores*, who are the actual buyers at first hands, and who store it in large warehouses, where it is graded and bagged, and stored until required for shipment to the foreign markets. The sacks of coffee being piled on either side, each being numbered and further distinguished by some special mark or brand. At the present time many commissarios have the coffee weighed as they sell it, but sales between the commissarios and ensaccadores are never concluded in Rio without the assistance of a *Corretor* or broker, while in Santos, where the exporter buys his coffee direct from the commissario, it is sold mostly

without the intervention of a broker, the terms of payment being fixed at thirty days.

Brazilian coffees are generically classed in the Rio and Santos markets as "Highland" and "Lowland" and are graded as Superior or "Choice," Primera or "First," Primera boa or "Good first," Primera regular or "Regular first," Primera ordinaria or "Ordinary first," Segunda or "Second," Segunda boa or "Good second," and Segunda ordinaria or "Ordinary second." Importations are generally in "Cargoes" divided into "Invoices" or "Lines," designated by letters. An invoice consisting of a number of "Chops" denoted by figures, each chop varying from the other in quality, size and color. In the American market the coffee is subdivided into six grades, known to trade as "Fancy," "Choice," "Prime," "Good," "Fair," "Ordinary" and "Common," the first four grades being further distinguished by the terms "Light," "Medium" and "Dark," and by prefixing the term "Strict" or "Strictly" correct selections of each grade may be secured.

There is no standard grade, nor is it possible to establish one, owing to the changes made by time in the appearance of the coffee, which causes the different grades to vary with the size, color and quality of the coffee and the condition of the market on arrival. On an active and rising market the coffee that on a steady market would be denominated only "Fair," suddenly becomes "Prime" or "Good," and on a dull or declining market may be classed as "Ordinary." The following constitutes the different grades as they are generally accepted on this market:—

Fancy Rio or Santos—Is large, bold and uniform in size and color, free from all imperfections, and attractive in style and appearance.

Prime—Is very clean and regular in size and color, but deficient in the rich, pleasing appearance of the former.

Good—Is acknowledged as the average or “Standard” grade, and ranges from clean to strictly clean, and is uniform in bean and color.

Fair—Is only moderately clean, containing some black or broken beans and other slight imperfections.

Ordinary—Is irregular in size and color, and unsightly in appearance, containing much black beans and other extraneous matter.

Common—Is the poorest grade, and is generally full of black and broken beans, stems, hulls and chaff, having no definite color, and very unsightly in general appearance. On the Coffee Exchanges they are graded numerically from No. 1 to No. 10, No. 7, or “Low ordinary,” being adopted as the “Standard grade,” upon which all transactions are based. In point of quantity Brazil heads the list of coffee-producing countries, its annual product ranging from 7,000,000 to 8,000,000 bags of 130 pounds each, 75 per cent. of which is exported to the United States, the remainder going chiefly to Europe.

OTHER VARIETIES.

Pea-berry Coffees,—Also known to trade as “Male-berry” and “Pearl-bean,” are concave-convex in form and may belong to any variety, from Rio to Java. Their peculiar shape being accounted for as follows: Each *perfect coffee berry should* contain two oval seeds or *beans* placed facing each other in the fruit or pod, but it most frequently occurs that only one *seed* will form in it, the other becoming abortive. The *one* forming receiving all

the nourishment of the investing coats, forces itself against the dividing membranes and encountering no opposition naturally develops into a larger bean, which in the process of growth assumes a shape different from that of the regular or "flat bean" of commerce.

Cherry-dried Coffee—Is a term applied in the East to coffees cured by the old or sun-dried process. After the berries have been harvested they are spread out on "patios" or terraces exposed to the sun's rays for a period covering from six to eight weeks, or until they are thoroughly dried, before being pulped and hulled. Meanwhile they are raked and turned over once a day during the drying period, in order to prevent heating and fermentation, and at night heaped up and covered over with matting or other material to protect them in case of rain, and from the heavy dews, until the process is completed, after which they are pulped and hulled by crushing in a mill.

Washed Coffees—Are so termed from being prepared by the new or West India process, by which the coffee is pulped immediately after being picked, the berries being placed in a large vat and the pulp soaked off. The coffee in the parchment left in the vat is kept in constant motion by agitation with a kind of rake or shovel to wash it well, the water being constantly changed also while the washing continues, to remove the *débris* with which the coffee charges the water, the coffee sinking, while the pulp, blighted berries and other extraneous matter such as stems and leaves are floated off by the water, after which the beans are again washed and spread out on mats to dry. By this method the coffee must be crushed the same day, otherwise it will ferment and the flavor be greatly injured.

Triage—Is composed chiefly of dead or decayed beans, which are invariably sour, bitter and black, being entirely destitute of the active principle of coffee, containing no aroma and invariably injuring and detracting from any coffee in which they may be mixed—as they usually are—no matter how small the quantity used.

Screenings—Are composed of the dust, chaff and mutilated beans separated from the regular grades of coffee in the process of milling, and drink well according to the variety or grade from which they are obtained, but are generally roasted, ground and mixed with chicory, and sold in package form.

Skimmings—Are usually composed of that portion of the cargo stowed in the bottom or sides of the vessels in which it is imported, or of the storehouse sweepings after the regular coffee has been delivered. A greater or less portion of all cargoes are found damaged by dampness or bilge-water during the voyage, thus staining and discoloring the coffee, rendering it mouldy or musty. The strained and damaged bags are emptied and the tainted coffee “skimmed” off, milled, rebagged and sold under the head of “Skimmings.” They are generally branded “G. S.” (Good skimmings), “G. L. S.” (Good light skimmings), “G. D. S.” (Good dark skimmings), “F. S.” (Fair skimmings), and “S. S.” (Store or ship sweepings) Notwithstanding their origin many of those coffees roast and drink exceedingly well, but great care must be exercised by the dealer in selecting them, as they may taste of the bilge-water or be mixed with coal, iron, chips and other extraneous substances.

United States Coffee—The Department of Agriculture at Washington has recently issued a circular relative to the possibility of coffee culture in some of the

Southern States, in which it is led to believe that the soil and climatic conditions of Texas, Florida and Lower California will be found suitable to the profitable cultivation of coffee. It is also claimed that a species of wild coffee has been discovered in the two latter States, and that in California seed has been planted obtained from Costa Rica with satisfactory results. A coffee planter from Guatemala has recently been investigating the soil and climate of San Bernardino in Lower California with a view to the introduction of coffee culture in that section. The conditions there, it is stated, are very favorable for its profitable production, and he has offered to invest capital in a company to be organized to start the industry.

CHAPTER VI.

ROASTING AND GLAZING.

COFFEE undergoes essential chemical changes in the process of roasting. In the raw or natural state the coffee-bean is tough and horny in structure and entirely devoid of the appearance, character and peculiar aroma that so distinguishes it in the roasted condition, and by which it is best known to the public. The testa or investing membrane of the raw bean has a layer of long cells with a peculiar pitted structure, containing a crystalline substance chemically termed *Caffeine*, and another known as *Caffeic*, or tannic acid, while the inner substance consists of an assemblage of vesicles of an angular form, the cavities of which include in the form of little drops a considerable quantity of a highly aromatic oil technically termed *Caffeone*, on the presence and amount of which the fragrance and active principles of the coffee depends, and by which its commercial value in the roasted state is estimated. The existence of this "coffee oil" makes itself known in a striking manner by roasting; being driven out of the beans by the intense heat, it is partially volatilized and, together with other products of the roasting, produces the characteristic aroma peculiar to roasted coffee, an odor possessed by no other known substance. In the operation of roasting the beans swell up and open at the furrow by the liberation of the gases within

their substance, their weight decreasing, but volume increasing in proportion to the extent to which the operation is carried, developing the aromatic oil and liberating at the same time a portion of the caffeine from its combination with the caffeic or tannic acid. The amount of this aromatic oil contained in coffee varies from 8 to 13 per cent. at least, one-half of which is lost by evaporation during the roasting process, so that it may prove a paying experiment to attempt to collect it, especially in large establishments where large quantities of coffee are roasted and several pounds of this valuable oil are dissipated daily, which would no doubt find a ready market at a good profit for the making of liqueurs, or medicinal use.

Before being roasted coffee also contains from 6 to 8 per cent. of sugar, which after roasting is reduced to as low as 1 per cent. and sometimes even to zero, from which it would appear that the description of sugar (cane) present in the raw coffee suffers destruction during roasting, which, however, is not the case, as in the process of roasting the saccharine matter in the raw bean is converted into caramel. A change in the fat of the raw coffee is also brought about by the roasting, for where ether extracts only some four to five parts of fat from the raw coffee beans, it readily extracts double that quantity from the roasted beans. So striking is this fact that Von Bibra has even credited the roasting process with the production of fat, whereas the action is only mechanical in bursting the fat-cells of the raw bean, thereby rendering the fat accessible to the solvent action of the ether.

The operation of roasting also tends to make coffee soluble in boiling water, as when raw coffee is perfectly exhausted by means of boiling water, it yields up only 25 per cent. which passes into solution, while roasted coffee,

on the other hand, when completely exhausted by means of boiling water yields readily upwards of 40 per cent. of soluble matter, proving that in actually using coffee as a beverage, we are not in the habit of making anything like a complete extraction, as only some 10 to 12 per cent. of the active principles of the coffee passes into the liquid.

The modern appliances for the roasting of coffee are numerous and labor-saving to a great extent, many of them are, however, calculated only to enhance the appearance of the bean, while others enable the roaster to obtain almost to perfection the full development of the aromatic properties of the coffee. Coffee is roasted for commercial purposes and domestic use in a large sheet-steel or malleable-iron cylinder mounted on a hollow axle, so as to revolve over a brisk fire and allow the gases generated during the torrefaction to escape. The surface of the cylinder is perforated with a number of small holes for the purpose of allowing the vapor arising from the coffee in the process of roasting to pass off readily, and through the interior runs laterally four ridges, the object of which is to toss it about in all directions, causing it to pass from end to end, and diffuse a uniform heat to every part of the coffee in order to make the "roast" even and regular in appearance. This cylinder is again encased in a frame brick-work at the bottom of which is built a coal fire well distributed so as to heat all portions of the cylinder at the same time during the operation. On the outer head it has a small opening through which the operator occasionally inserts a "tryer" to enable him to note the progress made as the process advances, the cylinder being also so arranged that it can be drawn from over the fire when it is required to either fill or empty it through a slide or hopper in the centre. It is

operated by steam-power, revolving slowly but regularly, and having a capacity of from 25 to 300 pounds.

After roasting, the coffee is run off into a large wire-bottomed box termed a "cooler," to the end of which is fitted a powerful fan or "blower" used for forcing cold air through the hot beans and preventing the volatile oil from exuding, the coffee being thoroughly agitated during the process, the hulls, chaff and stems being removed meantime to a large extent by the fan and sieve. Thirty-five to forty-five minutes is usually the time consumed in the operation, the former for a "Light" and the latter for a high or "Dark" roast, the entire process of roasting, cooling and rebagging occupying about one hour. In roasting, coffee loses in weight from 12 to 16 per cent., according to the age and nature of the coffee under treatment and the extent to which the operation is carried, the average, however, being 14 per cent. for old and well-seasoned coffee, which accounts for the relatively higher price—three to six cents per pound—of roasted coffees, according to the price green and the loss per cent. in roasting. But, it at the same time increases in bulk—100 volumes of raw coffee yielding from 150 to 160 volumes of roasted—that is, two pints of raw beans will yield three pints roasted. It also loses from 1 to 2 per cent. more in the warm months of summer than in the damp months of winter, for which reason it should not be roasted as high in the former season as in the latter, owing to its greater tendency to sweat and absorb the higher temperature, thus causing the volatile oil to exude, and dissipate and impart an astringent taste to the infusion. When coffee is roasted light-brown, or until it assumes a pale-chestnut color, the loss is from 13 to 14 per cent. the quantity of extract obtained from such roast by means of boiling water ranging from 20 to 21 per cent. of the

weight, while the loss in weight of the extract will be much larger if the roasting process is continued until the color becomes dark-brown or black by over-roasting. New, moist and light coffees lose a larger percentage than old, dry and solid ones, the average being about 14 per cent. The operation of roasting coffee is one of the greatest exactness, amounting almost to an art, perfect roasting requiring not alone skill and judgment but experience and constant practice, as not only the style, strength and flavor but also the commercial value of the coffee depends upon the operator deciding when it is properly parched or roasted. It is also one of a crucial nature, for equally by insufficient as well as by excessive roasting, much of the aroma of the infusion is lost, the beverage under either of these circumstances being neither agreeable to the palate or exhilarating in its influence. The operator, for these reasons, must judge of the exact amount of heat required for the adequate roasting of the different varieties, which, while variable, the range of roasting temperature proper for roasting the various grades is only very narrow. In a modern, well-equipped coffee-roasting establishment, the coffee is handled almost exclusively by machinery, being fed into the cylinder from hoppers, emptied into the cooler from the cylinder and from thence into the bins by drafts of air through tubes or pocket-elevators, so that the coffee is scarcely once handled during the entire process.

The entire art of coffee roasting may be summed up in the following sequence: (1) Starting the machinery in motion. (2) Starting a brisk fire with enough coal for a single roast. (3) Putting in the coffee before the cylinder becomes too hot. (4) Opening the draft and keeping up a brisk fire during what is termed the steaming period. (5) When the beans begin to crackle and the steam

changes into an aromatic vapor, rake the fire well, put on sufficient coal to make the next roast and shut off the draft. (6) Empty the coffee from the cylinder into the cooler and cool off rapidly, then sift and pack. If a light color is required roast quickly, if a dark, slowly. The exact time for a perfect roast under these rules depend to a great extent on the size of the cylinder, the quantity of coffee to be roasted, the amount of heat and the color desired, the average ranging from 30 to 40 minutes. The addition of a little water to the coffee when it begins to crackle in the cylinder, will cause the beans to swell up, liberate the chaff and make the process safer by extinguishing any sparks that may by accident occur in the cylinder. It also preserves the aroma longer to some extent when used in moderation, but will not, as is sometimes claimed, protect it from atmospheric influences, but on the contrary makes it more liable to such influences, particularly when used in excess.

When the beans begin to crackle the revolutions of the cylinder are increased for a short time in order to prevent them from scorching or burning, a bluish vapor is emitted at the same time, which indicates that the coffee is nearly if not quite roasted. At this stage the operator pours on the coffee a quantity of water to prevent it from burning, the rapid evaporation from which reduces the intense heat and causes the beans to burst open and swell up to about double in size. The use of a little lard at this juncture will impart to the beans a smoother, glossier and more attractive appearance. The addition of water in the roasting of coffee is not, as is generally supposed, intended to increase its weight—unless when used to excess—as the intense heat converts it into steam which rapidly passes off in the air, many old roasters contending that coffee cannot be properly

roasted without the use of some water. In the proper roasting of coffee a strong, well-distributed heat extending the entire length of the cylinder is imperative. The cylinder should never be allowed to lie empty over the fire for any length of time or become too hot before the coffee is put in, as the beans will become mottled or "specked" if poured in while in that condition, thus detracting from the appearance and value of the roasted coffee.

An experienced roaster can readily discern when the coffee is properly roasted, by the light bluish vapor arising from the coffee, as well as by the smell of the aromatic principle developed as it evaporates from the cylinder at this stage of the operation, without even once examining it during the process. A perfect "light roast" should be free from specks and other blemishes, of a cinnamon-brown color, even, uniform and oily in appearance, much depending on the amount of this latter property developed in the process, imparting as it does a pleasanter and more agreeable aroma as the quantity is increased, making the liquor blander and more mellow in the cup. While a perfect high or "dark roast" when required should be of a deep chestnut or chocolate-brown color, oily and free from all burnt or scorched beans, as the latter, no matter how few the number, invariably spoil the flavor of the coffee in the infusion, irrespective of its fineness or value. Over-roasting dissipates the active principle (Caffeine) to which the coffee owes its refreshing and stimulating properties while under-roasting imparts to the infusion a raw, uncooked, grassy or astringent flavor by not properly developing it. So that the finest grades of coffee when imperfectly roasted—that is, be under or overdone—yield an inferior liquor to the poorer grades when properly roasted. As stated before,

coffee contains a crystalline substance termed caffeine (identical with the theine of tea), which is volatile in its nature, and every care must be taken to retain this principle in the coffee, for which reason the beans should be roasted only until they are of a pale-brown color; again, if they are roasted too dark this essential property is destroyed.

The proper cooling of coffee after roasting is also an operation of great importance. If the coffee has been properly roasted and the beans well developed, it must be cooled quickly to prevent them from becoming too dark-colored or mottled in appearance. When the coffee has been cooled and cleaned it is then packed, the operations of roasting, cooling and rebagging occupying altogether about one hour.

In France and other European countries it is the custom to roast coffee in small quantities, so that the whole "charge" is well under the control of the operator during the process, while in this country large roasts are the rule, in dealing with which much difficulty is experienced in producing uniform torrefaction as well as in stopping the process at the proper moment. A novel method for roasting coffee in use in France is to put it in an iron globe, suspended over a brisk fire, and containing a tubular shaft perforated with holes smaller than the beans, through which passes the vapor generated from the coffee in the process of roasting and issuing out of either end of the shaft or axis of the globe. As these openings are small, but a limited amount of the vapor escapes, thus confining the aroma within the globe and securing the retention of the volatile or essential element of the coffee to a greater degree than is possible by the cylindrical method of roasting. When the globe is filled and suspended over the fire an iron cap is placed

over it so as to completely surround it, but leaving an intervening space between it of about three inches, the object of which is to secure the full power of the heat, which being so confined circulates completely around the globe, the retention of the vapor under this high pressure preserving to a still greater degree the aroma of the coffee. The application of the heat by this method is very uniform, while the motion of the globe distributes the beans equally about the interior and thus removes any possible chance of scorching.

The roasting process also usually develops in many coffees more or less whitish beans, technically termed "quakers" but more properly "blights," being in reality blighted or immature beans, which, having ripened to an extent on the tree and after obtaining a certain growth cease to draw further nutriment from it, thus failing to develop into healthy fruit. These peculiar beans detract considerably from the value of the coffee, and cannot always be detected in the natural state except by experts and others accustomed to the constant handling of raw coffee, but in the roasted condition their real character is unmistakably shown, presenting as they do a yellowish-white color, totally devoid of the moisture, oil and flavor so characteristic of the healthy bean. They exist to a much greater extent in some varieties more than others, most notably in lowland and coast-grown coffees—in mild grades more than strong—the only kinds most unaffected being mountain-grown and "washed" coffees, the blighted beans in the latter rising to the surface in the process of washing and carried off by the water. Some authorities contend that these "blights" or "quakers" in coffee instead of being, as might be naturally expected, detrimental or injurious to its drinking qualities really improve it by softening or mellowing what may otherwise

prove to be a harsh or astringent flavor, thereby rendering it smoother and more palatable. Such a claim is simply preposterous, as the said beans are entirely devoid of any of the properties distinguishing coffee, possessing neither caffeine or caffeone, the two principal constituents of coffee, and an infusion prepared exclusively of "quakers" will be found to resemble more closely, in flavor and aroma, a decoction made from roasted peanuts than anything else it may be likened to.

Raw coffees are distinguished in commerce by the names of the countries, districts, localities, plantations in which they are grown or from the ports of export, and it is found that the produce of each particular country and respective district maintains a fairly constant and distinctive flavor and character of its own. While in the roasted state this distinctive character disappears, the process of roasting largely destroying these distinguishing features of raw or green coffee, making it very difficult for any but experts to determine from its appearance when once roasted its kind or origin. After coffee has been once roasted it should be kept in air-tight bins and sold or used as fresh-roasted as possible, as after the process the aroma constantly escapes, thereby losing its strength and fragrance rapidly on exposure to the oxidizing influences of the atmosphere. Neither should it be exposed in damp or humid weather, as it constantly absorbs moisture which makes it tough and difficult to grind, or placed in the vicinity of any foul or foreign odors, the porous and sensitive nature of the roasted bean making it liable to absorb such flavors, for which reason wooden and freshly-painted bins should never be used to hold roasted coffee, as it readily absorbs the wood and paint flavors, which become very pronounced in the infusion.

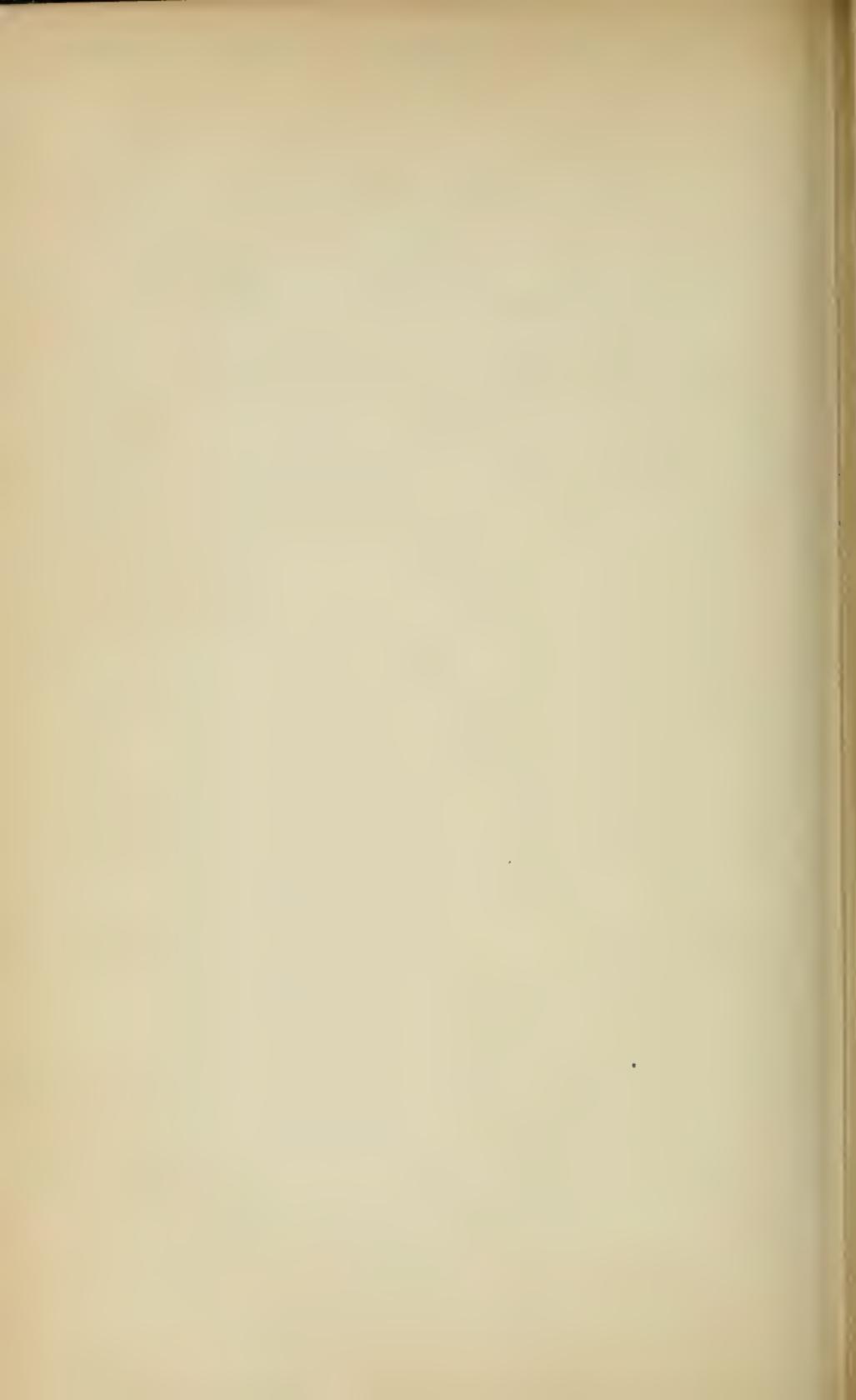
GLAZING.

It has been the custom for some years back to coat or glaze coffee with certain gluey or starchy compounds, ostensibly to protect the beans from the oxydizing influences of the atmosphere, preserve the aroma and clarify the liquor in preparation, each roaster and dealer having a different compound for the purpose. It is most generally composed of various glues, moss and other starchy substances and is usually prepared by placing the materials composing the compound in a cask, vat or tank filled with boiling water conveyed through pipes or by injecting steam, thoroughly stirring it at the same time until it is mixed to the requisite consistency. After the solution is prepared it is applied to the coffee while hot, generally in the cylinder while revolving, which diffuses the material and imparts an even and uniform coating to the coffee, adhering and hardening as it cools. But the claims made by roasters and others who coat or glaze coffee, that large quantities of eggs are used exclusively in the preparation of the glazing compound is simply absurd, as is also the claim that it is resorted to for the purpose of closing the pores, to protect and retain the aroma and for self-settling purposes. The real object being to conceal defects, disguise low grades and damaged coffees, as well as to add weight and color to light, chaffy and "quakery" coffees, the process adding all the way from 5 to 10 per cent. to the weight, according to the nature of the coffee and the character of the substance used; light, chaffy-bean coffees absorbing more of the material than the hard and solid ones, while the softer and rougher the bean the more it improves in appearance by the process.

What is known as the "Egg-glaze" is prepared from eggs alone, mashed and applied after the coffee has been first cooled, and then baked on by means of a hot blast, when it forms a hard, transparent shell, protecting the coffee until it is ground and ready for use; and also serving to clarify the liquor in the pot after infusion. Another composed of one part gum arabic dissolved in water, to which is added four parts starch, with sufficient water to make it limped, the whole being boiled for upwards of twenty minutes, and which is best accomplished by inserting a small pipe of live steam from the boiler into the compound until it is reduced to the consistency of cream; then, after stirring well, it is poured on the coffee while in the cylinder as it revolves, or it may be spread over it while in the cooler, if proper care be taken to diffuse it well. Still another excellent compound for glazing coffee is prepared from one part Irish moss, one part gelatine, one part isinglass, one ounce sugar and two dozen eggs, the first three ingredients being first boiled in water, then strained and applied as in foregoing formula. For the purpose of imparting a lustrous aspect to roasted coffee, a liquid has recently been invented, the composition of which is so far unknown. It has a specific gravity of 0.868 at 15 degrees, burning with a sooty flame and leaving no fixed residue. It absorbs no iodine when treated, and is but little affected by chromic acid or concentrated sulphuric acid, taking only a slight color when treated with the latter. It is clear and oily in appearance, but entirely free from color, taste, or smell, and mixes in all proportions with petroleum, from which fact it would appear to be nothing more than a highly purified petroleum oil, in which case it must be classed among the illegitimate additions to roasted coffee.

GRINDING.

The process of grinding the roasted bean is also one that requires more attention than is generally bestowed on it. Coarse-ground coffees require protracted boiling in order to extract its full strength, and too much boiling is fatal to the production of good coffee in the cup. But, on the other hand, it may be ground too fine, so that just to what degree of fineness it should be ground depends in a great measure on the method of preparing it for use.



CHAPTER VII.

ADULTERATION AND DETECTION.

IN commerce coffee is to be met with in three conditions—Raw or unroasted, Roasted and Ground—and, as may be inferred, it is in the latter condition that it is most liable to the chief adulterations, so that with the raw and simply roasted coffee the public analyst will have very little to do, his services being principally required in dealing with ground coffee alone. But at the same time it is also subject to much manipulation and sophistication in the two first conditions also, scarcely any dietic article being so persistently adulterated. From the time of picking and preparing coffee for market until it finally reaches the table of the consumer, there is probably no article of diet subjected to more or as many forms of manipulation, sophistication, substitution and adulteration as coffee. The producer mixes one variety with another, the refuse of the old and inferior with the new and choice, while the commission agent at the shipping ports manipulates it again by changing the grade or altering the quality by running one grade with another in order to complete his consignment. Again, on its arrival in the consuming countries it is frequently emptied out of the original packages, separated or run together as required, the bags turned inside out, and the marks altered in order to conceal any stained or damaged

in transit. All "bilge-water" or otherwise damaged coffee being picked over, the musty beans set aside, milled or cleaned, rematted or rebagged as the case may be, and eventually sold as sound, but which no process of roasting or glazing can eradicate. But while almost all varieties pass through more or less manipulation or substitution, from the producing to the consuming countries, it does not always follow that it is detrimental to the coffee.

RAW OR GREEN COFFEES.

Rios—Are most subject to sophistication by altering the color from light to green and dark to meet the demand for each particular kind, the light Rios being converted into dark by the application of a preparation of "bone black," and into yellow or golden by the use of chromate of lead, or into green by a combination composed of both compounds. This dangerous and iniquitous practice is resorted to in order to cater to the prejudices of dealers and consumers in the different sections of the country for "Light," "Dark," "Green" and "Golden Rios," as the case may be. The cosmetic is best detected by the simple process of washing in a little warm water and rubbing with a dry towel, exposing the natural color of the bean, whatever the original may be, or by cutting the bean in half and seeing if the color runs through.

Maracaibos—In the raw or natural state are principally substituted with large, white-bean Santos, Savanilla, San Domingo, Mexican, Salvador or other Central American coffees as well as by transferring the lower into high-grade bags. While La Guayras are usually polished or "soapstoned," and converted into Rios when the finer grades of the latter are scarce or high.

Javas—Are generally either substituted, mixed, sweated or colored artificially. In the first case any large, whitish, yellowish or brownish variety, such as Maracaibo, Savanilla and Santos is used for the purpose or mixed with it in the natural state, and can only be detected by a familiar knowledge of the genuine bean. The lower and paler grades of Java, such as Lahats and Maccassars are usually “colored” or “sweated” for the purpose of imparting an aged appearance or the so much desired brown color, other spongy-bean coffees that easily absorb, and retain the coloring matter being frequently subjected to the same processes. While the higher grades are more often substituted one for the other by changing the mats, such as replacing a Preanger with a Timour, an Ankola with Padang or Singapore. When simply colored as before described the washing it with a little water and rubbing with a dry towel will expose the cosmetic, or better still by cutting the suspected bean open with a sharp pocket-knife, examining it through; if not of the same color to the core it is undoubtedly doctored. Another method, when the coffee is mixed with Savanilla or other light bean coffee, is to place a sample of the suspected coffee on top a vessel of water, in which case the hard, solid-bean Java will sink to the bottom and the light-bean substitute float on top. “Sweated” Javas are browned by placing any fair-sized, light-colored variety such as Lahat, Maccassar, ordinary Jamaica or Savanilla in a zinc or iron-lined room or case surrounded on all sides by pipes, through which steam passes and subjecting them to an intense heat, the process causing the—whatever little volatile oil this class of coffee contains—to exude and impart a dark, muddy-red color to the beans. This sophistication is best detected by the unnatural, repulsively reddish

color produced by the process, by their light weight and irregular, unsightly appearance in the hand as well as by their nauseous, almost sickening flavor, developed by the volatile oil and the zinc, and which is evidently prejudicial to the health of the consumer.

Mocha Coffee.—Probably there is no single variety of coffee grown more generally counterfeited or adulterated than Mocha in the raw or unroasted state, owing to its limited supply and high commercial value. In addition to the manipulation and substitution which it undergoes at the ports of export, by the addition or substitution of small-bean Wynaad, Malabar, Ceylon, Bourbon and other African varieties annually shipped to Aden for the specific purpose of conversion into Mocha, that it has become a difficult matter to determine what is true Mocha and what is not. The substitutes are first separated from the regular crops and then carefully picked over and assorted by hand, the better to adapt them to their respective markets, and then packed in the unique and peculiar packages which distinguish the true article from all others. It had at one time been considered as next to impossible to tamper with or imitate these packages without detection, composed as they are of a coarse vegetable material, sewed with a fibrous substance that becomes excessively hard and tough by age; but modern ingenuity has found a way in the countries of consumption to cut this "Gordian knot," first by a process known to the initiated as "stove-piping," by which a portion of the genuine coffee is run out of the original package with an iron tube resembling a "coffee tryer," inserted at one end of the bale and a spurious article composed of some small-bean variety, such as Santos, Maracaibo or Guatemala, poured in its place and

the puncture closed up. Another ingenious method is to soften the fibrous cord of which the withes are made, and with which the bales are sewn, by a process known as "steaming," by which they are softened and drawn out, the bales being easily opened entire and the contents substituted by the introduction of one or other of the same class of coffees already mentioned, and even by small-bean Rios, particularly when the former kinds are high or difficult to procure. These glaring forms of adulteration and substitutions practiced in Mocha coffee may be readily detected by a comparison of the mixture or contents with a sample of the genuine bean, which is invariably small, round, uniform and symmetrical, varying in color from a rich olive-green cast, almost translucent when new, and a bright-yellowish hue when old, being at the same very clean, and attractive in the hand. While the adulterants and substitutes are much larger, more irregular and varying in size, style, form and color, from a dark or grass-green to a pale white, according to the age and nature of the coffee used.

There has recently been discovered another and very ingenuous coffee fraud, in which the raw beans look quite natural, but yield no coffee liquor on infusion. On close inspection these spent or exhausted beans resemble artificial coffee beans composed of baked dough colored, but a microscopical examination disproves this supposition. The beans are genuine coffee beans, but the cells show a remarkable freedom from caffeine and the oil of coffee, indicating that they had been steeped in water, so that on the microscopical examination being supplemented by a chemical analysis, the result showed that almost every valuable property of the coffee had been removed from the beans, evidently for medicinal purposes or the manufacture of some extract of coffee, after which they are re-dried and

disposed of to roasters and unscrupulous dealers as sound coffee. The beans of such coffee look quite natural, but on close inspection are found to be tough and light, yielding a watery and flavorless liquid on infusion. A patent has also been recently obtained the purpose of which is to impart to coffee beans by a summary operation the properties and characteristics possessed by coffee which has been stored and kept under favorable conditions for a comparatively long period of time. The process of maturing or "aging" the coffee consisting in spreading out the raw beans in a thin layer between alternate layers of damp bags or other textile material first by sprinkling a number of bags with water, and piling them one on top of the other until they have all become uniformly moistened, then spreading out one of the bags and laying on it a dry bag upon which is placed a layer of green coffee, another dry bag being placed over it and a damp bag on that again, and so on to any desired height. The pile of bags and coffee thus formed is then compressed in order that the dry bags may absorb the moisture from the damp bags and also become damp, thus maintaining the coffee beans in their confined space until the desired maturing or aging effect has been produced.

ROASTED COFFEES

Are chiefly sophisticated by mixing or substituting lower with high-grade coffees, and by coating or glazing the beans with some obnoxious compounds as previously described. Many of the so-called Javas and other high-sounding-name coffees now in the market so much vaunted and extolled being nothing more than combinations of Santos, Maracaibo and other medium grades, some of the most reputable consisting merely of Santos and Java in the proportions of 40 per cent. of the former



WASHING COPPER.



to 60 per cent. of the latter. The distinguishing features of the raw or natural bean being largely altered in the process of roasting, making it a difficult matter for any but experts to detect this most common form of adulteration, an acquaintance with the original flavors of the different varieties being the only sure means of detection.

Some years since, there was invented a bean resembling that of roasted coffee, made from dyed plaster of paris, which was intended for admixture with coffee, and at the present time a far more dangerous fraud is being perpetrated in the already too wide field of coffee adulteration. It is that of a bogus or artificial bean, resembling that of whole roasted coffee, which, on analysis, proves to be largely composed of wheat flour, mixed with a glutinous compound of cracker dust, paste and molasses, moulded in the form of the true coffee bean of commerce and flavored with a weak solution of caramel or chocolate. These spurious coffee beans are not, however, intended to supply in themselves a beverage which from any similarity of appearance, taste or effect might form a substitute for coffee and cannot therefore be regarded as such, but are intended solely as an adulterant of whole roasted coffee. It is readily detected by close inspection in the hand, but still more so in the cup, tasting as it does more like a decoction made from burnt dough and molasses. When dissolved in boiling water it yields a blackish, muddy liquor akin to slop, leaving a thick, greasy residue in the bottom of the vessel. The custom of coating or "glazing," now so much in vogue among roasters and dealers, may also be classed among the many, but milder forms of adulteration, which, though ostensibly claimed to protect the pores of the coffee from the oxydizing influences of the atmosphere, preserve its aroma, and at the same time clarify the

infusion, is in reality, in nearly all cases, resorted to for the purpose of disguising or concealing the defects of artificially-colored, stained, damaged and immature or "quakery" coffees, or for adding an extra weight of from 5 to 6 per cent. to it.

GROUND COFFEES

Are subject to the most extensive adulterations, all being more or less sophisticated or adulterated in one form or another, chief among which is that of the admixture of the roasted and ground roots of Chicory, Dandelion, Carrot, Parsnip, Beet and other leguminous vegetables. Peas, Beans, Rye, Rice, Wheat, Barley and various other cereal grains, including the seeds of the broom, fenugreek, iris and acorn. These various roots and seeds, with many more similar substances, have not only been used as adulterants, but under various high-sounding names several of them have been introduced as substitutes for coffee. But so far not a single one of them have either merited or obtained any success as such, their sole effect being to bring coffee into undeserved disrepute as a pleasing and agreeable beverage with the public.

SUBSTITUTES AND ADULTERANTS.

Among the numerous substitutes and adulterants in use for coffee may be mentioned first:—

Rye Coffee.—Prepared from roasted rye and a little butter ground fine, and put up in packages.

Rice Coffee.—Made from roasted rice in the same manner as the former and considered a very good substitute.

Malt Coffee.—A preparation made from malt, which is first soaked in water at 40 degrees and dried in a coffee roaster until the grains assume a glossy-brown color is used as a substitute for the coffee of commerce, the finished product, when ground and infused, is claimed to be a passable coffee substitute.

Currant Coffee.—Manufactured from the seeds of that fruit, washed out of the cake left in making currant wine, then roasted and ground, but principally used as an adulterant.

Gooseberry Coffee.—Prepared from the seeds of that fruit in the same manner and used as an adulterant also.

Holly Coffee—Is made from the berries of the common holly, roasted and moistened with a little lemon juice.

Acorn Coffee—Is prepared from acorns, deprived of their shells, husked, dried and roasted in the same manner as regular coffee.

Sassafras Coffee.—Manufactured from the fruit or root of that plant, or from the bark, cut up, dried and roasted, the decoction being very wholesome, and a specific for skin diseases.

Beechmast Coffee.—Made from the roasted and ground roots of the beechmast, and also claimed to be very wholesome.

Beet-root Coffee.—Principally used as an adulterant; is prepared from the yellow beet-root, sliced, dried in an oven and ground with genuine coffee.

Almond Coffee—Is made from either rye or wheat, roasted with almonds and a very small quantity of cassia buds, making a very good substitute.

Bean Coffee—Is prepared from ordinary horse-beans, roasted along with a little honey and burnt sugar, a small quantity of cassia buds being frequently added when removed from the fire, the whole being stirred until cold.

German Coffee—Is chiefly made from chicory roasted and ground fine, and used either as a substitute or an adulterant of the regular coffee of commerce.

Coffee-pulp Coffee.—In Arabia the pulp of the berries, which constitutes about twenty per cent. of the prepared coffee, is dried and shriveled up by a method peculiar to Arabia. This product is known by the distinct name of *Kishr*, a decoction of which forms the common beverage of the poorer Arabs.

French Coffee.—What is known and celebrated as "French Coffee" is made from a mixture of coffee and caramel, which must be packed in tins, as otherwise the hygroscopic properties of the caramel will cause it to absorb moisture, and thereby run to decomposition.

Pelotas Coffee—Is also prepared from ground acorns and sold under the name of Pelotas, but is exceedingly dark in liquor, wild and insipid in flavor.

Corsican Coffee—Is made from the roasted seeds of the Knee-holly, and used extensively on that island as a substitute for the regular coffee of commerce.

Egyptian Coffee—Is prepared from the common Chick-pea roasted, ground and mixed with genuine coffee in equal parts, being more of an adulterant than a substitute.

Mesquite Coffee.—It has been recently claimed that a species of coffee may be produced from the "Mesquite plant" found growing in wild abundance in Texas, Arizona and New Mexico, but so far no positive results have been reported.

Dandelion Coffee.—The root of the Dandelion, first dried, roasted and ground, is also extensively used as a substitute for coffee, and is claimed by many physicians to be much preferable to chicory for that purpose, its infusion, decoction and extract being frequently employed as a tonic and aperient, especially in disorders of the liver and digestive organs.

Spent Coffee—Prepared from “exhausted” coffee grounds which are dried and re-atomized by the transforming hand of modern chemistry, put up in shiny packages under seductive titles, and from which the deluded and over-confiding consumer endeavors to extract a desired beverage.

Mussenda Coffee.—A patent has recently been granted in France, the object of which is to substitute the berry of the *Mussenda* plant for the various substances now used for mixing with ground coffees, by which the berries are roasted with the coffee in any desired proportions, usually from $\frac{1}{3}$ to $\frac{2}{3}$ Mussenda, or $\frac{3}{4}$ coffee to $\frac{1}{4}$ Mussenda. During the roasting process a small quantity of Caramel is added to improve the flavor, the compound being then ground and put up in cans, possessing at least one good recommendation, that of not containing any injurious properties.

Canada Peas—Which is the most extensive form of adulteration, are first roasted in the same manner as coffee, but requiring a much longer time and more care, as the shell of the pea does not assume a coffee-color until the inside is overdone, and must be judged by the inside appearance, being brittle and a little darker when broken than coffee, but when ground they are dry and dusty, on which account they make an excellent compound with chicory, keeping it from forming

into lumps and making it assume a uniform color. Wheat, rye or barley may be substituted or added to this compound without affecting it, the method of treatment being identical. There being but little aroma to protect and none to save, the virtue of this compound lies altogether in the healthy properties of the cereal used, not in the flavor of the liquid.

Essence of Coffee—Is simply an article of manufacture, containing no coffee, but intended for use with coffee for the purpose of imparting color and as a clarifying agent. It may be prepared at will from any cereal before named, bread raspings or burnt cracker dust, but is chiefly composed of carbonized corn, that is, corn roasted to blackness. The material from which it may be prepared is first roasted, ground fine and spread out thinly over a large surface, and then covered with burnt sugar or molasses while boiling hot, the whole forming a large cake, which when thoroughly cooled is broken into pieces and reground in an iron mill until reduced to a dust, after which it is put up in packages or barrels for use in coffee. It is also used extensively as an adulterant in ground coffee, and when made from good stock it is not objectionable, possessing excellent coloring, sweetening and clarifying properties.

Coffee-leaf Coffee.—A decoction made from the leaves of the coffee shrub has long been used in the Eastern Archipelago, and has more recently been introduced among the coolies of southern India, and a few years since attracted considerable notice, being recommended as a new article of import to become a cheap substitute for tea. There seems to be no doubt that coffee leaves contain the principle coffeeine in sufficient abundance for the making of a valuable beverage, but

the presence of an unpleasant senna-like odor militates greatly against its popularity as a regular drink, and there exists also the difficulty that of depriving the tree of its foliage damages the crop of berries and injures the tree itself. On berry-producing trees therefore only the leaves obtained in the ordinary pruning operations would be available, and these would seem to yield so small a supply as not to be worth the cost of collection, while growing the shrubs for the leaves alone would be a very questionable undertaking. Yet there appears to be no valid reason why in the event of the berry crop failing a portion at least of the leaves might not be gathered and prepared in the form of coffee if any means can be invented for removing the objectionable odor.

Whey Coffee—Another very novel substitute for coffee is prepared of whey from milk, which is evaporated down in open vessels or vacuum pans until most of the water is driven off and a thick paste remains. During the process the whey is kept constantly stirred, the stirring being continued until the pasty mass becomes cold, when it is rolled into cakes and dried at a temperature of boiling water, after which it is broken up and moulded into pieces about the size and form of coffee beans. The next operation is that of roasting, which is more preferably performed by first mixing them with an equal quantity of raw coffee, the roasting process thus turning the whey-paste beans into a rich brown color, which on cooling are ground with another percentage of coffee. The compound yields a pleasant and agreeable beverage and may find some use as a harmless if not really nutritious ingredient in the lower priced coffee preparations.

In Brazil and other South American countries the fruit of the Wax palm is used extensively as a substitute for

coffee, being very rich in caffeine and possessing nutritious properties, while recently a substitute for coffee has been introduced to England and the continent of Europe under the name of "Mochara," which is simply a preparation made from ripe figs, roasted and pulverized, which is sold at about half the price of coffee. Another illustration of the modern craze for replacing every genuine article by an inferior substitute is to be found in the announcement of a company to work a recent patent for making coffee out of dates. In New Zealand the berries of the *Coprosma* have been proposed as a coffee substitute, while the seeds of the *Cassia* have been lately imported into England from the river Gambia and sold there under the name of "Negro Coffee." But although such substitutes and admixture are demanded, yet it appears to be impossible to replace coffee altogether, all the elaborate attempts made by the French chemists during the wars in the early part of this century being unsuccessful in providing any approximate substitute for coffee.

Kola-nut Coffee.—The diminishing production of coffee in Java, Ceylon, and other countries of East Indies has given rise to the suggestion that the cultivation of the Kola-nut as a substitute for coffee should be undertaken, which not only as a stimulant, but as an article of food, possesses the essential properties of coffee, and is even said to be richer in the active principle, *caffeine*. Heretofore this product has been raised chiefly for medicinal purposes only, but its acceptability as a stimulating and nutritious beverage is rapidly growing, possessing as it does a high value, because of its power of enabling men to sustain great effort as well as to endure long fasting. It is fast finding a place in commerce in the same order as that held by coffee, the

beverage being called at the present "Kola-nut Coffee," but the term "Kolatina," has recently been proposed as more appropriate for the decoction, and to which there can be no reasonable objection. The beverage prepared from the Kola nut resembles that made from coffee, and is both pleasant and agreeable, and for persons troubled with weak indigestion "Kolatina" is found to be better adapted than either tea or cocoa. This is the bean which Stanley speaks in several of his works on African exploration as possessing much greater sustaining power than either tea, coffee, or cocoa; the natives, he states, carry these beans in their pockets and eat them during long marches. The beans are first ground and put up in packages, with directions for making the infusion, one teaspoonful being sufficient for a cup of Kolatina. A concentrated essence is also made from the beans, and an acerated drink called "Kola champagne," very agreeable to the taste and recommended by physicians.

Chicory—The common root of the Endive or "Suc-cory" plant, as used along with coffee was originally a Dutch practice dating back to over a century ago, but for many years after the nature of Chicoried coffee was kept a profound secret by the Dutch dealers until 1801, when the secret was first disclosed. The fact that for over a hundred years it has been successfully used as a substitute for and recognized addition to coffee, while in the meantime innumerable other substances has been tried for the same purpose and abandoned indicates that it must be agreeable, if not beneficial, to many constitutions besides imparting to coffee additional color, body and pungency, and may, by acting as a sedative, tonic and diuretic, modify its stimulating and exciting effects, and is at least in very general, almost universal, use at the

present time. It is extensively cultivated in Belgium, Holland, France, Germany and other European countries, being principally prepared from the old, stout and white roots of the plant, which after washing are sliced into small pieces, and kiln-dried, in which condition it is usually sold to the chicory roasters, by whom it is parched or burned, until it assumes a deep-brown color, after which it is ground, the fine dust being separated from the coarse and granulated parts. In its external characteristics it closely resembles ground coffee, but is entirely destitute of its pleasing and aromatic odor, neither does it possess any trace of the alkaloid—caffeine—which give their peculiar virtues to coffee, tea and other diet drinks. It occupies a peculiar position, however, since very many coffee consumers deliberately prefer an admixture of chicory with coffee to the pure article alone, notwithstanding that it is entirely devoid of the essential oil for which coffee is so valued. Differing diametrically in their botanical nature and chemical composition as well as in their physiological properties and action. Again, coffee is the fruit of a tree, while chicory is the root of a herbaceous plant, and it is a well-established fact that of all parts of either vegetables or plants the fruit and seeds possess the most active and nutritious properties. This is no doubt due to their being freely exposed to the influence of light and air—agencies which invariably promote chemical changes in the plant itself and so effect the elaboration of those complex organic substances on which the activity of all plants depends. While on the other hand it is manifest that, as roots are concealed from these powerful agencies, they cannot be richly endowed with active properties, there being but few roots containing either alkaloid or volatile oil—the properties which give to coffee its unique virtues.

The distinction therefore between the properties of the seeds and roots of plants in general is very important, and especially so in the case of coffee and chicory, the infusion of the latter being heavy, black, mawkish and entirely destitute of aroma; that of the former being light, rich, fragrant and refreshing. Coffee containing three active principles: caffeine, volatile oil and tannin, chicory possessing no such analogous constituents. Coffee exerting very marked and highly important physiological effects of a beneficial character in the human system, while there is not a single proof that chicory exerts any one of these effects, it being very questionable, in the contrary, whether the properties it does possess are not really injurious. None of these or analogous principles are to be found in any of the substitutes or adulterants of coffee, so that the latter cannot possess a single one of the peculiar and beneficial properties of coffee, being simply a deception on the stomach of the consumer.

Chicory contains neither *caffeine* nor essential oil like coffee, and is neither exhilarating nor pleasant in taste, while on some persons it acts as an irritant and purgative. Some so-called coffees contain large quantities of it, even to the extent of 95 per cent., which it would be more correct to call such a mixture "adulterated chicory," rather than coffee, which term it seems entitled to only as a matter of courtesy, chicory being in its turn also subject to adulteration in many forms, two very common adulterants being beet-root and mangel-wurzel. As to the nutrition possessed by chicory, it contains only about one-half the nitrogenous substances of coffee and even that quantity in no way benefits the consumer, as these substances are insoluble in water and are wasted in the infusion. It has been proved also that even the chicory itself is extensively adulterated, as all of the

substances found in adulterated coffee have also been discovered in ground chicory. Viewed under a magnifying glass the component fibres and elementary structures of the different substances used in the adulteration of coffee present peculiarities and characteristics that enables the experienced observer to identify without difficulty the particular substitute or adulterant employed. The principal adulterant, chicory, being readily distinguished by the size, form, and ready separation of the component cells of the nut, as well as by the presence of an abundance of spiral vessels of a dotted form. Whole roasted beans, peas and cereals may be best detected by the respective size, form, texture and other characteristics of the starchy granule, of which such substances are chiefly composed.

In minute structure true coffee is so distinct from all other vegetable substances that it is readily recognizable by means of the microscope, and as the roasting process does not destroy its distinguishing peculiarities, microscopic examination forms the readiest method of determining the genuineness of any suspected sample. The true coffee bean consists of an assemblage of vesicles or cells, angular in form, which adhere so firmly together that they break up into pieces rather than separate into distinct and perfect cells. And, again, by microscopical, physical and chemical tests the purity of coffee can be still further determined with perfect certainty. The mixture of chicory with coffee is best detected by the aid of the microscope, the structure of both which they retain after torrefaction being very characteristic and distinct. The granules of coffee remain hard and angular when steeped in water, to which they communicate but little color, while chicory on the other hand by swelling up and softening imparts a deep brown color to the water,

the specific gravity of chicory being also much lighter than that of coffee.

All of the pseudo patent or proprietary ground coffees, put up in bulk or packages, and recommended to the consumer by high-sounding, seductive names and attractive labels, which are annually palmed off in such vast quantities, consist of nothing more than a combination of these adulterants with genuine coffee. So much so that it may be safely said that wherever grinding is done it may be safely set down that more or less adulteration is practised, the ground coffee being put up in packages or in bulk form. The average basis for the compound being composed of the following proportions to every 1,000 pounds: chicory, 100; rye, 200; peas, 400; coffee, 200, and other substances 100 pounds.

According to some English chemists, coffee is adulterated in that country, outside of chicory, with such substances as roasted peas, beans, carrots, turnips, parsnips, potatoes, acorns, beets, lupins and even fragments of the baked livers of oxen and horses. To such an extent is the practice carried there, that it is next to impossible to procure a pound of pure coffee there at almost any price. The evil also flourishes to a great extent in this country, but with the exception that nothing worse than roasted rye, peas, beans and cereal grains are chiefly used for its adulteration. With regard to the propriety of selling chicory with coffee, it may be stated that while it certainly is not right to sell a mixture of coffee with chicory under the name of pure coffee, and unreasonable to compel the manufacturer or vender to specify approximately the proportion of chicory contained in the mixture, this latter is especially desirable, inasmuch as chicory is far cheaper than coffee, and it is, therefore, necessary to protect the public against having chicory palmed off

on it for pure coffee. According to the best authorities, coffee, when pure, is a most valuable ingredient of our food, owing to its agreeable flavor, pleasing odor and refreshing and gently stimulating properties, which, if not absolutely necessary, is at least a most desirable constituent of our daily dietary, and any one that deprives it of its true qualities by adulteration or substitution inflicts an injury more or less grave on the public health, because the adulterants are *claimed* not to be poisonous—that is, directly—but only indirectly injurious. The offense is thought little of, and never punished in this country, with the result that the nefarious practice is rather encouraged than repressed. So that, in considering the many evils of coffee adulteration, we must not overlook the fact that coffee is not only a beverage, but also a drug, antagonistic in action to the *alkaloid morphia*, as well as to other alkaloids of like nature, so that in cases of poisoning its adulteration may lead to the failure of medical treatment, even to the extent of the loss of life.

The operation of roasting also tends to make coffee soluble in boiling water, as when Raw coffee is perfectly exhausted by means of boiling water it yields up 25 per cent. which passes into solution, while Roasted coffee, on the other hand, when completely exhausted by means of boiling water, yields up 39 per cent. of soluble matter. These figures appear rather high, as in actually using coffee as a beverage we are not in the habit of making anything like a complete extraction, only some 10 to 12 per cent. of the coffee passing into the liquid. From these the facts it will be perceived that the chemical character of coffee provide fairly satisfactory criteria for the recognition of many species of adulteration, the absence of starch alone in genuine coffee offering in itself a character which enables

the analyst to at once deal with the whole class of possible adulterants, including many species of grain, while the absence of more than traces of sugar in Roasted coffee can likewise be turned to excellent account inasmuch as Chicory contains no starch, but is highly saccharine even after roasting, the percentage of sugar in Roasted coffee ranging from 0.0 to 1.1, while in Roasted chicory the quantity of sugar ranges from 12 to 18 per cent. The proof of this character is best made by the aid of the copper-reduction test, for which purpose a standard solution of copper is required, which may be prepared by dissolving 34.65 grams of crystalized sulphate of copper in 200 C. C. of water and adding to it 173 grams of double tartrate of potash and soda, with 400 C. C. of a solution of caustic soda, the whole being subsequently diluted with water so as to occupy a litre. The standard solution of copper made in this manner is of such a strength that 10 C. C. are reduced by .050 grams of grape sugar, the best method of using this solution being to take a known volume of it, say 10 C. C. accurately measured out, and dilute it with three or four times its volume of boiling water and then dropping into the boiling copper solution, which is to be added, until the point is just reached when the copper solution is exhausted, and as the reduction of the copper-salt to the state of red sub-oxide of copper progresses, the precipitate will accumulate, and at the same time the blue color will fade from the solution. The last delicate reading is finally effected by half of the reduction between the ferro-cyanide of potassium and copper solutions, for which purpose a little of the liquid is filtered, acidified slightly with acetic acid and tested with a drop of the solution of the ferro-cyanide of potassium. In this triturate, as in all like cases, a rough and rapid estimation

is first made, and then a second operation when the quantity is approximately known to make a delicate and careful reading of the exact point. Thus if 100 parts of coffee when infused yield sensibly more than 1 per cent. of sugar, then the presence of chicory or other adulterant may be strongly suspected and a rough calculation of the quantity made. The fact that coffee extract is devoid or almost devoid of sugar, while many of the other natural products yield saccharine extracts, makes itself manifest in many ways, and the specific gravity also of equal quantities of an infusion of coffee being very much lower than the specific gravity of an infusion of chicory and the other principal substances used in the adulteration of ground coffee. Chicory also possessing greater coloring power than coffee, for which reason this character may be rendered available in the testing of coffee, as not only does chicory color water more deeply than coffee, but it colors it with greater rapidity, the oil contained in the coffee hindering the solution of the coloring matter by the water, whereas chicory, which contains no oil, imparts its coloring matter to water with great readiness. All of which tends to render the color-test, when properly applied, the easiest and most available for the detection of chicory or other substances in coffee.

What is known as the "Ash test," is as follows: Pure coffee when incinerated or burned, yields about 4 per cent. of ash on an average, while the ash of chicory and other adulterants used in coffee amounts to between 5 and 6 per cent. of the residue, the ratio of soluble to insoluble ash being inverted when dissolved in water thus:—

Ash of Coffee.	Ash of Chicory.
Soluble, 3.24	Soluble, 1.74
Insoluble, 0.76	Insoluble, 3.52

From this analysis it will be observed that the average ash of coffee when incinerated is about 4 per cent., 3.24 of which is soluble in water, and 0.76 insoluble, more than half of the entire ash consisting of potash in combination with carbonic and phosphoric acids. Magnesia amounting to about 8 and lime to about 4 per cent. of the whole, while it is claimed that soda and silica are entirely absent from coffee ash, great stress being laid on this circumstance. The ash of chicory, on the other hand, which is the main adulterant of coffee, amounts to 5.06 when incinerated, 1.74 per cent. of which only is soluble in water, and 3.32 insoluble, being almost an inversion of figures and from which it may be easily understood why the examination of the ash alone would suffice to distinguish between coffee and chicory, and from which it may readily be determined, an examination of the ash test alone sufficing to distinguish pure coffee from the adulterated compounds.

Another unerring test, known as the "Color test," is to prepare a saturated solution of common salt and mix a small quantity of the coffee to be tested with ten times its weight of the solution in a test-tube at least three quarters of an inch in diameter, shaking it repeatedly so that the coffee may be thoroughly wetted, and then allow the tube to stand for half an hour. Next, closely observe the color of the liquid and the quantity of coffee floating on the surface as well as the amount deposited in the tube. If the color be a very pale amber and almost all of the coffee floats on top, the sample may be assumed to be pure, but if of a decidedly dark-yellow or brownish hue, it clearly indicates the admixture of chicory or some similar adulterant, in which case there is also a larger deposit for the reasons already stated. This deposit increases and the color of the brine grows darker in proportion to the

extent of the impurity in the coffee, as with the addition of only 30 per cent. of chicory the brown color is very marked, so that with a still larger percentage of the adulterant it becomes correspondingly darker.

CHAPTER VIII.

BLENDING AND PREPARING.

BY the combination of different varieties of coffee much better results are sometimes obtainable than when one variety is used alone, but in the mixing or blending of two or more kinds together, several points have to be studied, such as the age, grade, body, flavor, appearance, and affinity of the coffees to be combined. The public taste for certain flavored coffees, like that of tea, being an acquired one, it behooves the dealer to first study and learn the taste of his customers before catering to it.

The successful blending of coffees may be easily accomplished if only a fair knowledge of the merits and general character of the coffees be possessed by the dealer; but tastes differ so widely that it is next to impossible to give any fixed formulas for any specific combinations. For this reason the following blends are only given for the purpose of conveying some idea as to what coffees assimilate best in combination and also ascertain what body, strength and flavor is required by the customer or customers before preparing the combination; but a taste for any fairly good blend of coffees may be cultivated in the customer with time. And as no definite formulas can be given for combining two or more varieties of coffee, the dealer must study the taste and requirements of his trade, noting its peculiarities and

experimenting with it until he has discovered a combination that will suit or please a majority of his customers which, having once found, he should adhere to strictly, by being always careful to select, as nearly as possible, the same grades of coffee, and keeping them up to the same high and uniform standard.

Though not generally admitted, the testing of coffee is much more difficult and requires more experience than that of tea, inasmuch as the sample of tea is all ready to have the water applied to it, while the sample of coffee is presented in the raw or natural state and must not only be roasted properly and ground before being tested, but must also be roasted as precisely as the other samples with which it is to be compared, in order to determine its exact value. To smell or taste correctly requires a knowledge of all the properties and characteristics of the article under consideration, as these senses convey to the mind their impressions, so that if the mind can analyze the cause and effect, the senses of smell and taste act in consonance with the sense of reason. It is thus obvious that to be an expert judge of either tea or coffee requires a thorough knowledge of the different varieties and grades of both, and what the most desirable qualities of each are. It is also further necessary that the dealer should be well aware of what characteristics and blending of flavors his customers prefer. Having carefully selected, tested, and purchased his coffee, the next important thing is to so roast or have it roasted as to best develop the drinking qualities, which, as stated before, is a more important and essential process than the hulling and curing of it, though frequently underestimated by the average dealer, as many otherwise good coffees are injured irreparably by improper roasting.

Owing to the wide difference in the age, weight and texture of coffees they should never be blended in the raw or natural state, as old and dry coffees require a shorter time to roast than new and moist ones, the same rule applying to what are known in trade as "mild" and "strong" coffees, as one will be but half roasted or roasted only when the former is roasted or burned, thus imparting to the combination a raw, uncooked or burned flavor, as the case may be. The best way is to roast or have roasted the coffee intended for the blend in different cylinders, then mix and cover them up tightly immediately after roasting, in order that the differing characters and flavors may exchange and assimilate freely while the pores are still open to receive them.

ROASTED COFFEE BLENDS.

No. 1.—(Low-priced). May be made from a fair Rio and Santos, low-grade Maracaibo or other mild sort, in the proportions of half and half, or, when three or more varieties are used, in equal quantities.

No. 2.—(Medium). Is composed of equal quantities of a large white-bean Santos and Cucuta Maracaibo or other standard mild growth, the whole being strengthened by the addition of one part choice Rio, if considered too weak in body.

No. 3.—(Choice). When a really rich, smooth, mellow beverage is desired a combination, composed of one-third Arabian Mocha and two-thirds Preanger Java will yield the desired results. While a liquor equally as good, if not more popular, may be obtained from equal parts of Cucuta or Merida, Maracaibo, Aden, Mocha and Preanger Java, particularly when fresh roasted.

For a good coffee the most common practice is to blend a Padang Java and a Cucuta Maracaibo, or large, yellow, old-bean Santos in the proportions of 40 pounds of the former to 60 of either, or both the two latter, the combination answering well for a straight coffee, and for which it may be safely sold. In fact, one of the most popular so-called finest Javas in the market to-day is composed of these three varieties, the addition of the Santos improving the combination, as it lends to it the essential quality which is lacking.

GROUND COFFEE BLENDS.

In ground coffees the appended specimen blends are given to illustrate how they are mixed, rather than as laying down any fixed formulas, and are recommended as being at least non-injurious, if not positively wholesome.

No. 1.—Composed of 20 pounds roasted rye, 20 pounds chicory and 20 pounds ground coffee makes a fairly drinkable compound, when a cheap coffee is required.

No. 2.—A good medium grade may be prepared of 10 pounds rye, 20 pounds chicory and 20 pounds coffee. These proportions may be altered at pleasure, but care must be taken to at all times have the rye in excess of the chicory and to thoroughly mix and grind the component parts together. The dry dust of the rye quickly absorbs the moisture of the chicory and will also prevent the mill from becoming clogged in grinding.

No. 3.—Better still in the proportions of 15 pounds rye, 10 pounds chicory and 10 pounds good, mild coffee. the component parts of which may be still further varied to suit the price and taste of the customer and to which may be added any of the other ingredients with which

coffees are mixed, except corn or beans, but it must be borne in mind that only the best grade of coffee must be used in the blend, as what may otherwise be a good combination may be utterly spoiled by the introduction of a tainted, stained, damaged or hidey coffee.

But the best and safest of all substances for mixing or blending with coffee with the object of reducing its cost is chicory and rye, containing as they do a large percentage of saccharine, which in the process of roasting becomes carameled, thus imparting to the compound the flavor of coffee to a much greater extent than any other substitute known and for which reason it lends itself to the purpose more readily than any other vegetable substance. Again, it is not injurious to health, while at the same time it gives up its extractive matter easily, thus improving the extract yielded by poor coffee and imparting a dark color to the decoction such as can only be produced by three times the weight of pure coffee. It has one great defect, however, that of easily absorbing moisture, becoming hard and lumpy on exposure to the atmosphere, more particularly when ground fine.

PREPARING FOR USE.

The methods of preparing for the table are almost as numerous as the countries in which it is grown, and as much of the beneficial influence which it undoubtedly exerts depends in a great measure on its proper preparation. This question has given rise to such a maze of psuedo chemical subtleties and mechanical devices that it is difficult to arrive at any fundamental common-sense rule for its most perfect production in the cup. The two principal objects to be sought for in the proper preparation of coffee as a beverage are : (1) To obtain the greatest amount of strength and aroma, without extracting any

of its astringent properties, and (2) to produce a rich, transparent, nut-brown liquor, free from all cloudiness and grounds. The first requisite in securing these results is that the article be purchased *pure* and *fresh roasted* in the bean and ground personally a short time previous to preparing for the table, for if roasted too long prior to its use the beans lose much of their strength and aroma, becoming tough and difficult to grind. This latter defect, however, may be remedied in part by reheating in a pan or oven for some minutes previous to being ground and infused.

The usual methods of preparing coffee for use as a beverage are: (1) By Infusion or drawing; (2) By Decoction or boiling, and (3) By Filtration or distillation.

Infusion—or “drawing”—is accomplished by first making the water boil and then putting in the ground coffee, the vessel being immediately removed off the fire and allowed to stand quietly, in the same manner as tea, on the stove or range for about ten minutes, in order to more fully extract its properties. The coffee is ready for use by this method when the powder swimming on the surface sinks to the bottom on slightly stirring it. This process yields a very aromatic beverage, but one containing very little of the extract or stimulating properties.

Decoction—or “boiling”—is the custom in the East, and generally yields an excellent coffee. The ground coffee is put in the vessel with cold water and placed on the fire, where it is allowed to boil for a few seconds, care being taken not to allow it to overboil. If boiled too long by this method the aromatic properties are volatilized, and while the coffee will be rich in extract it will be poor in aroma.

Filtration—or “distilling”.—By this process the coffee is prepared in a “percolator,” in which the ground coffee is compressed between two metallic diaphragms, so arranged as to permit the water to filter through it slowly. This method often, but not always, yields a cup of good coffee, as when the pouring of the boiling water over the ground coffee is done slowly the drops in passing come in contact with too much air, the oxygen of which makes a change in the aromatic particles, often destroying them entirely. The extraction also is incomplete, for, instead of 20 per cent. the water by this process dissolves only from 10 to 15 per cent., the balance being lost by evaporation, while by the other methods more than half the valuable parts of the coffee remain in the grounds and is entirely lost.

It is contended by many experts and connoisseurs that to obtain the full aroma of coffee without extracting its astringent properties, it must in all cases be prepared as an infusion with boiling water, that is, “drawn” in the same manner as tea, or simply allowed to reach the boiling point after infusion, but no more. While others, among whom is Baron Liebig, maintain that by simple infusion alone much of the valuable soluble principle in the coffee remains unextracted, being eventually thrown out with the grounds. To avoid this unnecessary waste, it is suggested that the grounds of the coffee once used by infusion should be preserved, boiled and the liquor resulting therefrom be used for infusing a fresh supply. By this method it is claimed that the substantial properties of the previously infused coffee, and the aroma of the new are obtained together in the fresh infusion. In many French households the coffee grounds are utilized by distillation for economy's sake, hot water being poured over them, which, after passing through, is preserved in a bottle

and used as an extract. In fact, this is claimed to be the method adopted in making the finest French coffee.

The best method under these circumstances is a combination of the second and third, in which the usual quantities of both coffee and water are to be retained, a tin measure containing half an ounce of roasted coffee beans being generally sufficient for two small cups (or one large breakfast cup) of coffee of moderate strength, or four ounces for eight small cups or four large ones. With three-quarters of the coffee to be prepared after being ground, the water is made to boil in ten or fifteen minutes, after which the other quarter is put in, and the vessel immediately withdrawn from the fire, tightly covered over and allowed to stand for five or six minutes. In order that the powder on the surface may fall to the bottom more readily, it is meantime stirred round, and after the deposit takes place the coffee may be poured off, being then ready for use. But in order to separate the grounds more completely, the coffee may be passed through a clean muslin cloth, but generally this operation is not necessary, being frequently prejudicial to the pure flavor of the beverage. By this process the first boiling gives the strength, the second adding to the flavor without extracting its astringent properties, it does not, however, dissolve more than one-fourth of the aromatic substances contained in the roasted coffee. The beverage, when ready for use by this process, ought to be of a rich brownish-black color, semi-transparent, somewhat resembling chocolate thinned with water.

Coffee may be prepared in any kind of vessel, tin cup, iron pot, earthen pitcher or regular coffee-pot, but the utensil, whatever it may be, must be thoroughly clean before using. When prepared in a tin cup or iron pot

first heat the ground coffee in the vessel and pour on boiling water or milk when the coffee is sufficiently heated, and stir with a spoon for one minute, then allow to stand by the fire where it will keep hot, without boiling, for another minute and stir again and then let stand to settle for two minutes, after which it is ready for use, care being taken when pouring out not to disturb the grounds. But, if a pitcher be used it, must be first heated with boiling water and allowed to stand in a warm place to infuse for at least ten minutes before serving.

There are so many different varieties of coffee and such a wide dissimilarity of tastes, that it is almost next to impossible to suggest the special kind of coffee to select for use, even for the average consumer, the same difficulty also applying to what constitutes the requisite quantity. Many old-time coffee-drinkers prefer a strong, dark, or, as they term it, "an old-fashioned Rio." Others like a good Maracaibo, or other fine, mild grade, such as Ceylon, Jamaica and Guatemala; in fact, these are the most popular grades and the choice of the majority of consumers, not only on account of their intrinsic merits, but also on account of price. For an exceedingly fine coffee, however, the best results are obtained from a combination of true Java and genuine Mocha, mixed in the proportions of two-thirds of the former to one-third of the latter, *fresh roasted, fresh ground and fresh made*; while, with regard to quantity, one, two and three tablespoonfuls to each pint of water is recommended, according to the number to be served and the strength required.

The degree of strength is altogether a matter of taste, two ounces, or four heaping tablespoonfuls, of pure, ground coffee, made with absolutely boiling water, will yield a full quart of average strength, making a pleasant and well-flavored breakfast coffee. But for four persons

a tea-cup of finely-ground coffee—the finer, the better—will be required, to be served as soon as made, as the infusion rapidly deteriorates by standing too long.

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In Ethiopia and Southeastern Africa, where its virtues were first discovered and where it has been in use for centuries prior to its introduction to civilization, it is used in a *solid* form, being first roasted, crushed and mixed with fat or grease, rolled into balls and eaten. The natives claiming that one of these balls will support them for an entire day, and preferring it so prepared to a meal of bread or meat.

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While the Arabs, to whom the civilized world is indebted not only for the first knowledge of the plant and its product, but also for the first knowledge of preparing it in liquid form, prepare it for use in a porous earthenware pitcher first set in hot ashes until all moisture is evaporated and the vessel is well heated, after which freshly roasted and pounded coffee is put in and a little salt added, both being heated thoroughly. Boiling water is then poured on, the vessel covered and allowed to rest in the hot ashes until it settles before serving. A decoction known as *Kishre* is also made there from the dried pulp of the berries, which is prepared by bruising or pounding the raw pulp with stones and putting it in boiling water, contained in an earthen pan placed over a slow fire. Ground cardamons and a little cinnamon or ginger is next added to the decoction, after which it is allowed to simmer for half an hour before using.

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In Turkey, where it is regarded as the national beverage, it is prepared by first grinding the roasted beans exceedingly fine, almost as fine as flour, and put in a pot

in which cold water is poured and placed on the fire until it heats up to almost the boiling point and then served without the addition of either milk or sugar. But when only a single cup of coffee is wanted, the requisite quantity is measured into a small, long-handled brass coffee pot, made expressly to hold one or two cups, as the case may be, and water enough poured on to fill the vessel, which is set on live coals until it heats up to, but not beyond, the boiling point and then served in a tiny cup without straining or otherwise settling the grounds.

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While in Egypt, which is also proverbial for the excellence of its coffee, it is prepared by first grinding the beans fine, as in Turkey, and adding an equal quantity of sugar to it, pouring on boiling water, and placing the vessel over the fire until it is thoroughly boiled, but removing and allowing it to cool occasionally between times until it becomes black and rather thick, in which state it is served. Coffee thus prepared will be found very rich and strong, too much so for the average taste, but dark, frothy-tipped, and, taken altogether, a delicious beverage.

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In Java, Sumatra and other Eastern coffee-growing countries the natives make a beverage from the leaves of the coffee plant, the leaves containing a large percentage of the active principle—caffeine. They first roast and cure the leaves after the manner of tea, and prepare them by infusion the same as tea, the natives preferring the liquor from the leaves to that produced from the roasted beans.

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The Dutch settlers in South Africa not only use coffee at all meals but at all times, the coffee-pot being always on the fire ready for any visitors and friends who may call.

In preparing it they use two kettles, boiling the water in one and pouring it on the coffee which has been previously placed in the other; the water is then poured back and forth several times, a little cold water being finally added to settle the grounds just before serving.

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In Mexico the coffee is roasted, ground and prepared at the same time; the beans are roasted as required and pounded fine in a bag or coarse cloth, and immediately transferred to the pot, boiling water is then poured on and milk added to it, after which it is allowed to simmer or boil slowly for about three minutes. But in some instances the milk is added as served, a third of a cup of coffee, or less, and the balance in hot milk being the customary proportions.

* * * * *

In Cuba, where the most delicious coffee obtainable anywhere is to be found, the beverage is prepared by first half filling a coarse flannel bag with finely pulverized roasted coffee and suspending it from a nail or hook over the pot or other vessel. Cold water is next poured on the bag at intervals until the entire mass is well saturated, when the first drippings which have fallen into the receptacle are poured again over the bag until the liquid becomes almost thick and very black. One teaspoonful of this novel extracted liquid placed in a cup of boiling milk will yield a draught of coffee that is simply deliciousness itself—a nectar fit for the gods. In Cuba this flannel bag hangs day and night on the wall, the process of pouring on the cold water and allowing it to drip being almost ceaseless in its operation, all classes, ages and conditions offering and drinking coffee there as freely as the Chinese do tea or as we do water.

* * * * *

Coffee constitutes the almost exclusive or "national beverage" of the people of Brazil, particularly in the regions where it is most grown. It is made there by first roasting, as in this country, in small roasters, but more frequently in iron pans, very high and dark, and is prepared for use by grinding or pulverizing the beans very fine, almost as fine as flour, and putting it in a muslin or woolen bag placed in a pot or other vessel upon which boiling water is poured, and allowed to infuse for about fifteen minutes. The entire strength is thus extracted, the Brazilians almost universally preferring their coffee strong and "black," that is, without milk, for which reason larger quantities are also used.

Many connoisseurs maintain that the roasting of coffee is best done at home, as no doubt it is, all risk of adulteration and stale coffee being avoided by this method.

So to avoid all risks the consumer should purchase the coffee in a whole state and grind it personally; but any suspected sample of ground coffee may be tested by the following simple and practical experiments: (1). Note whether the ground coffee hardens or "cakes" when pressed between the fingers, if so, the coffee is evidently adulterated, most probably with chicory; (2). Place a small sample of the suspected coffee on top of water in a wineglass, and if part floats and part sinks it is undoubtedly adulterated either with chicory, roasted cereals or other analogous substances; (3). If the cold water in which a sample of the ground coffee has been placed becomes deeply colored it is an evidence of the presence of some roasted vegetable substance; (4). But to more definitely detect the presence of chicory or other foreign substances in ground coffee, put a teaspoonful of the suspected sample on the surface of a glass of cold water. If it floats for some time, scarcely coloring the

water, it is *pure* coffee, but if part sinks and imparts a reddish-brown tint to the water as it falls to the bottom of the glass, it is adulterated with either chicory, rye, peas or other analogous matter. Or again, place a spoonful of the coffee in a white bottle of cold water and shake well for a few moments, and if the sample is pure it will rise to the top, scarcely coloring the water, but if adulterated it will sink and discolor the fluid for the following reason: The pure coffee being enveloped in an oily substance prevents the grounds from absorbing the water, while the adulterant being devoid of this feature quickly absorbs the water, and thus becoming heavy sinks and discolors the fluid to a greater or less extent according to the proportion used; (5). Spread out on a piece of glass or other smooth surface a little ground coffee and moisten it with a few drops of water, and pick out by means of a needle the small particles. If these particles are of a soft consistence the coffee is undoubtedly adulterated, as the particles of the coffee-seed or bean are hard and resisting in nature and do not become soft or pliable even after prolonged immersion in water. These simple methods will usually suffice to detect the ordinary forms of adulteration, but to determine the character and extent of the adulteration science and chemistry must be resorted to, for which purpose the use of a microscope will prove the most reliable and powerful auxiliary as a means of detection. The appended formulas are given as showing the different methods by which coffee is or may be prepared to suit the varying tastes of different consumers, which after testing, one may be selected for permanent adoption.

1. Put the requisite quantity of finely-ground coffee in a granitized vessel and pour on sufficient cold water to just cover it and allow to stand over night in a moderately

warm position. Put it in the pot next morning, pour in absolutely boiling water and allow to heat to the boiling point and set back from the fire to prevent ebullition. By this method the full strength of the coffee will be obtained and the delicate aroma preserved without the extraction of its bitter and astringent properties.

2. To prepare coffee by filtration without the aid of an urn or French coffee-pot. Put finely-ground coffee in a thin muslin bag and place in an ordinary utensil, first heating the vessel thoroughly and pour on briskly boiling water slowly around the bag, so as to permit it to absorb and saturate the coffee effectually and extract its full strength, after which allow it to stand and settle without boiling.

3. Another excellent method, known as the "Cold-water process," is to mix the finely-ground coffee with the white of an egg and sufficient cold water to just cover the mass, stirring it well meantime; next, pour in about one-third of cold water required for the infusion and set the vessel on the range where it will heat gradually to the boiling point; just as soon as it approaches the boiling point add another third of cold water and repeat until it again reaches the boiling point, then pour on the balance of cold water and allow it to come to the boiling point again. After which remove and let stand where it will simmer for a few minutes and settle, which may be hastened by the addition of a little more cold water; but if in a hurry, boiling water may be used instead of cold by this method also, but the cold water extracts more fully the active and refreshing principles of the coffee without its deleterious properties making a stronger and richer infusion than the boiling water, as more of the strength and aroma is carried off in the vapor arising from the use of the latter.

4. A quick, convenient and economical method for producing a cup of good coffee is to first heat some freshly-roasted and finely-ground coffee—an ounce to each quart of water—in a pan over a brisk fire and fill a muslin bag with it, then so arrange as to suspend it midway in the pot, and pour on absolutely boiling water slowly, so as to allow it to trickle through the bag. After which allow it to stand for about ten minutes where it will keep hot without boiling, and serve with milk and sugar. But the simplest, most rapid and effective method is to place about two ounces of ground coffee in a stew or saucepan, and set it on a bright fire, stirring the coffee meantime with a spoon until quite hot, and then pouring over it a pint of briskly boiling water, covering it over closely for five minutes and passing it through a thin muslin cloth, warming the liquid again before serving.

5. For the "ideal cup of coffee," take one part genuine Arabian Mocha and two parts finest Java; roast each separately and blend well together, and grind fine immediately before preparing. Fill an ordinary tea-cup two-thirds full of the coffee, with one raw egg and shell.

Place the whole in a strainer or percolator and pour on one quart of briskly boiling water, then let stand for about ten minutes where it will keep hot without boiling, and serve with cream and sugar to suit, or, better still, with hot milk. But should a vessel without a strainer or percolator be used let the infusion boil up once, and pour in a cup of cold water, after which let it stand for at least five minutes to thoroughly settle, and you have a beverage brown, creamy, rich, fragrant and delicious.

A most convenient, simple and inexpensive method of roasting coffee by families, travelers or others desiring to

roast their own coffee is to put the requisite quantity—usually about a quarter of a pound—in a thin glass flask or bottle placed over a charcoal fire and shaking it well during the process until completed. The non-conducting power gives this material an advantage over the metal, the coffee being less liable to burn in it and the coffee can be better observed and regulated during the progress of the process. But a simple iron pan may also be used effectively for the purpose, if care be taken to keep the coffee constantly agitated with a wooden knife or spoon, as a single burnt bean will impair the aroma, and stopping the operation as soon as the beans begin to crackle and assume a light-brown color. Before grinding put the roasted beans in an iron pan or plate and place on the range to heat until the aroma developed in the coffee by the roasting operation perfumes the room, after which grind in an ordinary mill and prepare according to any of the foregoing recipes.

Many consumers connect the idea of the strength of coffee with a dark or black color and fancy their coffee to be thin and weak if it does not possess such color. This is entirely erroneous, as good, pure coffee is never so, the dark color being imparted by means of a little burnt sugar or other ingredient. The true flavor of pure coffee is so little known to some persons that many who drink it for the first time doubt of its goodness because it tastes of the natural flavor, forgetting that coffee which does not possess the flavor of coffee is not coffee at all, but an artificial concoction, for which many other things may be substituted at pleasure. Hence it is that if to the vile decoctions made from chicory, carrots and beets be added the slightest quantity of pure coffee, such persons fail to detect the difference, and which also accounts for the enormous diffusion of such substitutes and adulterants;

such mixtures with an empirical taste most people fancy to be coffee. Another error of frequent occurrence in the preparation of coffee for the table, and which results probably from the habit of tea-making, is that of using too little coffee in proportion to the quantity of water. More coffee in proportion should be used than tea, that is, for a full pint of the infusion an ounce to an ounce and a half of coffee, that being about the proper proportions for a beverage of average strength.

Café de Paris—Or “French Coffee” is most generally prepared by mixing a cupful of finely-ground coffee with a raw egg and shell in a quart of cold water and placing the pot over a brisk fire, occasionally stirring it until the boiling point is reached, after which set the vessel aside to simmer for a few minutes, then pour on a cupful of cold water and allow to stand for eight or ten minutes before serving, using cream and sugar to suit.

Café au Lait—or “French Breakfast Coffee” is made by grinding two tablespoonfuls of coffee for each cup required, and packing solidly in a regular French filtering coffee-pot, pouring on boiling water and passing it from two to three times through the coffee-pot. When serving, boiling milk in equal quantity or to suit the individual taste is poured into the cup from a separate vessel, after which it is sweetened to suit. The French usually mix chicory with their coffee, particularly when used in the form of *café au lait*. For this form, add half tablespoonful of powdered chicory to two tablespoonfuls of ground coffee, and after thoroughly mixing, pour on boiling water and pass twice through the coffee-pot before serving.

Café Noir.—A black “after-dinner coffee,” is prepared by adding four ounces of freshly-ground strong coffee to a quart of absolutely boiling water and allowing it to stand until it reaches the boiling point, meantime passing it twice or thrice through the coffee-pot before serving.

Café au Crème—Is prepared by the addition of boiled cream to clear, strong, fresh-made coffee and allowing to infuse or draw together from fifteen to twenty minutes.

Café Glacé.—To every six cups of freshly-made coffee add one egg with cream, and sweeten well, then mix thoroughly and place in a refrigerator until frozen to the consistency of cream.

Café Demi-tasse—Is a beverage prepared after the manner of *Café Noir*, but sweetened to a much greater extent, and to which is added Cognac, Kirsch, or some other liqueur, but when taken with a small glass of liqueur it becomes a *Café Gloria*.

Café Capucin.—Is merely another name for *Café au lait*, served in a glass instead of a cup, while “Mazagran” is coffee served with water instead of milk, the coffee which is prepared exactly the same as *Demi-tasse* is served in a tall, narrow glass or goblet, a decanter of cold water being served with it, the consumer diluting to suit.

Café à la Russe—Like “Tea à la Russe” is simply strong, black coffee, prepared after the manner of *Café au lait*, to which a squeeze or slice of lemon is added before drinking.

Coffee à la Hollandaise—Is prepared in a vessel composed of two detached parts, the lower one answering as a reservoir and the upper as a filter; the bottom

being perforated with small holes, and over which is placed a piece of flannel to cover it entirely. The requisite quantity of finely-ground coffee is placed in the filter and firmly pressed down, cold water being next slowly poured over it, after which it is allowed to stand until all the water has percolated through it into the reservoir beneath; the passing of the water occupying at least four hours, extracting the full strength and flavor of the coffee in that time. The vessel is high and narrow, so as to retard as much as possible the passage of the liquid, but large enough to hold the requisite quantities of both coffee and water at the same time and to avoid the necessity of an additional supply of water.

Vienna Coffee.—The famous Vienna Coffee is prepared in a somewhat complicated contrivance, resembling a cylinder or urn, fitted with a coarse sieve, the water being boiled by means of an alcohol lamp underneath. When the water boils the steam passes through a tube and at the same time through the finely-ground coffee, which has previously been placed loose on the top, but protected by several strainers. A glass top attached to the urn enables the cook to observe when the coffee is properly prepared, the process securing a perfect infusion of the coffee, and at the same time preserving its full aroma and other properties.

Creole Coffee—Is prepared by distillation, the coffee being first roasted until it has assumed a uniformly brown color, after which it is covered up and allowed to cool. It is then ground and covered up carefully again until ready for use, when the requisite quantity is put in a filtered coffee-pot into which it is pressed compactly, a little briskly boiling water is then poured on and allowed to filter through the coffee, when more boiling

water is poured on, the process being repeated about every five minutes until ready to serve. The result of this process is very strong and rich in extract, which is often preserved in a perfectly air-tight jar or other vessel until again required for use. A single teaspoonful of which is sufficient to yield a rich and creamy cup of the beverage when desired.

Extract of Coffee—Is, properly speaking, the true "Essence of Coffee." It is best obtained by distilling one part of pure ground coffee with five parts water and keeping them at a temperature of 209° C. in a very close vessel for about ten minutes, steaming and evaporating it at a low temperature in a vacuum pan until reduced to one part. Or it may be more conveniently obtained by the Cuban and New Orleans methods already described, one spoonful of which yields a delicious cup of coffee instantaneously as desired.

It is not too much to state that more than one-half of the beverage which masquerades and is sold under the name of coffee, is unworthy of the appellation and that the majority of the people of this country live and die without ever knowing even the true taste of that delicious and exhilarating beverage; people being prone to think that they know all about coffee without ever studying what special qualities the different varieties possess, or the best methods of preparing it. As a nation, the American people want the best of everything and expect to get it, and a country which expends so many millions of dollars annually for coffee, can well afford to study the best methods of selecting and properly preparing it. But what avails the best material if it be not prepared in such a manner as to develop and extract its most volatile, delicate, subtle and refreshing properties, as the same properties may be depressing and injurious, or

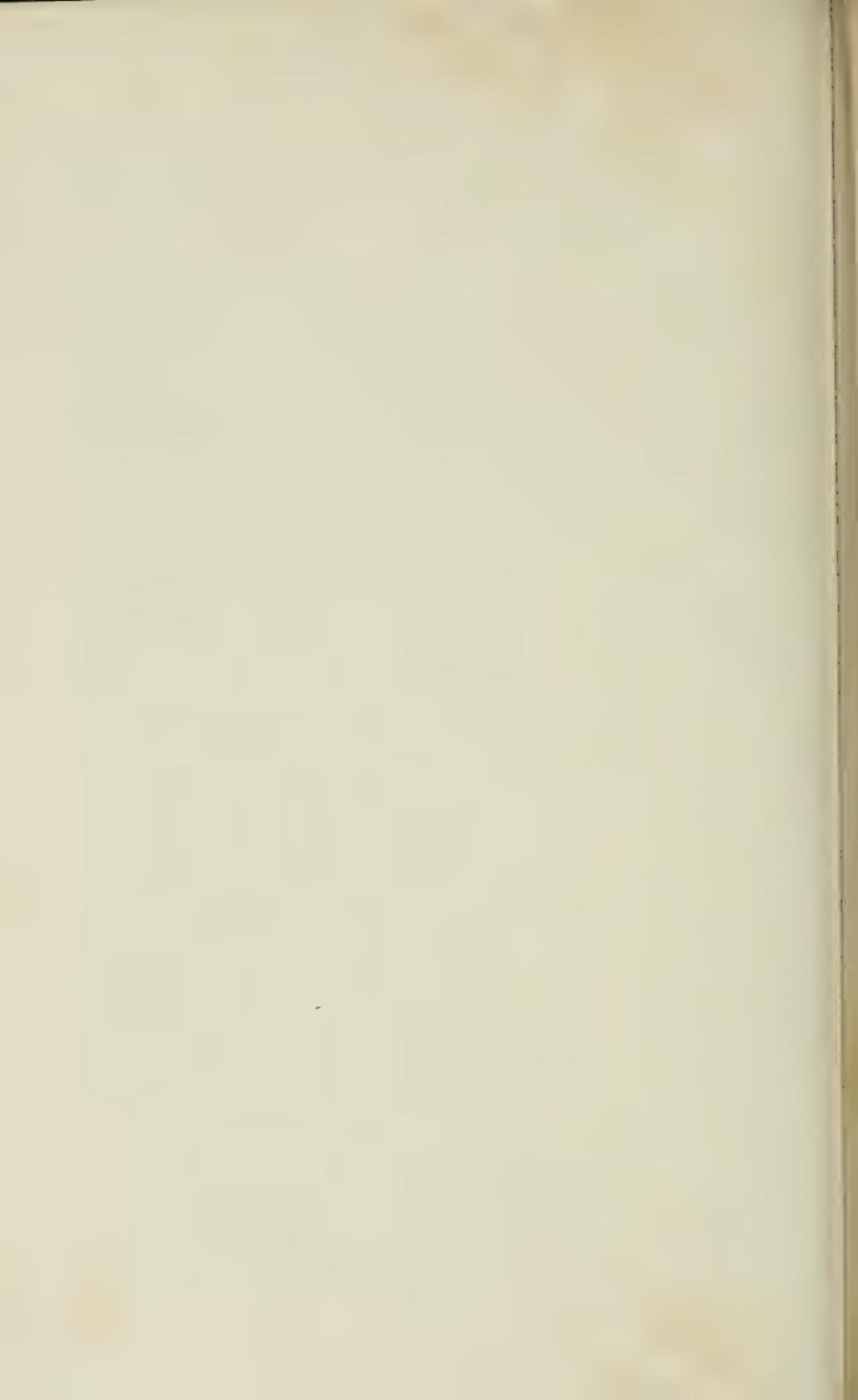
exhilarating and beneficial proportionately as they are treated?

A large proportion of housekeepers purchase their coffee already roasted, and many more buy it ground, but if bought whole while still hot and kept in an air-tight can until required and then ground, the improvement in the liquor would amply repay for the trouble expended, as much of the fragrance and aroma of the roasted coffee is lost by laying too long, there being even a greater loss when the coffee is ground for too long a time. But, on the other hand, unless the roasting is done very carefully at home, the coffee will not be good, either, as a few burnt beans in the roast will invariably spoil the drink. So that when careful attention cannot be given to the proper roasting of coffee at home, it will be better to purchase it in the whole bean already roasted but never ground, using a small mill which can be regulated to grind coarse or fine as needed.

To roast coffee at home, put the raw beans about an inch deep in an ordinary dripping-pan, which must be perfectly clean, and hold over a brisk fire and stir frequently until the beans are sufficiently browned. When the coffee becomes a cinnamon-brown, and begin to crackle, add one tablespoonful of fresh butter, stirring well at the same time, after which remove and place while hot in a can, and cover closely, again heating the coffee before or after grinding prior to preparing. Or place one pound of raw beans in a broad dripping-pan, shaking and stirring it until they begin to brown and crackle, then turn the pan from end to end rapidly, until they are evenly colored to a cinnamon or chocolate shade. Then place the pan on a table to rest, and stir into the coffee the beaten whites of two eggs and a tablespoonful of fresh butter, glazing every bean, as this

SORTING COPPER.





preserves the aroma until ground. When cool shake the beans in a small sieve, so that they may not stick together, and put them in an air-tight canister until required.

A combination of one part Mocha, one part Rio and two parts Java or Maracaibo will yield a heavy, rich, strong-flavored coffee, but not as smooth and pleasing as if the Rio were omitted, unless for those preferring it. In other words, when a smooth and delicate flavored beverage is required, use one-third Mocha and two-thirds Java. When strong and heavy is desired, use Rio and Maracaibo or temper the former by combining it with some of the milder kinds. When a rich, smooth beverage is desired, a combination of one-third Mocha and two-thirds Java; if a medium, Java and Maracaibo or some other good, mild grade. But when a heavy body and strong flavor is required, a blend of Rio or Santos and Maracaibo in equal proportions should be made. Good Maracaibo being equal to many Javas and is constantly substituted for it by unprincipled dealers, both wholesale and retail.

A combination consisting of one-third Mocha and two-thirds Java fresh roasted and fresh ground makes an ideal cup of coffee. Two tablespoonfuls or one ounce of this blend to each pint of boiling water produces a beverage that cannot fail to suit the average taste. But for consumers who prefer a heavy-bodied beverage a combination of equal proportions of Santos, Caracas and Maracaibo, will be found to yield a rich, heavy, pungent and fragrant liquor. These quantities are intended for a strong beverage, but where only a moderate degree of strength is desired it is best to use only half these quantities of coffee to the same quantity of water.

Some recent experiments in Germany confirm the opinion that coffee, which is an aid to digestion, should

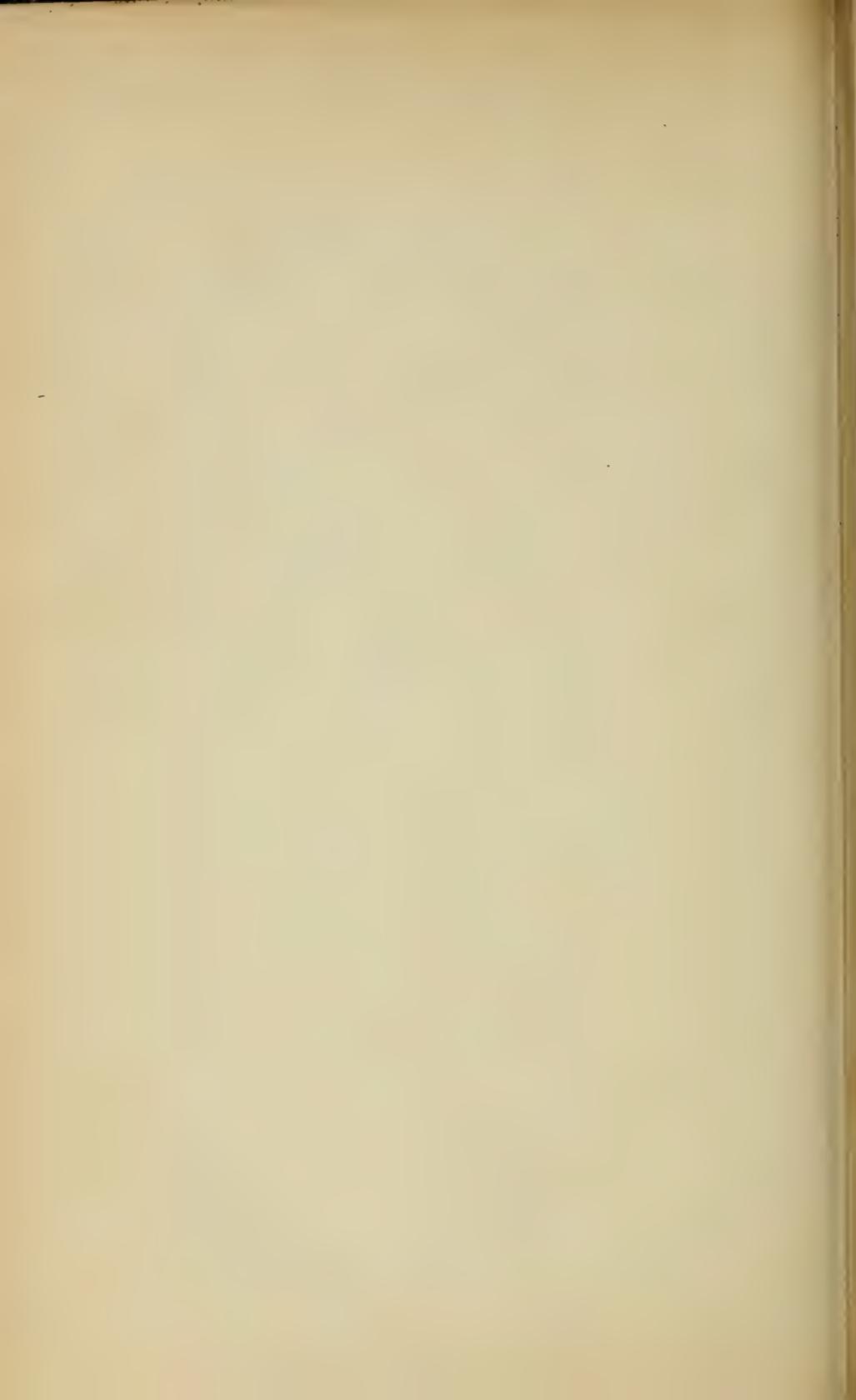
be an infusion and not a decoction, for which particular reason alone the after-dinner coffee especially should be an infusion, as the *caffeine* of coffee, which is the element most stimulating, is best drawn out by keeping the coffee at the boiling point, but without boiling, for a few minutes before serving, as prolonged boiling extracts the astringent property, tannin. There seems to be, however, a general tendency in favor of the filtering process, by which the use of all foreign substances, such as eggs, isinglass, hartshorn, codfish and sole-skins, to clear and settle it, may be dispensed with altogether.

To make filtered coffee with cold water, put one teacupful of finely-ground coffee in a small pan and heat over the fire. Stir constantly until hot and then put the hot coffee in the filter of the coffee-pot, placing the coarse strainer on top and pour in a cupful of cold water by degrees, then cover and let stand for half an hour. Next add three cupfuls of cold water, a cupful at a time, and when all the water has passed through the filter, pour it out, and pass it again through the filter, cover closely and heat it to the boiling point before serving. The coffee prepared in this manner will be perfectly clear and sparkling in liquor, smooth, rich and fragrant in flavor, or mix the coffee with the white of an egg together, then pour one-third of the requisite quantity of cold water and set the pot on the range where it will heat up gradually until it begins to boil; then add another third of cold water, and when it again begins to boil add the balance of cold water and allow it to again reach the boiling point; remove and let stand for a few minutes to settle before serving. By this method boiling water may be used instead of cold if so desired, but the use of cold water makes a richer and stronger infusion, as none of the aroma of the coffee is lost by evaporation, and the

refreshing properties are better extracted by the slower process.

Filtered coffee should never be boiled ; so that by placing the coffee-pot in a vessel of boiling water it keeps the coffee at the boiling point, but prevents it from boiling. Coffee made by the cold-water process is invariably stronger than when made with boiling water, and is, in the opinion of many connoisseurs, much better, so that a reduced quantity of coffee will answer. Another advantage of using cold water in the filtering process is that the coffee may be prepared from it at any time and heated as required ; but if to be served after dinner it will be better if made with three cupfuls of water instead of four.

But no matter what method of preparing is adopted, or what kind of vessel the beverage is prepared in, the result will be satisfactory if the coffee be pure, good and *fresh roasted, fresh ground and fresh made with fresh water, fresh boiled and fresh served*. But always serve with whipped cream or hot milk, heating the milk to the boiling point, but *never allow it to boil*.



CHAPTER IX.

CHEMICAL, MEDICAL AND DIETICAL.

IN chemical composition the seeds or beans of coffee are complex, containing as they do variable proportions of proximate principles. The appended analysis represents the average constitution of raw coffee, according to M. Payen, and which is accepted as the standard :—

Constituents.	Parts.
Fat,	10 to 13
Water,	12
Caffeine,	0.8
Cellulose,	34
Legumen and caseine,	10
Glucose, dextrine and organic acid,	15
Caffeone and aromatic oils,002
Caffetannate and potassium,	3 to 5
Viscid essential oil (insoluble in water),001
Ash and other mineral matter,	6
Other nitrogeous substances,	3

In addition to the foregoing, Payen also describes some 0.8 per cent. of free Caffeine and very small quantities of essential and aromatic oils, amounting to about 0.003 per cent. of the coffee, in addition to other azotized and saline matter.

In the process of roasting, coffee undergoes certain chemical changes, as before roasting it contains from 5.7 to 7.8 per cent. of sugar, which is reduced to 1.1, and

sometimes even to zero, after being roasted, and from which, it would appear, that the description of sugar contained in the raw coffee is destroyed by the roasting process to which it is subjected previous to using.

COMPARATIVE ANALYSIS OF RAW AND ROASTED COFFEES.

Constituents,	Raw.	Roasted.
Ash,	3.97	5.17
Fat,	11.42	8.30
Water,	8.26	0.36
Sugar,	8.18	1.84
Gluten,	10.68	12.03
Caffeine,	1.10	1.06
Cellulose,	42.36	44.96
Extractive matter,	14.03	26.28
Total parts,	100	100

In the operation of roasting, the saccharine matter is converted into caramel, and a portion of the caffeine is liberated from its combination with the caffeic acid, the latter still retaining its astringent properties and developing into a bitter, soluble principle. A change in the fat of coffee is also undergone in the roasting, as ether will extract only from 4 to 5 per cent. of fat from the raw bean, while it readily extracts double that quantity from the roasted bean. So striking is this fact that Von Bibra goes so far as to claim that the roasting process produces fat, but most probably the process is only mechanical and not chemical in its action in bursting the "fat cells," and thereby rendering the fat accessible to the solvent action of the ether. Roasted coffee is also tolerably rich in nitrogen, containing from 2.5 to 3 per cent., but is found to be quite devoid of starch. The operation of roasting, in addition, tends to make coffee soluble in boiling water, as, when raw coffee is perfectly exhausted

in boiling water, it will yield only some 25 per cent. of soluble matter, while roasted coffee, on the other hand, when completely exhausted by means of boiling water, yields as high as 40 per cent. in some instances. A chemical analysis of the bean after being roasted also shows that it contains 20 per cent. of water and about 60 per cent. of cellulose, a substance resembling starch or grape sugar. But the agents that especially distinguish coffee from all other substances are the Caffeine, Caffeine and Caffaic, each of which constituents possess virtues and effects peculiar to itself, and produce, by acting in combination, the general effect of coffee.

Caffeine—Is the principle to which coffee owes its refreshing and agreeable properties. It is an inodorous agent, having a slightly bitter taste, and belonging to that group of chemical agents known as alkaloids. It is identical with the *theine* of tea, and also forms the characteristic principle of cocoa, maté, the guarana and many other plants used by the inhabitants of widely-separated countries, on account of their yielding a slightly exciting and refreshing beverage and apparently forming a necessary diet for mankind in general. Its quantity varies from 0.8 to 1 per cent. in the different kinds of coffee, being greatest in Martinique and smallest in San Domingo. According to Chandler, pure Caffeine appears in white silky needles, having no odor, and containing about 8 per cent. of water of crystalization, which it parts with at 150° C., being apparently soluble in cold water, but much more so in hot, still less so in alcohol and still less in ether, acting as a weak base and dissolving in acids from which it may be crystalized by evaporation. When boiled with fixed caustic alkalies it decomposes and yields methlamine, while heating with basic-hydrates

alters it to a stronger base, termed Caffeidine, but when boiled with an excess of nitric acid and evaporated at a gentle heat gives it a reddish color resembling that obtained from minoxide; the addition of a little ammonia making it again quite characteristic. Administered in strong doses it causes trembling and a kind of intoxication not unlike that resulting from alcoholic stimulants, but diminishes the work of organic tissue at the same time.

Caffeone.—Besides Caffeine coffee contains a volatile or essential oil chemically termed Caffeone which, according to some authorities, is not present in the raw bean, but is the result of an essential change produced in the coffee by the roasting process. It is to this subtle and fugitive principle, however, that roasted coffee owes its peculiar and fragrant aroma, an odor possessed by no other known substance. When chemically separated by ether from the coffee it presents the appearance and consistency of cocoa-butter, which in roasting permeates the entire bean, but if the heat be too intense or the roasting prolonged beyond the proper time, it is entirely dissipated and lost, the result being to seriously injure the coffee. And although coffee forms part of the daily food of more than half the nations of the world, we are still uncertain of the chemical nature, composition and effects of these products of roasted coffee, and particularly of this "oil of coffee," one of the most important characteristic constituents of the bean. The existence of this coffee oil makes itself known in a striking manner by its roasting; being forced out of the bean by the intense heat, it is partially volatilized, and together with the other products of the roasting, produces the characteristic effects and aroma of roasted coffee. In very strong black coffee it is found in oil-like drops floating on the surface, the amount

in the raw bean varying from 8 to 13 per cent., at least one-half of which is dissipated and lost in the roasting, so that it might prove a paying experiment to attempt to collect this oil, especially in large establishments where much coffee is roasted, several pounds of this oil being wasted daily which might find a ready market at a handsome profit in the manufacture of liqueurs. It is best obtained by crushing about 50 pounds of roasted coffee in a mortar and then extracting with the aid of ether and alcohol. The oil of coffee obtained in this manner is a thick, green, almost transparent substance, which deposits after a time a few long needles of caffeine, proving that since caffeine is not extracted from the exhausted beans by ether, and very little is taken up by the alcohol employed, the coffee from which the oil has been extracted may be again used for the manufacture of caffeine. The oil becomes turbid in about six months from the time of extraction, although preserved in hermetically-sealed bottles small groups of crystals forming in the middle of the liquid, but slowly settling in the bottom, forming a precipitate, which in time forms a cloudy mass of crystals, consisting of the solid fatty acids, but the upper layer remaining clear and transparent for years, and of a beautiful green color, proving that a portion of the coffee oil consists of liquid oleic acid. Taken alone, this "oil of coffee" is found to produce a gentle perspiration and exhilaration, as well as to stimulate the mental faculties, but is claimed to retard, in a marked degree, the process of food assimilation, and consequently the waste of tissue matter. It also produces an aperient effect on the bowels, while overdoses cause sleeplessness and symptoms of sthenic excitement, a condition clearly bordering on inflammation.

Experiments made with Caffeine and Cafféone prove that they produce different effects on the animal economy,

the former exercising a sedative and tranquilizing action, being more prolonged in its effect than the latter, which acts strongly as a transient stimulant and exhilarant. But in the drinking of an ordinary cup of coffee both these actions are obtained, the stimulation and exhilaration preceding the state of sedation and repose. The essential principle of the coffee, however, is the alkaloid caffeine and not the volatile oil caffeone, the effects of both constituents being different in time and character. The former slows the heart's action and expends its main force on the spinal cord, to which effect is due the shaking hand of the inveterate coffee-drinker and the marked tremor which sometimes follows a copious drink of coffee when taken on an empty stomach, while the latter reduces the arterial tension, thereby allowing a freer flow of blood and a more rapid action of the heart, at the same time stimulating the brain, rendering the mind clear and promoting wakefulness, being also speedier and more transient in effect.

Caffeic.—Caffetannate, or "tannic acid," as it exists in the raw bean of coffee possesses an astringent action, which is greatly modified in the roasting and neutralized by the aperient properties of the Caffeone. A great deal of doubt still exists as to the exact agency of this property in coffee, many chemists contending that to it the flavor and other properties of the coffee as a beverage is due. It is a powerful astringent principle, puckering up the mouth when chewed, and is the property to which coffee owes its bitterness when boiled or over-infused, but whether it contributes in any degree to the exhilarating, satisfying or narcotic action of the coffee has not yet been definitely determined. But united, their specific properties modified by combination and

acting and reacting upon each other, these three constituents give to coffee its peculiar properties and effects on the human system.

To the chemist, coffee and tea are much the same, their two alkaloids, *caffeine* and *theine*, being to them undistinguishable one from the other, each also containing a volatile or essential oil, the difference in the taste of which is doubtless due to subtle properties which the chemist is so far unable to detect. For this reason the following comparative analysis of coffee and tea may be found interesting, as showing how closely they are chemically allied:—

Constituents.	Coffee.	Tea.
Water,	12.0	5.0
Theine,	0.75	0.5
Tannin,	5.	15.0
Gluten,	13.0	25.0
Wood fibre,	34.0	24.0
Volatile oil,	13.0	4.0
Gum and sugar,	15.0	21.0
Ash or residue,	7.0	5.0

From recent experiments it appears that the quantity of tannin in the coffee bean is not over about one-third of that contained in the tea leaf and frequently is considerably less, six samples of coffee being tested in the same manner as tea for the amount of soluble tannin, and steeped in fifty parts of water. Equal quantities of coffee and tea were also analyzed and the amount of tannin estimated with the result that, on an average, tea yielded nearly four times as much tannin than the coffee, which proves that in case of poisoning by alkaloids strong tea is better than coffee as an antidote. When used in equal quantities tea yields about twice the amount of theine that coffee does to the water in which it is

infused, but as we use a greater weight of coffee than we do of tea in preparing the beverage, a cup of coffee of ordinary strength will contain as much theine as a cup of ordinary strong tea. While, however, coffee checks waste and is naturally a food, the same cannot be said of tea, the specific effect of which is to quicken respiration and the vital functions generally.

MEDICINAL EFFECTS.

Coffee belongs to the medicinal or auxiliary class of food substances, being solely valuable for its stimulating and exhilarating effect upon the nervous and vascular system. It produces a feeling of buoyancy and exhilaration comparable to a certain stage of alcoholic intoxication, but which does not end in the depression and collapse produced by the latter. It increases the frequency of the pulse, lightens the sensations of fatigue and sustains the strength under prolonged and severe muscular exertion. It also contains valuable medicinal properties, among which is that of being an anti-soporific, and hence most useful in narcotic poisoning. It has also been found to be the best stimulant for administration to persons rescued from starvation or perishing from intense cold, as ardent spirits when given under these conditions often prove fatal. It dispels languor, stupor and lethargy and as an antidote is a specific in cases of poisoning by opium and morphine.

The early history of coffee informs us of its use among the Arabians for its exhilarating as well as its curative powers, being used in Mecca and Medina originally for the purpose of overcoming torpor and drowsiness by the Mohamedan monks, its exciting and sleep-dispelling

power tending much to bring it into popular favor in these cities as a medicine as well as a beverage. At this early period it was claimed that "this liquor purified the blood by gentle agitation, dissipated the ill-condition of the stomach and aroused the spirits." In the treatment of spasmodic asthma its utility is well established as well as in the cure of whooping cough, cholera infantum and similar complaints, being also an excellent preventative against all infectious and epidemical diseases. While in hysterical attacks, for which, in many instances, the physician can find no diagnosis, coffee has proven to be one of the greatest helps.

Fresh-roasted coffee has proven to be an effective dispeller of foul gases as well as a valuable disinfectant in the sick-room, or any enclosed space where the fumes can penetrate. As an instantaneous deodorizer, particularly in the sick-room, where it has no equal, possessing wonderful, almost magical power, all foul and noxious exhalations being immediately neutralized or dispelled by simply passing a chafing-dish of fresh-roasted coffee through the room. As a disinfectant fresh-roasted coffee has been invaluable as an absorbing agent in purifying the atmosphere of all foul-smelling and offensive odors, especially when roasted in the vicinity of the room or place to be fumigated. When roasted, and while still hot, if placed on a tray or other open vessel in the centre of the apartment, by the time it has cooled the surrounding atmosphere will be rendered thoroughly pure and sweet. Or, better and more advantageous still, by heating an iron fire-shovel red hot and placing a handful of ground coffee on it and carrying it around the room or house to be disinfected in this condition until it cools. The vapor arising from the coffee so heated will meantime have destroyed all disagreeable and noxious odors.

Experiments recently made with roasted coffee in France prove it to be one of the most powerful deodorizers yet discovered for the dissipation of all noxious odors. As an instance of its great worth in this case, a quantity of decomposing meat was hung up in a tightly-closed room and a tin pan containing a few handfuls of fresh-roasted and ground coffee was placed over a spirit lamp, as the pan became hot and the vapor from the coffee filled the room, it was found that the foul smell of the decomposed meat was entirely removed, even when standing close up to it. While Professor Beer, an eminent Vienna oculist, maintains that the vapor arising from pure, hot and fresh-made coffee is very invigorating to the eyes, but at the same time attributing many frequent occurring cases of affections to the sight to the constant use of chicory, as well as to the habitual use of the decoctions prepared from the admixtures of chicory and coffee.

Coffee and pepper are highly recommended as a certain specific for rheumatism, as well as in many forms of gout. In such cases the proper proportions consist of a pint of hot, strong, black coffee, which must be perfectly pure, and seasoned with a teaspoonful of *pure* black pepper, thoroughly mixed before drinking, and the preparation taken just before retiring. Quite a number of chronic cases of rheumatism are reputed on excellent authority to have been cured by a single dose of this simple remedy. The greatest care has to be exercised, however, that cold is not contracted through the free perspiration that follows its use, yet severe colds may also be broken up and cured by its administration. Such a simple and convenient remedy is certainly worth a trial, as it is, at least, perfectly harmless, and makes no demand on the doctor or druggist. Another use for coffee medicinally, is in nausea and violent retching, for which purpose

a strong infusion is prepared and "sipped" slowly while very hot. This oftentimes acts effectively alone, but is much more so if a strong mustard plaster is applied to the pit of the stomach at the same time. Its beneficial effects in extreme alcoholism is already too well known for description, but is as yet not fully appreciated in such cases, nor as to what extent this otherwise exhilarating and potent beverage may be substituted in lieu of spirituous and malt liquors. It is positively asserted by men of high professional ability that when the system requires a good stimulant, nothing equals a cup of good, strong, fresh-made coffee for the purpose, so that those who may desire to rescue a drunkard from his bane will find no better substitute for alcoholic spirits or malt liquors than strong, fresh-made coffee, in the proportions of two ounces of good, pure coffee to one part of boiling water, making an excellent tonic beverage, but must be administered without the addition of either milk or sugar in these particular cases.

It is also positively asserted by those who have tried it that malarial and other miasmatic complaints are prevented by drinking a cup of hot coffee before venturing out into the morning air, and by many eminent physicians it is regarded as almost a specific in typhoid and other endemic fevers, so much so that in malarial and intermittent fevers it has been used by the best physicians with the happiest results, coffee being opposed to malarial and all noxious vapors, particularly in alienating and reducing the earlier attacks, and, when properly administered in such complaints, it is found superior to the sulphate of quinine in many extreme cases, while in that low state of intermittent fever as found on the Mississippi and the banks of all large rivers, accompanied with torpid liver and enlarged spleen, when judiciously prepared and administered it has been found one of the safest and most

effective remedies. In districts rife with malarial and other low fevers the drinking of hot coffee before passing into the infected districts will enable persons living in such regions to escape all contagion, the nervous system being aroused and the fever germs thereby rendered innocuous by the coffee. It is also almost a specific for the disease after being contracted when used with lemon juice, and is found to be of sovereign efficacy in tiding over any attacks of the nervous system in a number of emergencies from whatever cause; and in answer to the query so often put, "Does coffee facilitate or retard digestion?" it may be observed that it contains several active principles, each of which exercises a specific influence on the human system, the first and most important of these being the caffeine, which raises the activity of the heart, operating in small doses as a wholesome stimulus. The second, the caffene or volatile substance, which operates chiefly on the nerves and acting in moderate quantities as an agreeable exhilarant, but to which is also attributable the fantasies and intoxicant effects so frequently experienced as a result of excessive coffee drinking. The third being the caffeic or tannin, to which coffee owes its bitter taste when boiled or over-infused and which, as is well known, enters into combination with the albumen, thereby materially prejudicing its digestibility. These three principal properties vary greatly in the quantities extracted according to the methods of preparation, so much so that if the coffee be simply infused in water at the boiling point and allowed to cool rapidly we get but little of the caffeine in the extract, a good deal of the aromatic principle and scarcely a trace of the tannin, but by over-boiling and prolonged infusion the aroma is dissipated by passing off with the steam or vapor arising from it

in the process of preparation, more caffeine being also extracted, and the longer it is infused or boiled the more tannin is dissolved in the liquid. These facts serve to confirm the views generally expressed by physicians, that coffee boiled or over-infused prejudices its digestibility, while simple infusions facilitate it, but its beneficial action in the latter case is now proved to be due not to any direct chemical action on the albumen present, but indirectly to its action on the nerve-centres of the stomach by promoting the secretion of the gastric juices, such action being, in other words, physiological and not chemical, as heretofore supposed.

With regard to the anti-bilious properties of coffee Dr. Elliott states that "We speedily found that patients in hospitals and all persons leading sedentary lives must avoid too concentrated food and drink abundantly of diluent fluids, that coffee acted on the liver and was altogether the best remedy for constipation and what is commonly termed a bilious condition, that tea acted in a precisely opposite direction, and that not poppies, mandragora nor all the drowsy syrups of the East could bring the peace to a sufferer from malarial chill that would come of strong coffee, with a little lemon juice added, and that strong tea was almost a specific for neuralgia in its simplest and most uncomplicated form." Liebig also calls attention to the fact that coffee contains many of the elements which stimulate the flow of bile, being a decided laxative, as well as a pronounced diuretic, which is confirmed by the fact that the "coffee belt" of the world is also the "bilious belt" and the "malarial belt," as well as the regions where noxious germs and suppurative processes most abound. Ample evidence of "the fitness of things" in nature, no people understanding better than the inhabitants of these tropical

countries the value of coffee to open the secretions which have been checked by the heat or miasmatic influences of such climates. Knowing this, they take full advantage of the well-known antiseptic properties of coffee.

It is now more than thirty years since Landarabilco called attention to the great value of raw or unroasted coffee in hepatic and nephritic diseases; who, after having continued to use the remedy for over a third of a century in many hundreds of almost hopeless cases, still continues to use it with marked success in the treatment of liver and kidney troubles which have persistently resisted all other treatment. For such cases, 3 drams ($\frac{1}{4}$ oz.) of raw coffee beans are placed in a tumbler of cold water—the best results being obtained from a combination of Mocha, Bourbon and Martinique coffees in equal parts of 1 dram each. The infusion is allowed to stand over night, and after being properly strained or filtered must be taken on an empty stomach the first thing on rising in the morning. This simple remedy has been found a sovereign remedy in numerous cases of renal and hepatic colics, as well as in diabetes and migraime or nervous headache, which, while rebellious to all other treatment for years, readily yielded to the raw coffee infusion. It may be here remarked that Bourbon and Martinique coffees cannot be had in this country, going exclusively to France, but may be substituted by what is known in trade as Bourbon or Mocha-seed, Santos, Jamaica and Mocha or almost any other fine mild coffee.

Coffee, like tea, acts powerfully on the respiratory organs, but increases the rate of respiration more than tea and also the pulsation; while tea, on the other hand, increases the action of the skin, and, by lessening the force of the circulation, cools the body, and does not cause congestion of any of the mucous membranes,

particularly that of the bowels. But coffee, by diminishing the action of the skin, lessens also the heat of the body, but increases the *vis-a-tergo*, and therefore the heart's action and fulness of pulse, thus exciting the mucous membranes. The conditions, therefore, under which coffee may be used are different from those suited to the use of tea, and under these circumstances better adapted for use among the poor and feeble as a dietecal beverage. But, besides accelerating the action of the bowels, and, according to Liebig, aiding in the secretion of the bile, it also invigorates to a very high degree the ganglionic system of the brain, soothing the painful feeling of fatigue and exhaustion, stimulating to renewed mental exertion, for which reasons it always has been highly appreciated by students and literary people generally. The exhilarating and stimulating effect which coffee has on the human organization is due chiefly to the characteristic principles which it contains. It excites the heart's action, and, as that organ is feeble in the morning and the skin is active, it is best adapted for use at the morning meal, its action upon the nervous system being less exciting than that of tea. Very strong coffee, however, produces sleeplessness in many persons when taken at night, owing to its effects on the heart's action, by retarding that full action of this organ, which is natural at night, and so requisite to permit sound sleep, while if only a light infusion be prepared and taken at night, these effects are not likely to be experienced.

In typhoid and other fevers its action is frequently very prompt and efficacious, particularly in the early stages before local complications set in. Dr. Guillaſſe, of the French navy, in a recent paper on typhoid fever, states that "Coffee has given us unhopedor satisfaction, for, after having dispensed it, we found,

to our great surprise, that its action was as prompt as it was decisive. No sooner had our patients taken a few tablespoonfuls of it than their features became relaxed, and came immediately to their senses, while the next day the improvement was such that we are tempted to look upon it as a specific against typhoid fever. Under its influence the stupor is dispelled and the patient arises from the state of somnolency in which he has lain since the invasion of the disease; soon all the functions take their natural course, and he enters on convalescence." His formula is to give to an adult two to three tablespoonfuls of strong, black coffee every two hours, alternately with one to two tablespoonfuls of claret or burgundy wine, a little lemonade or citrate of magnesia, to be taken daily, and after a few days quinine in small doses. From the fact that malaise or cerebral symptoms appear first, the doctor regards typhoid as a nervous disease, and the coffee, acting on the nerves, is peculiarly indicated in the early stages, before local complications arise. While in extreme cases of yellow fever it has been used effectively by many doctors as the main reliance after all the other well-known remedies had been administered and failed. In such cases it acts by retarding the tissue change, that becoming a conservator of force, especially in that state in which the nervous system tends to collapse, owing to the blood becoming impure. In such a condition it sustains the nervous power until the depuration and reorganization of the blood are accomplished, possessing the advantage over all other stimulants of inducing to no secondary ill-effects.

As early as 1835, during the cholera epidemic, the physicians of New York issued a public manifesto urging the people to abstain from beer and other liquors and confine themselves to the exclusive use of pure, strong

coffee as a beverage, in order to keep the system healthy and render it less liable to an attack of the disease, with the most beneficial and gratifying results. That they "built better than they knew" has since been conclusively proven by Sudentz, who in detailing a series of experiments in which he has determined the powerful influence of coffee infusions of varying strength upon the growth of the different forms of pathogenic and non-pathogenic micro-organisms. The variety of coffee used in these experiments was the finest Java—although good and bad coffee was afterwards found to effect precisely similar results—the infusions being made by adding from 10 to 30 parts of coffee to from 70 to 90 parts of boiling water. The coffee was first *freshly* roasted, ground fine and then covered with the boiling water, the infusion thus prepared being placed in a closed flask, put in a hot water bath for about ten minutes and next filtered through a sterilized filter. The infusion thus produced is used in the making of a gelatinous compound, both directly and in part, until a nutrient gelatine was prepared from it. With this as a "menstruum" the various forms of *fungi* and other forms of micro-organisms were inoculated with the object of determining the possibility of their growth or propagation in such a medium, but in other cases the organisms were added directly to the coffee alone in infusions of varying strength and after different periods of time inoculations were made from these infusions into other nutrient *media*. By this method he found that the forms of *fungi* experimented with showed more or less growth in the coffee gelatine and that the abundance of the growth was in many cases distinctly less than in the former *media*. The other organisms which he used for his experiments were the *phyogenesis aureus*, *prodigiosus*, *crisipelous*, the germ of *anthrax* or

splenic fever, the *bacilli* of typhoid fever and the *spirulum* of Asiatic cholera, all of which and many other forms of micro-organisms were greatly influenced in their life and growth by exposure to the coffee infusions, some being far more susceptible than others, however, the *bacillus prodigiosus* and *proteus vulgaris* being entirely destroyed only after an exposure of four days in a 10 per cent. infusion, while in a 30 per cent. infusion they were all destroyed in one day. The spore of erysipelas was totally destroyed after an exposure of one day in a 10 per cent. infusion, the germ of splenic fever dying in from one to three hours in a 20 to 30 per cent. infusion; while the typhoid *bacilli* were completely destroyed in a 5 per cent. infusion after an exposure of three days and in a 30 per cent. infusion in from one to two days. While *the microbe of Asiatic cholera was easily destroyed in a 1 per cent. infusion after only seven hours' exposure, in a 5 per cent. infusion after four hours and in a 30 per cent. infusion after two hours*; the cholera *spirulum* being by far the most susceptible of the numerous organisms used in the experiments, next to which was the *anthrax bacilli*, except the young forms or spores of the latter germs, which perish only in from three to four weeks' exposure. These latter results speak volumes for "coffee as a germicide" for anthrax or splenic fever, as the spores of this disease are by no means easy to scotch or kill, and after these revelations *coffee administered internally or hypodermically in some new form or combination of forms, may be eventually used as a remedy for all germ-produced diseases*. It must be borne in mind by the student or chemist, however, that the antiseptic effects of coffee do not depend on its *Caffeine* so much as on its *Caffeone* or essential oil developed in the roasting of the beans. But aside from these experiments, others

were also made with decomposing meat soups, which were actually swarming with various forms of micro-organisms, the results obtained showing that the vitality of the spores contained in the fluid was greatly diminished after a short exposure, but was not completely destroyed until after an exposure of many days.

It may at first sight seem irrational that a substance which restricts tissue-waste should be used for the purpose of quickening certain other functions, more especially those of the brain, yet the physical activity, mental exhilaration and wakefulness it causes explains the liking for it shown by so many men of science, poets, scholars and others devoted to thinking. But all of these occupations involve increased waste of tissue in the brain as well as of the spinal marrow, the very action which coffee is said to restrain, so much so that to reconcile these apparent incongruities, it has been maintained that coffee does not act primarily as a cerebral stimulant, but only secondarily by removing the vascular plenitude occasioned by prolonged study, by a full meal, and especially by opium, alcohol, or other agents which directly tend to load the brain with blood, so that when taken on an empty stomach it does not quicken the functions of the brain, but on the contrary renders it dull and inapt for steady thought, creating nervousness and general debility and frequently causing hemicrania.

During digestion, however, the case is different, particularly if a full and stimulating meal has been taken, the mind grows dull and sluggish, a tendency to sleep arises, and everything indicates an increased amount of blood on the brain, it being in like manner that prolonged mental labor produces cerebral plenitude and drowsiness. It is this condition apparently which coffee corrects

by contracting the blood-vessels and thereby relieving the brain of its oppressive load of blood. The habit of using coffee at breakfast and after dinner is thus explained by the stimulant action which it exerts, not only upon the nervous system generally, but more especially on the stomach and bowels, there being no doubt that it quickens gastric digestion and relieves the sense of plenitude in the stomach, stimulating the secretion of bile and augmenting the peristaltic action of the intestine, and thereby promoting defecation. While it is quite as certain that, used to excess, it paralyzes the digestive function in all its stages and leads to further disorders, of which the chief are constipation, hemorrhoids and congestion of the liver, but whether these effects are to be ascribed to a power in coffee to produce contraction of the capillary blood-vessels or not is uncertain, but their reality is beyond dispute.

With regard to the injurious effects charged to the abuse of coffee by some authorities, it may be said that the consequences of an abuse of tea were declared to be similar to that of coffee long before chemistry had demonstrated the identity of *theine* with *caffeine*, when among their evil effects were enumerated acidity, heartburn, indigestion, tremors, wakefulness, irritability of disposition and depression of spirits. Most of these ill-effects are more likely to follow the abuse of tea than coffee, if at all, and the spinal symptoms, such as painful muscular tension, cramp and persistent wakefulness, are also more apt to be produced by tea. In experiments made with a number of selected healthy persons, the operation of caffeine has been found to vary exceedingly, some being scarcely affected at all, while others by the same dose suffered from a full, frequent or irregular pulse, headache, trembling limbs, palpitation of the heart, flashes before

the eyes, roaring in the ears, sleeplessness, phantasms, a sort of intoxication, and a subsequent unfitness for all physical and mental labor when very large doses were taken. These effects illustrate the danger of exceeding due moderation in the use of coffee, showing that it may, if abused, tend to develop a morbid condition of the nervous system, rendering it peculiarly liable to disease, although in a much less degree than either opium or alcohol, its excessive use being much more injurious to the spinal than to the cerebral functions.

From these facts it may be advanced by some authorities that an article possessing such great powers and capacity for such energetic action must be injurious by habitual employment as an article of diet, or at least not without some injurious or deleterious properties. But no corresponding ill-results or nervous derangements are ever observed after its effects have disappeared as are noticed in other narcotics and stimulants, the action imparted to the nervous system by coffee being natural and healthy in the extreme, in proof of which it has been shown that habitual coffee-drinkers generally enjoy good health and spirits, some of the longest-lived people having used coffee continually from their earliest infancy without experiencing any inconvenience, depressing reaction, or other ill-effects such as is invariably produced by the use of alcoholic stimulants. There are, on the other hand, systems with which it does not agree, as, being a stimulant, it may be taken too freely; in such cases it undoubtedly produces irregularities in the action of the heart and nervous system. But generally it is an unmixed blessing, its beneficial influence becoming more apparent as its use penetrates into the lower strata of society, taking the place of the various debasing alcoholic beverages.

In addition to its many other virtues, coffee has been found to be an excellent barometer, from the fact of its being such a great absorbent. On the eve of a rain-storm grinding coffee will be found difficult, the bean becoming damp and tough, while when dry weather is indicated the process is quite easy. Another method of predicting the weather by it is to drop a lump of sugar into a cup of coffee without stirring. In a very short time the air contained in the sugar will rise to the surface in the shape of bubbles. If the bubbles collect in the middle of the cup a fair day will be sure to follow, but if they should adhere to the side of the cup, forming a ring of bubbles with a clear space in the centre, rain is certain to be near at hand, while if the bubbles be neither of these, but scatter irregularly over the surface of the liquid, variable weather is indicated by the movement. What the scientific explanation of the action of the atmosphere on the bubbles so found is not known, but that their indications curiously and correctly agree with those of a barometer has been tested and proved.

DIETETICAL PROPERTIES.

The human family have, from time immemorial, been addicted to the use of warm food and liquids in some form, infusions or decoctions of sage and the leaves of other plants being used extensively in Europe for the purpose prior to the introduction of tea and coffee. The human body demands food or liquid when in an exhausted state, and if they be not warm they make an immediate drain on the system for heat before it can supply material for combustion, so that the body is taxed for heat at a time when it is least fitted for the purpose. It

is but natural therefore that there should be a craving for warm food and drink, and as liquid food, particularly in a cold state, is deficient in heat-giving matter, the use of cold liquids is more injurious than that of cold solids. The temperature of the human body being 98° , when food is taken into the stomach at a lower temperature than that of the body, it obstructs the heat from the stomach and surrounding tissues, so that when the practice of taking cold food into the body becomes habitual, depression occurs and the stomach is disordered. The system must therefore make good the heat lost in raising the temperature of the cold food—liquid or solid—or else suffer the consequences.

The action of coffee as a diet is directed chiefly to the nervous system, producing a warming cordial impression on the stomach, which is quickly followed by a diffused and agreeable nervous excitement which extends itself to the cerebral function, giving rise to increased vigor of the imagination and intellect, this too without any subsequent reaction or stupor such as are characteristic of liquor and other narcotics. It contains essential principles of nutrition far exceeding in importance its exhilarating properties, and is one of the most valuable articles of food for sustaining the system in certain protracted and wasting diseases, and as compared even with the best soups, coffee has a decided advantage and is to be preferred to them in many cases. But to rightly understand its function as a food it should be used chiefly as an accessory to food, as it aids in the digestion and assimilation of the other foods when it is properly prepared—that is, by protracted infusion—as when boiled too long the caffeic acid or tannin is extracted. The action of this acid in combination with the milk and cream being to harden the albumen into an indigestible compound, which has

been found exceedingly irritating to the delicate membranes of the digestive organs and nervous system. Milk and coffee act similarly upon the skin and other organs, its use with coffee making it a more perfect food than when milk is used with tea. But while, like tea, it increases the respiration, yet again, unlike it, its effects are not lasting, as by the use of coffee the rate of the pulse is increased, and the action of the skin's pores diminished, thereby lessening the quantity of the blood circulating in the organs of the body, it distends the veins, but contracts the capillaries, thus preventing a waste. According to Professor Johnstone, "Coffee arouses, exhilarates and keeps awake, counteracts the stupor occasioned by fatigue, disease or opium, allays hunger to a certain extent, gives to the wearied increased strength and vigor, and imparts a feeling of comfort and repose. Its physiological effects upon the human system appear to be, that while it makes the brain more active, it soothes the body generally, retards the change and waste of tissue, making the demand for food consequently less.

The Gallæ, a wandering nation of Africa, during their incursions, are obliged to travel over immense deserts, and being also desirous of falling upon the towns and villages of their victims without warning, carry nothing to eat with them but the roasted and pulverized beans of coffee, which they mix with grease to a certain consistency, that will permit of its being rolled into masses about the size of billiard-balls, which they keep in leather-bags until required for use. One of these balls so prepared supports them for an entire day when on a marauding excursion or in active war better than a loaf of bread or a meal of meat, claiming that they prefer it to grain or meat because it cheered their spirits as well as fed them. Eaten in this manner, coffee undoubtedly affords much

nourishment, as, according to Payen, it contains more than twice the nutriment of soup and three times as much as tea. In the liquid state, however, the nitrogenous or flesh-forming properties, being mostly insoluble, they remain in the grounds. For this reason coffees lightly roasted possesses the maximum of nutrition, strength and aroma.

The Belgian coal miners live and work effectively on a ration of solid food less than the French miners, yet perform more labor than the latter, the only difference in their food consisting in the Belgians receiving a ration of coffee instead of wine, to which is attributed their greater endurance. While Jomand states that eight pints of an infusion made with six ounces of different kinds of coffee enabled him to live for five consecutive days without lessening his ordinary occupations, as well as to use more and prolonged muscular exercise than he was accustomed to without any other physical injury than a slight degree of fatigue and a little loss of flesh. The value of hot infusions of coffee under the rigors of an Arctic cold has been demonstrated by the experience of all polar explorers, and it has been found scarcely less useful in tropical regions, where it beneficially stimulates the action of the skin. Captain Parry states that when on his Arctic expedition he placed his starboard watch on a diet of coffee and the port watch on that of rum, as an experiment, with the result that the coffee watch was found to possess a vigor of health and activity entirely wanting in that of the other. And many of our own troops during the late war declared that they could march longer and endure more hardship and exposure under the stimulus of a cup of warm coffee—and they got far from the best or purest—than they could under an equal quantity of liquor.

But there is still another effect of coffee—that of checking the too rapid consumption of nitrogeous matter in the system—which, while not nutritious in itself, yet possesses an indirect nutritive value; this result, added to its stimulating character, have made it the chosen beverage for breakfast, and therefore the best staple supply for both our army and navy. By taking a cup of strong, black coffee, without milk or sugar, between two glasses of hot water before rising in the morning and at least an hour before breakfast, the various secretions are stimulated and the nervous force aroused, so that an hour later a hearty meal is enjoyed and the day's labor begun favorably, no matter how the duties of the day and night preceding may have drawn upon the system. While another cup at four in the afternoon is sufficient to sustain the flagging energies for many hours thereafter. In this manner its full effect is best secured, but if along with this the proper diet is taken at the proper time, the capacity for work will be almost unlimited. Its physiological effects upon the human system, so far as they have been investigated, appear to be that while it makes the brain more active it soothes the body generally, making the waste and loss of tissue slower and the demand for food less. It is a mental stimulus of a high order, and therefore is as a beverage liable to be abused for that reason. Through its influence the student burns the midnight oil to excess, and consequently reduces his store of physical force.

The German naturalist Martin relates a case he met with of a horse which owed its life to the use of coffee after being in a condition considered as incurable. The animal was reduced to a mere skeleton and so weak that it could scarcely walk, when infusions of coffee were first given it as an experiment, and then some ground coffee

mixed with honey. In a short time the animal began to improve rapidly, eventually becoming better than ever. The same treatment was afterwards tried with like success in many similar cases where the horses had been over-worked or lost their strength and appetite.

It has been affirmed that coffee and other substances containing the alkaloid Caffeine have a direct influence in retarding the waste of tissue matter in the human frame, a single cup of the liquid prepared from a quarter ounce of coffee, containing from 1.5 to 1.9 grains of Caffeine in the infused state. The moderation of tissue waste attributed to coffee in common with other articles having the same general action and in use among different nations, is proven by various well-established facts. In its primary operation it agrees with those stimulants in exciting mental and muscular activity as well as cheerfulness, while in its after effects it does not tend to produce narcotism or stupor, only that unsteadiness of mind and of the spinal functions which denotes exhaustion.

MORAL INFLUENCE.

It has been the custom at frequently-recurring periods for moralists and scientists to claim that coffee is injurious to the health of its votaries, and many coffee drinkers believing such statements give up its use regretfully. That its use or rather its abuse may be injurious in some instances cannot be denied, but of all beverages now in use the facts and effects prove it to be the least injurious of any and all when not indulged in immoderately. Taken in moderation it is both a mental and physical stimulant of the most agreeable and pleasant nature, being followed by no harmful reaction. It produces contentment of mind, allays hunger and bodily weakness,

increases the incentive and capacity for work, enabling those who use it in bounds to remain long without food or sleep, endure unusual fatigue, and preserve their cheerfulness and composure, coffee-drinkers as a rule being generally cheerful, active and persevering. The truth is that coffee, if of a pure kind and properly prepared, is about the pleasantest and most innocuous stimulant that can be resorted to, particularly after a long worry or severe drain on the emotional or intellectual forces. So that if it could be but made to take the place of absinthe, champagne and other such beverages the coming race would be all the better intellectually and physically for it. Habitual coffee-drinkers generally enjoy good health, some of the longest-lived people have used it from their earliest infancy without apparent injury or depressing reaction, such as is invariably produced by alcoholic stimulants. The physiological action of coffee is directed chiefly to the nervous system, producing a warm, cordial feeling in the stomach, which is quickly followed by a well-diffused and agreeable nervous excitement extending itself to the cerebral functions, giving rise to increased vigor to the imagination and intellect without causing any subsequent stupor or confusion of ideas, such as are so characteristic of all other narcotics. It produces contentment of mind, allays hunger, mental and bodily weariness, increases the capacity for work, makes man forget his troubles and anxieties, enabling those who use it judiciously to endure unusual fatigue and remain a long time without food or sleep, as well as to preserve their temper and cheerfulness.

The influence which the introduction of coffee has exercised on modern morals is on account of its peculiar character, much easier to understand than to prove. We

know that the discovery of gunpowder changed the entire art of war from the equipment of the individual soldier to the alignment of an entire army, and thus its influence became a palpable fact. But the changes in modern life effected by the introduction of coffee belong to the general and concealed springs of life; to its motives, rather than to any circumscribed set of utterances regarding its facts, and an influence of this nature requires the application of a peculiar instrument in order to in a measure calculate or even demonstrate it. A doctor may be perfectly correct in ascribing a fever to certain atmospheric conditions, but without thermometer, barometer or microscope, he can prove absolutely nothing. We may be perfectly certain then that the introduction of coffee has altered the whole moral atmosphere in which we move, but without statistics we are unable to demonstrate the legitimacy or correctness of the assumption, and statistics is a scientific instrument of much later date than the introduction of coffee.

Observations, however, which in some degree may be of some service in arriving at exact figures, are not altogether wanting. It cannot be contended that life has become more just and honest, which would be the legitimate result of a better education, but it is certain that it has become gentler, more uniform and pacific, two results which essentially depend on food and occupation. Nor can it be denied that it is the increasing demands of reason which awe, superstition, bigotry and narrow fanaticism out of our educational system, and not this system which spontaneously has endeavored to make everything else subservient to reason, and what thus is dimly or vaguely indicated by a general view of life, often becomes more striking in many individual instances. It is a hazardous, but nevertheless felicitous

expression, that "if Queen Elizabeth had breakfasted upon coffee and hot rolls, instead of beer and bacon, Queen Mary would never had been beheaded." We find in bygone ages a perversity of temper, an impetuosity of will, a violence of the passions which has led some moralists to consider the later generations of the human race as decreasing in vital force, while indeed the phenomenon might be explained as the single result of an over-stimulating and too exciting a diet and a lack of temperance. Let the people begin to indulge once again in drinking wine, ale or other intoxicating beverages at the morning meal instead of tea or coffee, and we will soon have the same amount of vital force back again. It is not the power of passion which has decreased, but the power of restriction which has increased, and a comprehensive consideration of historical facts seem to justify the conclusion that this increased power of the reason is due as much to a more proper feeding of the body as to a better system of education.

The mental exhilaration and physical activity and buoyancy which coffee causes explains the fondness which has been shown for it by so many men of science, poets, scholars and others devoted to writing or thinking at all times, and for which reason it has been styled the "intellectual beverage." Preachers, orators, editors and lawyers finding a cup of good coffee the gentlest, most harmless and effective of brain-bracers, but it does not appear to be generally known that nearly all men of literary habits who exhaust much nerve force use it constantly. It supported Voltaire in his old age and enabled Fontenelle to pass his hundred years. It was Voltaire who replied, on being informed by his physician "that coffee was a *slow poison*," "Yes, I know it is a *very slow poison*; it has been poisoning me for over seventy years;" and Sydney

Smith who said, "If you want to improve your understanding drink coffee; it is the intellectual beverage." Brady terming it "The sovereign drink of pleasure and of health," and Pope eulogizing it in the following lines:—

"From silver spouts the grateful liquors slide
While China's earth receives the smoking tide,
At once they gratify their sense and taste,
And frequent cups prolong the rich repast;
Coffee!—which makes the politician wise
And see through all things with half-shut eyes."

Howells paying his tribute to it when he says, "This coffee intoxicates without exciting, soothes you softly out of dull sobriety, making you think and talk of all the pleasant things that ever happened to you." But times have changed since Voltaire, Diderot, Pope and others wrote and sang of coffee, jested, reasoned and made themselves immortal under its influence; alimentary and not literary is the modern *café*, though some can still boast of a *clientèle* artistic, journalistic, or scientific, the commercial element preponderating, but the old historic *café*, the *café* of tradition, where one was sure to find some celebrity on exhibition—a poet or a philosopher—may be said to be defunct.

From its cordial and gently stimulating effects we may well join in the enthusiastic panegyric pronounced on it by an Arabian of old, of which the following is a free, but condensed, translation: "O, coffee, thou dispellest the cares of the great and bringest back those who wander from the paths of knowledge! Coffee is our gold, and in the place of its illusions we are in the enjoyment of the best and noblest society. Every care vanishes when the cup-bearer presents the delicious

chalice to our lips. It circulates freely through our veins and will not rankle there. Grief cannot exist where it grows and sorrow humbles itself before its powers."

Vive la café!

CHAPTER X.

PRODUCTION AND CONSUMPTION.

FIFTY years ago a supply of 150,000 tons of all kinds of coffee was considered sufficient to meet the entire demand of Europe and America combined. In 1848, however, these two continents alone consumed upwards of 250,000 tons, which had increased in 1868 to 375,000 tons, and in 1888 to over 700,000 tons, or more than double that of fifty years before.

TABLE I.

WORLD'S PRODUCTION (ESTIMATED).

Countries.	Weight in Tons.
Liberia and all other Countries on the West Coast of Africa,	19,500
Abyssinia and all other Countries on the East Coast of Africa,	20,000
Natal and Cape of Good Hope,	300
Arabia, Bourbon and Mauritius,	15,000
British India and Ceylon,	30,500
Java, Sumatra and Celebes,	60,000
Bali, Timour and other Islands in the Malayan Archipelago,	10,000
Philippine, Fiji and Samoa Islands,	11,000
Sandwich and all other Islands in the South Pacific Ocean,	1,200
Cuba and Porto Rico,	25,000
Hayti and San Domingo,	15,000
Jamaica and other Islands in the West Indies,	18,000
Mexico and Central America,	80,000
Venezuela and Colombia,	50,000
Equador and Bolivia,	15,000
Brazil and other Countries in South America,	500,000
Grand total,	875,500

Or about 1,800,000,000 pounds per annum, the value of which averages over \$275,000,000 wholesale, according to its market price at time of sale.

TABLE II.

WORLD'S CONSUMPTION (ESTIMATED).

Countries.	Weight in Tons.
Asia,	40,000
Africa,	25,000
Australia,	5,000
Continent of Europe,	430,000
Great Britain and Ireland,	15,000
United States and Canada,	275,000
Mexico and Central America,	20,000
West India Islands,	15,000
Brazil and South American Countries,	40,000
Total,	865,000

Which shows that, in recent years, the world's supply has not kept pace with the growing demand throughout the civilized world.

TABLE III.

Showing the average annual consumption in the United States, imported principally as follows:—

Country.	Tons.	Per Cent.
Brazil,	150,000	75.00
Venezuela,	20,000	5.00
Mexico,	10,000	4.00
Central America,	5,000	2.00
West India Islands,	10,000	4.00
India and Ceylon,	1,000	1.00
Arabia and Africa,	10,000	5.00
Java and Sumatra,	10,000	4.00
Total,	216,000	100.00



BAGGING COFFEE FOR SHIPMENT.

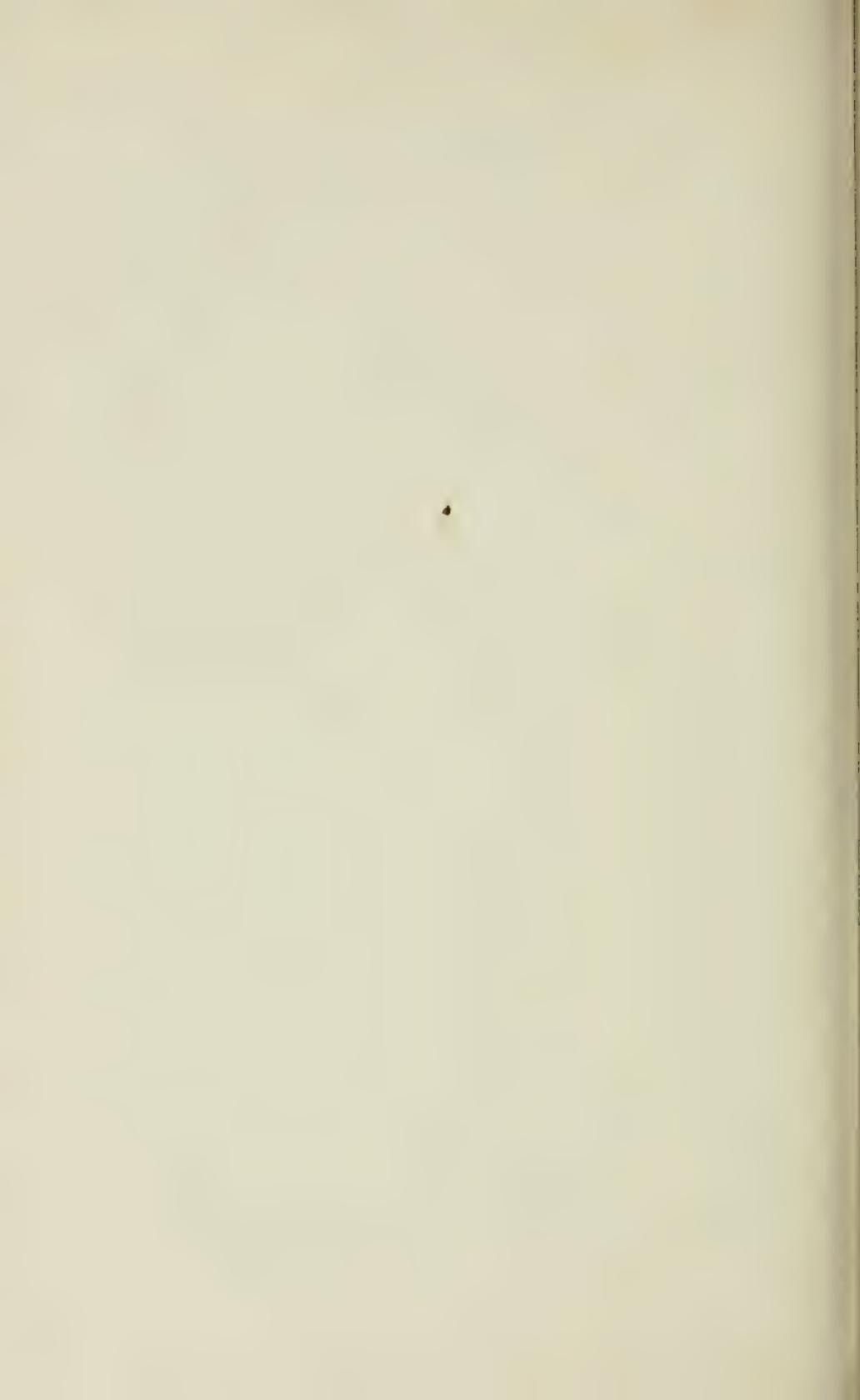


TABLE IV.

Showing where United States receives supplies of coffee from in general and the various kinds consumed :—

Country.	Pounds.
Africa,	25,000,000
Arabia,	10,000,000
England,	5,000,000
Holland,	5,000,000
Germany,	250,000
Belgium,	80,000
Portugal and Spain,	150,000
Brazil,	400,000,000
Canada,	500
Mexico,	10,000,000
Venezuela,	35,000,000
Colombia,	15,000,000
Equador and Bolivia,	1,000,000
West India Islands,	5,000,000
British and Dutch Guiana,	1,500,000
Malayan Archipelago,	25,000,000
British India and Ceylon,	5,000,000
Philippine and Pacific Islands,	10,000
Sandwich and other Islands,	75,000
Azores and Cape Verde Islands,	1,500
French Possessions in Africa, Madagascar and Bourbon,	1,500
Total importation,	600,000,000
Total value,	\$80,000,000

Which, according to the Bureau of Statistics, is about 9 pounds *per capita*, valued at \$1.15 per head, for every man, woman and child in the United States, while it has been ascertained that the consumption of coffee has declined in England in the past ten years to less than one pound *per capita* of the population as against an increase in the consumption of tea from 6 to 8 pounds.

TABLE V.

Showing *per capita* consumption of the principal countries of the world in round numbers:—

Countries.	Consumption (Pounds).	Per Capita (Pounds).
Asia,	80,000,000	—
Africa,	50,000,000	1
Australia,	10,000,000	2
Austria,	10,000,000	2½
Belgium,	50,000,000	10
Denmark,	25,000,000	6
France,	100,000,000	2½
Germany,	180,000,000	5
Greece,	2,000,000	0½
Holland,	70,000,000	14
Italy,	30,000,000	1
Switzerland,	20,000,000	5
Russia and Siberia,	15,000,000	—
Sweden and Norway,	35,000,000	10
Great Britain and Ireland,	35,000,000	1
United States and Canada,	600,000,000	6
Mexico and Central America,	35,000,000	3
West India Islands,	30,000,000	5
South American States,	100,000,000	3

What tea is to the United Kingdom coffee is to the United States, the consumption of the latter in this country increasing from 80,000,000 pounds in 1861 to 116,000,000 in 1871, and to over 400,000,000 pounds in 1881, the consumption of coffee, at the present time in this country, falling just short of the enormous figures of 600,000,000 pounds.

The use of coffee has been extending at an enormous rate for the past 150 years, until at the present day it is found in every civilized country and almost every uncivilized country on the habitable globe. It has become

one of the corner-stones of civilization. As has been well said by one writer, it smoothes the troubled soul, heals all family feuds, fits one for the annoyances of business, and organizes a truce between the man who drinks it and all the troubles and cares of life. The United States is without doubt a nation of coffee-drinkers, the average annual consumption reaching upwards of 600,000,000 pounds, or nearly ten pounds *per capita* of the entire population.

Up to 1860 there was a wide disparity between the production and consumption of coffee throughout the civilized world, the former remaining stationary while the latter continued to increase rapidly until the civil war, which caused a reduction in this country of nearly 200,000 tons per annum, thus re-establishing the relative difference between the laws of supply and demand. With the close of the rebellion, the United States, however, and a reduction of the duty, the consumption again steadily increased, exceeding in a short time the increase in the production, causing a steady advance in prices from 1869 to 1880, the extreme advance in prices in the latter year naturally stimulated and increased production until stocks accumulated largely and prices again declined accordingly. During the period from 1880-87, planters and dealers suffered greatly, many disastrous failures among both classes following as a consequence. The consumption meanwhile continued to increase steadily, as did also the production, owing to the yield of new plantations previously opened under the stimulus of the high prices prevailing in 1880, fair relations between the production and consumption being to the present maintained.

The history of tariff legislation on coffee in the United States may be summed up in the following sequence: The first duty on coffee was levied in 1789,

which was $2\frac{1}{2}$ cents per pound. In 1790 this was increased to 4 cents, and again to 5 cents in 1794, being retained at the latter figure until 1812, when it was increased to 10 cents, owing to the increased expenditures of the government, due to the war with England. At the close of this war, in 1814, the duty was reduced to 5 cents per pound, remaining at the latter figure until 1828, when it was still further reduced to 2 cents; in 1830, to 1 cent, being removed altogether in 1832, and placed for the first time on the free list. No tax was again placed on coffee until the beginning of the civil war in 1861, when a duty of 4 cents per pound was levied on it, which was shortly after increased to 5 cents, at which figure it remained until 1871, when it was reduced to 3 cents, the duty being entirely removed from coffee in 1872, since which year it has remained uninterruptedly on the free list.

During the years from 1832 to 1861, when coffee was entered free of duty, it ruled lower in price and increased more in consumption than it had at any previous period, the *per capita* consumption increasing from three pounds in 1830, to nearly six pounds in 1860, the quantity imported into the United States in the latter year reaching nearly 236,000,000 pounds, being valued at \$21,500,000, the three following years showing an average annual importation of about 220,600,000 pounds, valued at \$21,000,000. In 1855 fair Rio averaged 11 cents per pound; Maracaibo, 12 cents, and Java, $14\frac{1}{2}$ cents; these being the three principal then in demand in the American market, while in 1860 the range was considerably higher and the consumption correspondingly less, Rios averaging $13\frac{3}{4}$ cents; Maracaibos, $14\frac{1}{2}$ cents; and Javas, $16\frac{1}{2}$ cents. These prices continuing to advance until 1863-4, when the prices of coffee ruled

exceptionally high, owing to the war duty of 5 cents per pound; the figures averaging in 1863 31 cents for Rio, 32 cents for Maracaibo, and 37 cents for Java, increasing in 1864 to 42½ cents for Rio, 43 cents for Maracaibo, and 49 cents for Java. From 1864 to 1880, however, there was a steady decline in the prices of coffee, there being at the same time a correspondingly steady increase in its consumption. The prices ruling for the three leading kinds of coffee in the American market, from 1880 to 1890, is as follows, per pound:—

Year.	Rio. Cents.	Maracaibo. Cents.	Java. Cents.
1880	16	16½	23½
1881	12½	13	18
1882	9¾	10½	16
1883	10½	11	17½
1884	11	11¼	16½
1885	9	10¼	15½
1886	10¾	10½	16¾
1887	8½	10	16
1888	16½	16½	20
1889	19	20	22
1890	18	20	22

In many of the years from 1870 to 1880, Java, which is regarded as the standard coffee, sold less than Maracaibo; the latter frequently selling for less than Rio, which is considered the lowest in the scale during the same period. In 1875, however, the imports again increased to 300,000,000 pounds, valued at \$51,000,000. Taking the population in 1856 at 27,000,000 and in 1875 at 42,000,000, it will be noticed that the increase in quantity of imports was only 34 per cent., 21 per cent. less than the increase of population for the same period, while the increase in value was 146 per cent. meantime. Figures which serve conclusively to prove that while

low prices tend to increase consumption, high prices only serve to retard it. About 1883 new factors in the buying and selling of coffee appeared, coffee exchanges been opened in Havre, Hamburg and New York, which created large transactions in "options," some of them becoming enormous in their magnitude, and against which considerable quantities of coffee must be held, the operations for future deliveries reaching as high as 22,000,000 bags in 1887. This enormous increase in the transactions of that year was due entirely to a short crop report and to the active speculation based thereon. The continued increase in consumption and the increased demand for stocks held against the trading in options not being met by a corresponding increase in the production of the article, added to the serious injury to the crops in Java by leaf disease and in Brazil by blight, having still further disturbed the relations between the established laws of supply and demand.

APPENDIX.

APPENDIX.

TABLE I.

Showing tares, style of package and average weight of the principal coffees imported into the United States.

Kind.	Style of Package.	Average Weight Pounds.	Tare.
Mocha, . . .	Bales, . . .	160 . . .	Actual.
Javas, . . .	Mats, . . .	66 . . .	1 per cent.
India, . . .	Bags, . . .	140 . . .	2 per cent.
Ceylon, . . .	Bags, . . .	140 . . .	2 per cent.
Ceylon, . . .	Casks, . . .	1,000 . . .	Actual.
Jamaica, . . .	Bags, . . .	200 . . .	2 per cent.
Jamaica, . . .	Barrels, . . .	200 . . .	Actual.
San Domingo, . . .	Bags, . . .	150 . . .	2 per cent.
Hayti, . . .	Bags, . . .	150 . . .	2 per cent.
Mexican, . . .	Bales, . . .	150 . . .	2 per cent.
Guatemala, . . .	Bags, . . .	140 . . .	1 per cent.
Nicaragua, . . .	Bags, . . .	140 . . .	1 per cent.
Honduras, . . .	Bags, . . .	140 . . .	1 per cent.
Costa Rica, . . .	Bags, . . .	140 . . .	1 per cent.
Caracas, . . .	Bags, . . .	130 . . .	2 per cent.
Maracaibo, . . .	Bags, . . .	130 . . .	1 per cent.
Laguayra, . . .	Bags, . . .	130 . . .	1 per cent.
Angostura, . . .	Bags, . . .	130 . . .	Actual.
Colombo, . . .	Bags, . . .	230 . . .	1 per cent.
Equador, . . .	Bags, . . .	130 . . .	1 per cent.
Bolivian, . . .	Bags, . . .	130 . . .	1 per cent.
Brazilian, . . .	Bags, . . .	130 . . .	1 per cent.

All other coffees in bags one per cent. and all others in bales and barrels actual tare.

TABLE II.

Showing relative difference between cost of raw and roasted coffees, including cost of roasting ($\frac{1}{2}$ cent per pound), and loss by shrinkage (15 per cent).

Raw.	Roasted.	Raw.	Roasted.
10	12 35	17 $\frac{3}{4}$	21 47
10 $\frac{1}{4}$	12 65	18	21 76
10 $\frac{1}{2}$	12 94	18 $\frac{1}{4}$	22 06
10 $\frac{3}{4}$	13 24	18 $\frac{1}{2}$	22 35
11	13 53	18 $\frac{3}{4}$	22 64
11 $\frac{1}{4}$	13 82	19	22 93
11 $\frac{1}{2}$	14 12	19 $\frac{1}{4}$	23 22
11 $\frac{3}{4}$	14 41	19 $\frac{1}{2}$	23 52
12	14 71	19 $\frac{3}{4}$	23 82
12 $\frac{1}{4}$	15 00	20	24 41
12 $\frac{1}{2}$	15 29	20 $\frac{1}{4}$	24 41
12 $\frac{3}{4}$	15 59	20 $\frac{1}{2}$	24 71
13	15 88	20 $\frac{3}{4}$	25 00
13 $\frac{1}{4}$	16 18	21	25 30
13 $\frac{1}{2}$	16 48	21 $\frac{1}{4}$	25 59
13 $\frac{3}{4}$	16 67	21 $\frac{1}{2}$	25 88
14	17 06	21 $\frac{3}{4}$	26 19
14 $\frac{1}{4}$	17 35	22	26 47
14 $\frac{1}{2}$	17 67	22 $\frac{1}{4}$	26 76
14 $\frac{3}{4}$	17 94	22 $\frac{1}{2}$	27 06
15	18 24	22 $\frac{3}{4}$	27 35
15 $\frac{1}{4}$	18 53	23	27 64
15 $\frac{1}{2}$	18 82	23 $\frac{1}{4}$	27 94
15 $\frac{3}{4}$	19 13	23 $\frac{1}{2}$	28 24
16	19 41	23 $\frac{3}{4}$	28 53
16 $\frac{1}{4}$	19 71	24	28 82
16 $\frac{1}{2}$	20 00	24 $\frac{1}{4}$	29 12
16 $\frac{3}{4}$	20 30	24 $\frac{1}{2}$	29 42
17	20 59	24 $\frac{3}{4}$	29 71
17 $\frac{1}{4}$	20 89	25	30 00

For each one-eighth of a cent Raw add one-fifteenth Roasted.

TABLE III.

Showing comparative loss in roasting coffee between Winter and Summer months of the principal coffees:—

Months.	Rio. Per cent.	Java. Per cent.	Mocha. Per cent.	Maracaibo. Per cent.
January,	14	16	15	16
February,	14	16	15	16
March,	14	16	15	16
June,	13	15	14	15
July,	13	15	14	15
August,	13	15	14	15

From which it may be noted that Rio and Mocha lose on an average one per cent. less than Java and Maracaibo in both seasons, which is accounted for by the greater hardness and solidity of the bean of the former over the latter, which are lighter and softer in texture, the average loss being 15 per cent. on all coffees.

TABLE IV.

Showing comparative weights of Raw and Roasted coffees, after sustaining a loss of from 12 to 16 per cent. :—

Weight raw. Net.	Weight roasted.				
	Per cent.				
	12	13	14	15	16
50 lbs.	44	43 $\frac{1}{2}$	43	42 $\frac{1}{2}$	42
55 "	48 $\frac{1}{2}$	48	47 $\frac{1}{4}$	46 $\frac{3}{4}$	46
60 "	52 $\frac{1}{4}$	52	51 $\frac{1}{2}$	51	50 $\frac{1}{2}$
65 "	57	56 $\frac{1}{2}$	56	55 $\frac{1}{4}$	54 $\frac{1}{2}$
70 "	61 $\frac{1}{2}$	61	60	59 $\frac{1}{2}$	58 $\frac{3}{4}$
75 "	66	65 $\frac{1}{4}$	64 $\frac{1}{2}$	63 $\frac{3}{4}$	63
80 "	70 $\frac{1}{2}$	69 $\frac{1}{2}$	68 $\frac{1}{4}$	68	67
85 "	74 $\frac{3}{4}$	74	73	72 $\frac{1}{4}$	71 $\frac{1}{2}$
90 "	79	78 $\frac{3}{4}$	77 $\frac{1}{2}$	76 $\frac{1}{2}$	75 $\frac{1}{2}$
95 "	83 $\frac{1}{2}$	82 $\frac{1}{2}$	81 $\frac{1}{2}$	80 $\frac{3}{4}$	79 $\frac{3}{4}$
100 "	89	87	86	85	84
105 "	92 $\frac{1}{2}$	91 $\frac{1}{2}$	90 $\frac{1}{2}$	89 $\frac{1}{4}$	88
110 "	96 $\frac{3}{4}$	95 $\frac{1}{2}$	94 $\frac{1}{2}$	93 $\frac{1}{2}$	91 $\frac{1}{4}$
115 "	102	100	99	98	96 $\frac{1}{2}$
120 "	105 $\frac{1}{2}$	104 $\frac{1}{2}$	103	102	101
125 "	110	108 $\frac{3}{4}$	107 $\frac{1}{2}$	106 $\frac{1}{4}$	105
130 "	114 $\frac{1}{2}$	113	112	111	110 $\frac{1}{4}$
135 "	118 $\frac{3}{4}$	117 $\frac{1}{2}$	116	114 $\frac{3}{4}$	113 $\frac{1}{2}$
140 "	124	121 $\frac{3}{4}$	120 $\frac{1}{2}$	119	117 $\frac{1}{2}$
145 "	127 $\frac{1}{2}$	126	124 $\frac{1}{2}$	123 $\frac{1}{4}$	121 $\frac{3}{4}$
150 "	131 $\frac{1}{4}$	129 $\frac{3}{4}$	128 $\frac{1}{4}$	126 $\frac{1}{4}$	125 $\frac{1}{4}$

TABLE V.

Showing cost of Roasted coffee after sustaining a loss of:—

Cost Raw.	Per cent.				
	12	13	14	15	16
10	$11\frac{3}{8}$	$11\frac{1}{2}$	$11\frac{5}{8}$	$11\frac{3}{4}$	$11\frac{7}{8}$
$10\frac{1}{2}$	12	$12\frac{1}{8}$	$12\frac{1}{4}$	$12\frac{3}{8}$	$12\frac{1}{2}$
11	$12\frac{1}{2}$	$12\frac{5}{8}$	$12\frac{3}{4}$	$12\frac{7}{8}$	13
$11\frac{1}{2}$	13	$13\frac{1}{4}$	$13\frac{3}{8}$	$13\frac{5}{8}$	$13\frac{3}{4}$
12	$13\frac{5}{8}$	$13\frac{3}{4}$	14	$14\frac{1}{8}$	$14\frac{1}{4}$
$12\frac{1}{2}$	$14\frac{1}{4}$	$14\frac{3}{8}$	$14\frac{1}{2}$	$14\frac{3}{4}$	$14\frac{7}{8}$
13	$14\frac{3}{4}$	15	$15\frac{1}{8}$	$15\frac{3}{8}$	$15\frac{1}{2}$
$13\frac{1}{2}$	$15\frac{3}{8}$	$15\frac{1}{2}$	$15\frac{5}{8}$	$15\frac{3}{4}$	$15\frac{7}{8}$
14	$15\frac{7}{8}$	$16\frac{1}{8}$	$16\frac{1}{4}$	$16\frac{1}{2}$	$16\frac{5}{8}$
$14\frac{1}{2}$	$16\frac{1}{2}$	$16\frac{5}{8}$	$16\frac{7}{8}$	17	$17\frac{1}{4}$
15	17	$17\frac{1}{8}$	$17\frac{3}{8}$	$17\frac{5}{8}$	$17\frac{7}{8}$
$15\frac{1}{2}$	$17\frac{5}{8}$	$17\frac{7}{8}$	18	$18\frac{1}{4}$	$18\frac{1}{2}$
16	$18\frac{7}{8}$	$18\frac{3}{8}$	$18\frac{5}{8}$	$18\frac{7}{8}$	19
$16\frac{1}{2}$	$18\frac{3}{4}$	19	$19\frac{1}{8}$	$19\frac{3}{8}$	$19\frac{5}{8}$
17	$19\frac{1}{4}$	$19\frac{1}{2}$	$19\frac{3}{4}$	20	$20\frac{1}{4}$
$17\frac{1}{2}$	$19\frac{7}{8}$	$20\frac{1}{2}$	$20\frac{3}{8}$	$20\frac{5}{8}$	$20\frac{7}{8}$
18	$20\frac{3}{8}$	$20\frac{5}{8}$	$20\frac{7}{8}$	$21\frac{1}{8}$	$21\frac{3}{8}$
$18\frac{1}{2}$	21	$21\frac{1}{4}$	$21\frac{1}{2}$	$21\frac{3}{4}$	22
19	$21\frac{5}{8}$	$21\frac{7}{8}$	$22\frac{1}{8}$	$22\frac{3}{8}$	$22\frac{5}{8}$
$19\frac{1}{2}$	$22\frac{1}{8}$	$22\frac{3}{8}$	$22\frac{5}{8}$	23	$23\frac{1}{4}$
20	$22\frac{3}{4}$	23	$23\frac{1}{4}$	$23\frac{1}{2}$	$23\frac{3}{4}$
$20\frac{1}{2}$	$23\frac{1}{4}$	$23\frac{1}{2}$	$23\frac{3}{8}$	$24\frac{1}{8}$	$24\frac{3}{8}$
21	$23\frac{3}{4}$	24	$24\frac{3}{8}$	$24\frac{3}{4}$	25
$21\frac{1}{2}$	$24\frac{1}{2}$	$24\frac{3}{4}$	25	$25\frac{1}{4}$	$25\frac{5}{8}$
22	25	$25\frac{1}{4}$	$25\frac{5}{8}$	$25\frac{7}{8}$	$26\frac{1}{8}$
$22\frac{1}{2}$	$25\frac{1}{2}$	$25\frac{7}{8}$	$26\frac{1}{8}$	$26\frac{1}{2}$	$26\frac{3}{4}$
23	$26\frac{1}{8}$	$26\frac{3}{8}$	$26\frac{3}{4}$	27	$27\frac{3}{8}$
$23\frac{1}{2}$	$26\frac{3}{4}$	27	$27\frac{3}{8}$	$27\frac{5}{8}$	28
24	$27\frac{1}{4}$	$27\frac{5}{8}$	$27\frac{7}{8}$	$28\frac{1}{2}$	$28\frac{7}{8}$
$24\frac{1}{2}$	$27\frac{7}{8}$	$28\frac{1}{8}$	$28\frac{1}{2}$	$28\frac{3}{4}$	$29\frac{1}{8}$
25	$28\frac{3}{8}$	$28\frac{3}{4}$	$29\frac{1}{8}$	$29\frac{3}{8}$	$29\frac{3}{4}$

To which must be added cost of roasting, $\frac{1}{2}$ cent per pound.

TABLE VI.

Showing New York Coffee Exchange point card, and giving decimal value of 5 points to one cent per pound on 250 bags coffee (32,500 pounds), which is the smallest transaction:—

Points.	Difference.	Points.	Difference.
05,	\$16 25	105,	\$341 25
10,	32 50	110,	357 50
15,	48 75	115,	373 75
20,	65 00	120,	390 10
25,	81 25	125,	406 25
30,	97 50	130,	432 50
35,	113 75	135,	438 75
40,	130 00	140,	455 50
45,	146 25	145,	471 25
50,	162 50	150,	487 50
55,	178 75	150,	487 50
60,	195 00	155,	503 75
65,	211 25	160,	520 00
70,	227 50	165,	536 25
75,	243 75	170,	552 50
80,	260 00	175,	568 75
85,	276 25	180,	585 00
90,	292 50	185,	601 25
95,	308 75	190,	617 50
100 (one cent),	325 00	195,	635 75
		200 (two cents),	650 50

No. 7 (low ordinary) is adopted as the "standard grade," and is taken as a basis for all operations, but a grade comparing with any of the ten numbers may be substituted at their approximate values when delivered is insisted on and No. 7 cannot be had. The brokerage for buying and selling is 4 cents per bag, and the original margin \$1.00 per bag, the smallest transaction allowed being 250 bags and the market fluctuation $\frac{5}{100}$ cents per pound.

TABLE VII.

Showing method for converting Rio and Santos quotations into United States currency, including freight charges at 40 cents and 5 per cent. per bag marine insurance. One month's charges in New York, at 2 per cent. discount, \$4.80, equaling the pound sterling at 60 days sight.

Market Price in Rio per 10 Kilos.	Rio Rates of Exchange on London (equivalent in cents per pound).		
	21d	21½d	22d
.000	12 $\frac{11}{100}$	12 $\frac{39}{100}$	12 $\frac{67}{100}$
.200	12 $\frac{56}{100}$	12 $\frac{85}{100}$	12 $\frac{14}{100}$
.400	13 $\frac{01}{100}$	13 $\frac{31}{100}$	13 $\frac{61}{100}$
.600	13 $\frac{47}{100}$	13 $\frac{77}{100}$	14 $\frac{89}{100}$
.800	13 $\frac{92}{100}$	14 $\frac{40}{100}$	14 $\frac{56}{100}$
.000	14 $\frac{37}{100}$	14 $\frac{70}{100}$	15 $\frac{03}{100}$
.200	14 $\frac{82}{100}$	15 $\frac{16}{100}$	15 $\frac{51}{100}$
.400	15 $\frac{27}{100}$	16 $\frac{62}{100}$	15 $\frac{98}{100}$
.600	15 $\frac{72}{100}$	16 $\frac{09}{100}$	16 $\frac{45}{100}$
.800	16 $\frac{18}{100}$	16 $\frac{55}{100}$	16 $\frac{92}{100}$
.000	16 $\frac{63}{100}$	17 $\frac{01}{100}$	17 $\frac{40}{100}$

Fractional equivalents to be added if necessary, each $\frac{1}{4}d.$ in exchange being equivalent to about 1 per cent. Bases for freight differences to be added or deducted at rate of 5 cents and 5 per cent. per bag—.04 cents per pound, to which must be also added commission for buying in Rio or Santos, but if the coffee should be wanted for sale on the Exchange no addition need be made.

TABLE VIII.

For converting London quotations into U. S. currency, including cost, insurance, freight, one month's charges in New York and 2 per cent. discount.

Market Price in London per 112 pounds. Shillings.	London Rates of Exchange at 60 days, equivalent in cents per pound.		
	\$4 80	\$4 85	\$4 90
50	\$11 43 . . .	\$11 54 . . .	\$11 65
51	11 63 . . .	11 78 . . .	11 89
52	11 89 . . .	12 00 . . .	12 12
53	12 11 . . .	12 23 . . .	12 35
54	12 34 . . .	12 46 . . .	12 58
55	12 53 . . .	12 69 . . .	12 81
56	12 73 . . .	12 91 . . .	13 04
57	13 02 . . .	13 14 . . .	13 27
58	13 23 . . .	13 38 . . .	13 51
59	13 48 . . .	13 60 . . .	13 75

The best and most rapid method of reducing the cost of coffee in Brazil to United States currency is, however, to multiply the price by the rate of exchange ruling at the time of purchase. The result will be in English pence, which is converted into American gold in the regular way at the existing rate of London exchange. Another method by which a result accurate enough for all practical purposes may be obtained is to multiply the price by the rate of exchange, and then deducting one-fourth of the amount so obtained, first getting the free-on-board charges in Rio or Santos, to which must be added the cost of freight and other charges.

TABLE IX.

Showing the average value for each year from 1846 to 1878, inclusive, for fair to prime Rio coffee, cargo price in gold, "in bond," in New York:—

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
1846 .	7.44	1857 .	11.15	1868 .	10.5	1879 .	14.87
1847 .	7.34	1858 .	11.08	1869 .	11.00	1880 .	15.12
1848 .	6.63	1859 .	11.66	1870 .	11.33	1881 .	12.23
1849 .	7.37	1860 .	13.74	1871 .	12.91	1882 .	9.77
1850 .	10.91	1861 .	12.31	1872 .	$\frac{16}{17} \frac{48}{27}$	1883 .	10.36
1851 .	9.44	1862 .	15.22	1873 .	19.99	1884 .	10.92
1852 .	8.85	1863 .	16.39	1874 .	21.08	1885 .	9.01
1853 .	9.76	1864 .	16.22	1875 .	18.87	1886 .	10.33
1854 .	10.48	1865 .	15.95	1876 .	18.21	
1855 .	10.47	1866 .	13.86	1877 .	18.45	
1856 .	11.04	1867 .	12.23	1878 .	15.58	

Coffee was admitted free up to the first of August, 1861, when an import duty of four cents a pound was levied. In January, 1862, the duty was raised to five cents a pound; and this continued to 1870, when the duty was reduced to three cents a pound. On the first of July, 1872, the impost was removed, and coffee was admitted to duty free once more. In the above table, it will be observed that the highest point was in 1874, after the impost had been removed, when it was 21 cents. This was about the same as in 1863 and '64, with the duty of 5 cents added; but this, it will be remembered, is an average for the years alluded to for fair to prime, but during the year there was often fluctuations, and prime, as circumstances demanded, brought a very high price, as in some instances it touched at or near 25 cents, when of course all other coffees were proportionally large.

TABLE X.

Showing fluctuations in the coffee market from 1850 to 1867, inclusive.

Year.	Pounds.	Year.	Pounds.
1850 . .	131,640,000	1868 . .	219,212,400
1851 . .	177,760,000	1869 . .	238,653,800
1852 . .	291,344,000	1870 . .	275,895,400
1853 . .	172,898,000	1871 . .	310,956,800
1854 . .	175,780,000	1872 . .	266,866,600
1855 . .	206,250,000	1873 . .	264,666,600
1856 . .	214,104,000	1874 . .	272,608,600
1857 . .	168,916,000	1875 . .	301,727,800
1858 . .	246,510,000	1876 . .	295,039,800
1859 . .	219,010,000	1877 . .	297,523,600
1860 . .	173,844,000	1878 . .	213,830,000
1861 . .	194,656,000	1879 . .	396,391,600
1862 . .	87,406,000	1880 . .	390,188,500
1863 . .	78,562,000	1881 . .	411,633,200
1864 . .	107,052,900	1882 . .	467,504,400
1865 . .	125,708,000	1883 . .	449,002,400
1866 . .	157,146,000	1884 . .	490,468,000
1867 . .	199,760,000	1885 . .	530,127,400

It will be seen that the consumption increased to 1858, and gradually declined to 1863, when it touched the lowest point. Since that time it has increased nearly seven-fold, but while the quantity imported or consumed has increased beyond our power to fully realize the amount in figures, it is curious to consider the varied values of coffee under the many peculiarities of circumstances for the past thirty-six years.

TABLE XI.

SHOWING HOW COFFEE IS IMPORTED.

*Pro Forma Invoice of 1,000 Bags of Coffee, of 60 Kilos. each,
Shipped from Rio de Janeiro or Santos to the United States.*

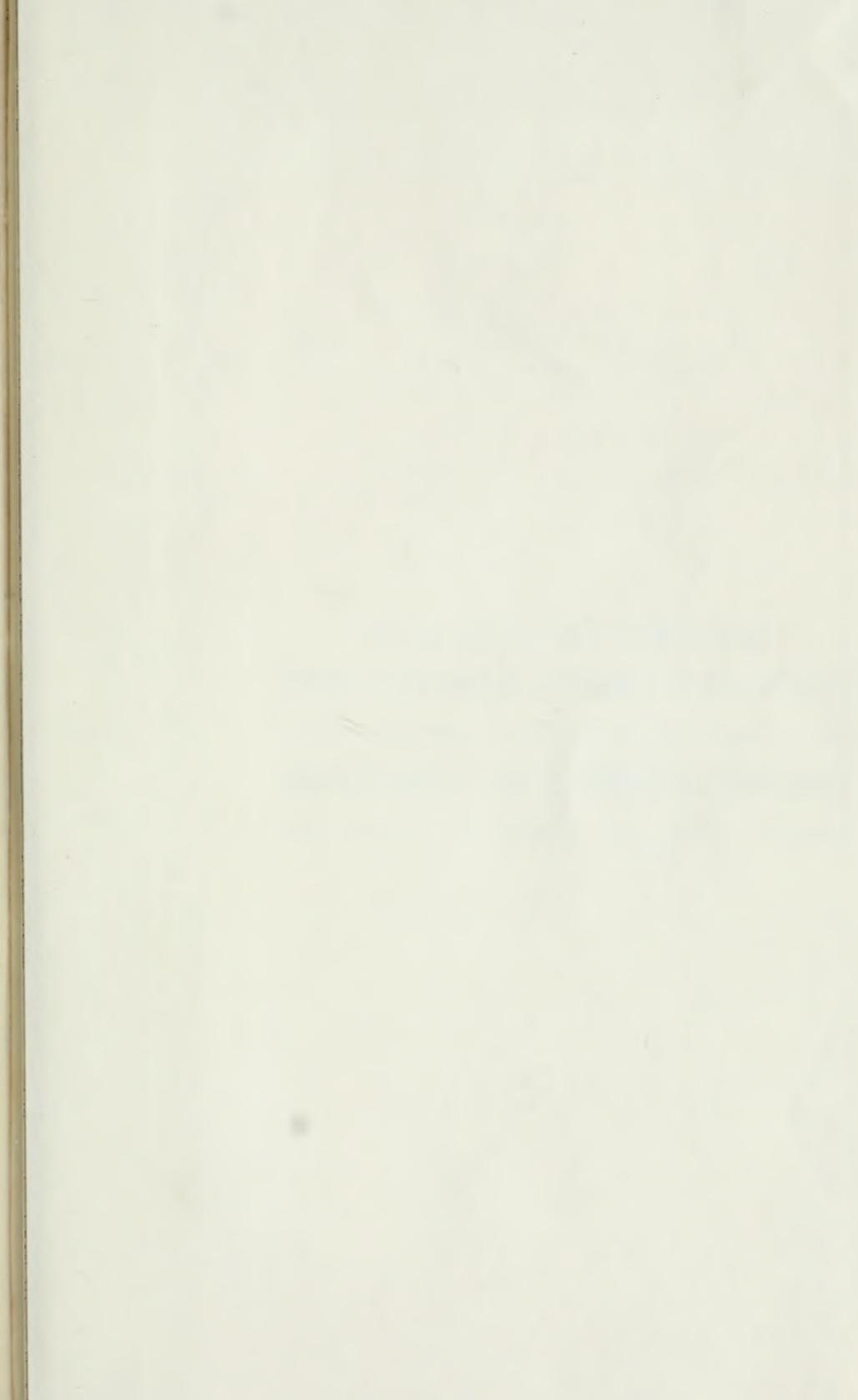
1,000 bags coffee of 60 kilos. each =net kilos. 60,000, @ 6\$350 per 10 kilos.,	*Rs. 38:100\$000	
1,000 empty bags @ 700 reis, . . .	700\$000	
		Rs. 38:800\$000
Export duty on kilos. 60,000 @ 502 rs. per kilo.=Rs. 30,120\$000 @ 13 per cent.,	Reis 3:915\$600	
Harbor-master (Capatazias) fees, 60 rs. per bag,	60\$000	
Brokerage, 50 rs. per bag, . . .	50\$000	
Shipping expenses (at 220 rs.=Rs. 220,000), sample, tins and box (Rs. 25\$000), freight on same (Rs. 2\$000), consul's certifi- cate (included in sample, tins, etc.), cablegram (Rs. 100\$000), stamps, petties, etc. (included in sample, tins and box), . . .	347\$000	
		4:372\$600
		43:172\$600
Commission for buying, 2 per cent.,		863\$450
		44:036\$050
Bill brokerage and stamps, $\frac{3}{8}$ of 1 per cent.,. . .		165\$760
		Reis 44:201\$810

* 1,000 reis=1 mil-ries=54½ cents, U. S.

TABLE XII.

SHOWING CONVERSION OF BRAZILIAN INTO AMERICAN
CURRENCY.

Amount of pro forma invoice, . . .	Reis 44:201	\$810
At 21½d. exchange at Rio, . . .	£3,959	15
\$4.84½—⅛ per £ sterling,		\$19,161 00
Charges accruing in the United States:—		
Freight per steamer to New York, 40c. per bag and 5 per cent. primage,		\$420 00
Marine insurance, 1 per cent. less 30 per cent.— $\frac{7}{10}$ net, on \$21,672 or invoice and £ value @ \$5.50,		151 70
Banker's commission for credit= $\frac{3}{4}$ of 1 per cent. on \$19,161,		143 72
Bill stamps in London (nil).		
Labor at vessel, 4c. per bag; storage, one month, @ 4c.; weighing, 3¼c.; fire in- surance, 1¼c. per bag, delivery (lighter- age), 4c. per bag= $16\frac{1}{2}$ c. per bag, . . .		165 00
Petty charges, <i>i. e.</i> , sampling, sewing, custom fees, etc., on bags, per bag, 3½c.; approx- imate for skimming of quality,—bags @ ; furnishing new bags,		35 00
Cables at New York,		5 00
		920 42
Cost of 1,000 in store,		\$20,081 42



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