

COFFEE

CONSIDERING the fact that the necessities of our daily life, whether as clothing, food, or medicine, are mostly provided by the vegetable kingdom, it is remarkable how little is generally known of the sources from whence we derive our most common articles of commerce. We propose in this article to say something about our Coffee, and especially about the mode of detecting whether the commercial article is pure or adulterated.

Although the specific name of the coffee plant, *Coffea Arabica*, appears to indicate the coffee tree to belong originally to Arabia, it is with good reason supposed to be a native of the mountainous part of the south-west point of Abyssinia, having been introduced from thence into Arabia, where it is said to have been first used about 1450. For about 200 years after this date the whole of the coffee used was grown on Arabian soil, from whence the Dutch introduced the plant into Batavia, after which it was carried into other eastern countries as well as into various parts of the western hemisphere. The introduction of coffee into Europe took place about the middle of the sixteenth century, fourteen years before the introduction of tea.

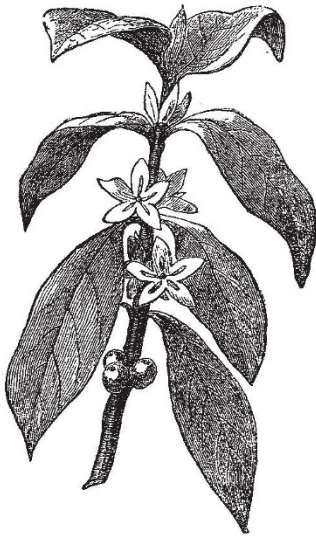


FIG. 1.—Branch of Coffee Plant.

The fruits of the coffee tree when ripe are gathered and taken to the pulping house, and placed in a machine called a pulper, by which the fleshy covering is removed, the beans or seeds pass into a cistern, and the pulps are carried off in another direction and are collected and preserved for manure; the seeds themselves are left to steep for several hours, so as to soak off any remaining mucilage or pulpy matter; they are then washed and dried, the parchment and the thin inner skin being removed by winnowing, after which they are packed in bags and ready for shipping.

The berries or seeds of true Mocha coffee, which is, however, now scarcely to be obtained in Europe, are usually more round than those of other varieties; they nevertheless vary much in form as well as in size and colour; and though the several commercial sorts are easily known to a practised eye, they are difficult to detect by an ordinary observer. The value to the consumer does not in all cases depend so much upon the size or shape of the seed as upon its flavour and the strength of its aroma, but these qualities cannot be discovered until after roasting; therefore in purchasing unroasted coffee, an important

point is to see that the seeds are not damaged by sea water or mouldiness. In roasted "whole" coffee, the case is different, for a greater or lesser aroma of more or less fragrance can be detected, the volatile oil, and the peculiar astringent acid to which the aroma and flavour are due, and which before were latent in the seed, being developed



FIG. 2.—Coffee Berry (*nat. size*).

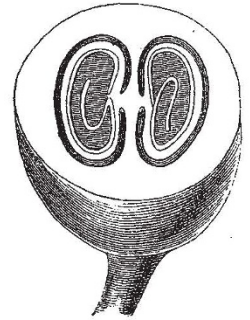


FIG. 3.—Section of Coffee Berry (*magnified*).

by the heat. In the process of roasting, the seeds lose about one-fifth in weight, but increase in bulk by about one-half.

The peculiar principle of coffee is called caffeine, and is identical with that of tea; it acts as a stimulant upon the brain, preventing sleep or drowsiness, and causing greater mental as well as bodily activity; it is also said by some chemists to repair or prevent in a remarkable degree the too rapid waste of the tissues, so that life can be sustained on a smaller quantity of food than would be the case without the use of coffee.

Understanding these principles which Nature has given to coffee, and which Science has revealed for our benefit, we cannot fail to see the great importance of obtaining the article in its genuine state. Upon microscopical examination, genuine coffee can be easily detected, the cells of the coffee-seed being very irregular in form, and having very thick walls with ragged sides. Some of these ragged projections belong to the true cell wall, while a few are composed of starch granules. Genuine coffee, then, should always present this appearance, for there are no tubes or spiral vessels in the true coffee seed as there are in the root of the chicory; and moreover, in the cellular part of the chicory root, the cells themselves are larger, the walls are shown as mere fine lines, closely fitting together by the pressure exerted upon them in the process of growth. This difference will be more readily understood by reference to Figs. 4 and 6. In the most genuine coffee, however, a certain portion of the skin must be present, the microscopical appearance of which is shown at Fig. 5; by reference also to Fig. 3, it will be

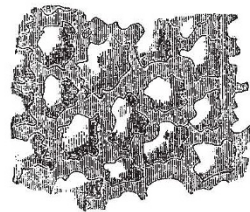


FIG. 4.—Tissue of Coffee Seed, after being roasted and boiled.



FIG. 5.—Microscopical appearance of Coffee Skin, after being roasted and boiled.

seen how a portion of this skin is naturally enclosed in the folds of the seed, so that, while in the process of cleaning it is entirely removed from the surface of the seed, the enveloped portion remains, as it cannot be removed without breaking or injuring the seed. This, however, has been done in the trade, and a series of coffees was

exhibited in the Great Exhibition of 1851, amongst which were roasted coffee seeds which had been divided longitudinally by a patented machine, and the folded skin taken out; these broken seeds were sold under the name of coffee nibs. We do not see any advantage in this; but on the contrary, the broken seeds would be much more liable than whole seeds to adulteration with damaged berries, and this skin is so thin that it adds little to the weight of the coffee, and the small proportion in which it occurs does not affect either the pocket or the health of the consumer; indeed, we are told by some travellers, that neither the skin nor the parchment itself deteriorates the quality of the coffee, but rather adds to its value, for in some parts of Arabia the parchment is preferred before the seed itself.

Therefore genuine coffee, when seen under a microscope, will exhibit an appearance similar to that shown at Fig. 4, with the addition, in nearly all cases, of a few small bodies like those at Fig. 5, scattered here and there.

A very simple test for the presence of chicory in ground coffee, is to drop a little in a tumbler of clean cold water. Do not stir it, but if chicory is present the particles will immediately drop to the bottom of the tumbler, imparting at once to the water a deep amber colour; the coffee particles will float for a much longer time, and the water

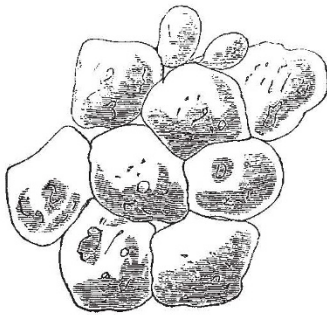


FIG. 6.—Cellular Tissue of Chicory.



FIG. 7.—Vascular Tissue of Chicory.

will be but slightly coloured. The most satisfactory way of purchasing coffee, however, is in the whole state, and to grind it as it is wanted, when all the freshness of the aroma is obtained in the infusion. For examination under the microscope, coffee should be previously soaked in water, or boiled in a weak solution of potash; this both softens the tissues and makes the substance more transparent. For persons unacquainted with vegetable structure, it will help them very much in determining the microscopical appearance of genuine roasted coffee, to examine first both the fresh coffee seed and the fresh chicory root; for this purpose a slice should be cut from each as thin as possible, moistened with water, and placed on a glass slide with an ordinary thin glass covering dropped on the top, and gently pressed down with the fingers so as to exclude all air bubbles. A half-inch objective may be used, and with an ordinary amount of perception adulterations may be detected. Other substances than chicory may be mixed with coffee, but none will present such microscopical appearances as those we have shown to belong to genuine coffee.

J. R. JACKSON

NOTES

WELL-WISHERS of the University of Oxford will rejoice to hear that the honorary degree of D.C.L. has been offered to Mr. Darwin. The state of Mr. Darwin's health unfortunately precludes him from accepting the proffered honour, but the scientific naturalists of this and other countries will none the less appreciate the compliment which has been paid to their great leader. It is all the more graceful as Mr. Darwin is not an Oxford, but a Cambridge man, a circumstance which the University of Cambridge seems to have forgotten; though by-and-by it will be one of her claims not to be herself forgotten.

DR. HOOKER, F.R.S., and Professor W. H. Flower, F.R.S., have been appointed examiners in botany and anatomy for the Natural Sciences Tripos at Cambridge. The other examiners are Professor Miller, Sec. R.S., in mineralogy, Mr. Trotter, fellow of Trinity College, in chemistry and physics, Mr. Danby, fellow of Downing College, in geology.

We are glad to announce that Mr. Geikie has arrived in England, and is in a fair way of recovery.

THE Sars subscription fund has now reached 343*l*. in England, and 11,666 francs in France. It is very desirable that intending contributors should forward their subscriptions without delay.

It is reported that the Secretary of State for India has determined upon establishing in this country a complete College of Science for civil engineers, for the education of those who are to be employed on the extensive Government works in that country.

ALL true lovers of science will be glad to hear of the approaching visit to this country of Prof. Henry, the Secretary of the Smithsonian Institution at Washington, United States. It is well known how much our own celebrated electricians are indebted to Prof. Henry for his valuable researches in magnetism and electricity, the results arrived at being freely placed at the disposal of all whom they might interest. We understand he is daily expected.

THE celebrated photographer, M. Niépce de St. Victor, having died in very straitened circumstances, leaving a wife and two children totally unprovided for, a committee of French photographers has been formed to collect a fund for their relief. Subscriptions may be forwarded to MM. Blaque and D'Eichthal, bankers, 19, Rue de Grammont; or to the president of the French Photographic Society, 9, Rue Cadet, Paris.

IN the Rev. William Hincks's address as President of the Canadian Institute, we find the following sentence:—"If we may implicitly believe a statement in the new periodical devoted to natural science, NATURE, whilst the English are still discussing the possibility of Darwinianism being true, the Germans have so thoroughly adopted it that it has become the foundation for new systems—the starting-point for fresh inquiries. This may appear to most of us to be going somewhat too fast; but then NATURE may be presumed to be the special organ of the extreme Darwinians, and might be thought to see facts through a somewhat coloured medium." It will hardly be necessary to point out to our readers that we are the organ of no party, extreme or otherwise. Free play has been given in these pages to the expression of opinion by competent men of every section or party. In so far as "Darwinianism" implies rigid accuracy of observation and a candid consideration of all the varied phenomena of natural science, we trust we shall always be Darwinian as we hope to be Newtonian.

A. H. GARROD was elected on the 13th inst. a Foundation Scholar of St. John's College, Cambridge, for proficiency in the Natural Sciences; at the same time H. Blunt and H. N. Read