Chocolate and Cocoa.

BY A. N. BELL, A.M., M.D.

The introduction and common use of the terms "coca" and "cocoa," applicable to medicinal substances, have had the effect of confusing people's minds with regard to the source and preparation, and, in some cases, creating a prejudice against the use, of the wholly different substances—chocolate and cocoa.

The medicinal wine of coca and the powerful alkaloids and nerve stimulants cocaine and hygrine are prepared from the leaves of *Erythroxylon coca*, a shrub indigenous to Peru and Bolivia, wholly different to *Theobroma cacao*, a small but beautiful tree, which grows luxuriantly both wild and cultivated in the northern parts of South America, Central America, Mexico, and the West Indies, from the *seeds* of which chocolate and cocoa, and (from the oil) cocoa ointment or "butter," are prepared.

When the Spaniards first visited Mexico, four centuries ago, they found the natives using *chocolatl*.

It was introduced into Europe as early as 1520, and has since been more or less extensively used in every civilized country. Linnæus was so fond of it that he gave to the tree from which it was obtained the name of *Theobroma*—food for the gods.

Chocolate and cocoa are only two forms of the same substance. The tree twice in the year yields a crop of reddish spongy fruit, shaped somewhat like a cucumber; the ripe fruit being collected at the decline of the moon, the tree continues its yield for twenty or thirty years. Each fruit or pod contains from six to fifty beans—usually about twenty—and there are from ten to twenty pounds of such beans from each tree at each crop. The beans are usually about the size of large almonds; they are frequently (from a confusion of language) called indifferently "beans," "seeds," "nuts," "berries," and "fruits," but their character will be better understood by regarding them as beans contained within a pod. They are generally picked out and dried for exportation.

Besides the beans, the pulp contains a creamy and cordial juice; and, by steaming and pressing, the beans will yield one-third of their weight of a kind of butter, to which the richness of cocoa is due.

For preparing the beverage material, the beans are exported in their original state, to be converted into cocoa or chocolate by a manufacturing process. They are first roasted in slowly rotating ovens, then broken by machine into such a state that the husks may be separated from the kernels by a blast of air, and they are afterward treated and beaten and converted into a pulp by means of their own oil. The pulp, when ground between millstones till it assumes a consistency something like that of treacle, is in a state to receive any of the modifications that will fit it for the market.

It may be "plain cocoa," or "homeopathic cocoa," or "vanilla chocolate;" it may have arrowroot, or sago, or sugar mixed with it; or, if the manufacturers be tinctured with roguery, there may, perchance, be bean meal or other adulterants mixed with the pulp. The pulp, when fully prepared in any of these diverse ways, is cast into large moulds; the cakes thus produced are cut into minute shreds by machine, and the shreds are rubbed, sifted, and packed for sale.

The preparations of cocoa and chocolate made in France are more numerous than those usually made in England or the United States: they comprise vanilla chocolate, milk chocolate, chocolate bonbons, chocolate papillotes, chocolate crackers, chocolate pastilles, chocolate with taraxacum or with sarsaparilla, chocolate with tar—in short, there is no end to the list; for once admit the principle of mixing cocoa with vegetable infusions, or decoctions, or essences, and the variety becomes interminable. The French limit themselves to the use of the word "chocolate," derived from the Mexican name of the plant (*chocolatl*); they seldom speak of "cocoa."

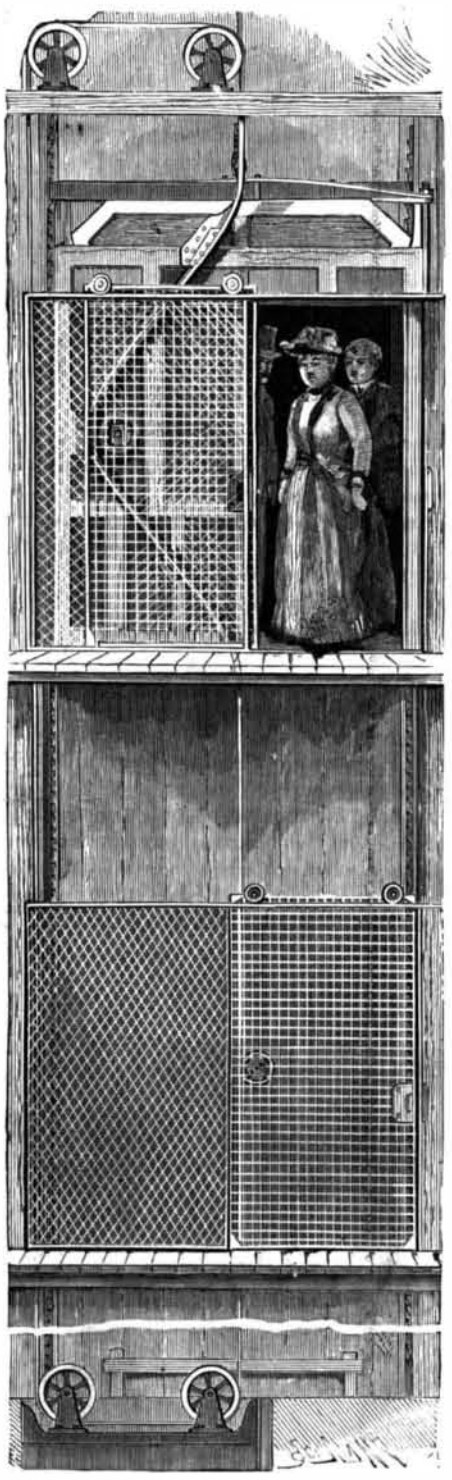
What are called "cocoa nibs" are the beans roughly crushed. "Flake cocoa," also, is another name for the beans when crushed between rollers, but before anything else has been added to them.

The husk of the seed, after roasting, contains a good deal of nutriment; indeed, so do the pods likewise; and all three are more or less used in making cheap cocoa. The plant is certainly used in more ways than coffee: drunk as a thick decoction (made to somewhat resemble gruel), made into various confections and pastries, eaten as bonbons, etc., while a poor decoction is drunk in some places by boiling the husks separated from the beans.

While chocolate and cocoa contain an essential principle, *theobromine*, comparable to *caffein* and *theine*—the alkaloids of coffee and tea—it is much less potent as a disturber of the nervous system; and chocolate and cocoa are proportionally more wholesome as a beverage, besides possessing specially nutritive qualities which render them much more sustaining; and there can be little question but that its general substitution for tea, especially of that cheap, oversteeped, second edition kind which is the too common beverage of overworked women in various avocations of life, would be promotive of health.—*The Sanitarian.*

AN IMPROVED METHOD OF AUTOMATICALLY CLOSING ELEVATOR DOORS.

The accompanying illustration represents a simple and inexpensive construction for automatically operating the sliding doors guarding the exposed landings of passenger elevators, and by means of which all the doors in the elevator shaft will be held positively closed, except the door at the particular landing where the car is stopped. This has been patented by Mr. C. H. Stilson, and Messrs. Otis Bros., of New York, have contracted to use the guard. On each landing door, near the latch side and opposite the latch, is a grooved wheel about eight inches in diameter, and on the elevator car there is a parabola-shaped track adapted to engage the groove of the wheel, this track running down and inward on the side of the car, from just above its top to a point about midway of the door, and back from the side of the car a distance equal to the width of the door. From there the track bends back to a point below the door, and in line with the commencement of the track at the top of the car. A wire cable is attached to the upper and lower ends of this track, and extends over pulleys at the top and bottom of the shaft, this cable being kept under tension by means of a weighted platform having a slight vertical movement to which the pulleys at the lower end of the shaft are secured, or for which an adjustable screw device may be substituted. When the elevator is at rest at a landing, as shown in the upper portion of the illustration, the door is opened by the attendant in the usual way, the grooved wheel on the door then fitting into the bend of the curved track; but on the movement of the car in either direction, up or down, the wheel follows the lower or upper arm of the track, forcing the door forward and firmly closing it. As the cable attached to each end of the track forms virtually a continuation of the track to the top and bottom of the shaft, all the doors in the shaft are thus held closed whether latched or not, as the car passes away from them, and cannot be opened except when the car is present. The car can thus be moved from a remote landing and brought to any other, above or below, closing the door of the landing it leaves, without requiring the services of an attendant on the car. The apparatus may be readily applied to all elevators, old or new, where the doors slide on rollers, and can be easily manufactured and put in place by any good mechanic. For further information address the inventor, Mr. C. H. Stilson, architect, 736 Chapel Street, New Haven, Conn.



STILSON'S ELEVATOR DOOR-CLOSING ATTACHMENT.

Fusible Plugs.

Fusible plugs are very important adjuncts to a boiler, yet, like everything else about a boiler, they need a great deal of attention, and often more than they get. These plugs usually consist of a piece of tin, lead, and bismuth inserted in various manners in the crown sheet or heads of the boiler, and as will be readily understood, the design being that when the water gets too low the fusible metal will be melted by the heat, allowing the water to escape into the fire, or the pressure to be relieved from the boiler. So long as the alloy is kept at a comparatively low temperature by the water on one side, it is of course prevented from melting by the fire on the other.

Notwithstanding the great favor in which they are held, Wilson claims there is no doubt that their efficiency has been much overrated, as in his experience as a boiler inspector numerous cases of failure to work are recorded every year. This is partly due to an accumulation of soot and dirt that usually takes place in the cavity over which the plug is inserted, and partially in consequence of the alteration which takes place in the nature of the alloy during long exposure to the heat of the furnace.

There are numerous instances given by Wilson, also, of fusible metal melting out without liberating the steam pressure. This is chiefly caused by the accumulation of incrustation on the metal being sufficiently strong to withstand the pressure upon it, and prevent the liberation of the steam, and it does not take much to do this. The simple plan of screwing or riveting a piece of lead or fusible metal into a hole should never be adopted, on account of the leakage that often takes place when the plug is slack, which leads to the corrosion, patching, and destruction of the plate. Moreover, the plug will probably not melt until the crown sheet shall have actually become bare. For this reason alone there should be a provision on the furnace plate for the insertion of the plug to keep the sheet still covered with two or three inches of water after the plug itself has been left bare. This is usually done by riveting or screwing a seating of the wrought iron into the sheet into which the fusible plug is fitted, sometimes one within another, so that in the event of one failing to work, the other may be ready. Where the area is small, greater care is necessary in keeping the metal free from incrustation, a coating of hard scale less than one-sixteenth inch thick over a one-half inch hole being sufficient to hold a pressure of 70 to 80 pounds. The mouth of the seating, when that method is used, is made two or three inches in diameter, to allow the easy removal of the soot and greater exposure to the heat.

In making a selection of the description of plug, the nature of the feed water should be considered. With feed water containing much carbonate of lime or magnesia, especially where grease is present, many of the fusible plugs in use are found to be too sensitive, and cause much trouble by melting, even where there is still abundance of water over the sheet, from the same cause as brought about the bulged plates referred to recently.

It must not be supposed that the steam in an ordinary large sized boiler can always be liberated with sufficient rapidity through a small hole to prevent overpressure. Many engineers state that, on the melting of the plug, the discharge of dry steam over the fire greatly increases the heat of combustion. That this will take place under certain favorable conditions there can be no doubt, and is probably one reason why fusible plugs are sometimes ineffective; but when the discharge of water or wet steam over the fire is to any extent, combustion will be retarded, the pressure relieved, and warning of danger given.

To guard against the risk arising from the tendency to change in the nature of the alloy, it is advisable to renew the fusible metal every three or four months, and only plugs that will admit of this should be chosen. Low temperatures can be determined by the melting points of compositions of lead, tin, and bismuth, and the following alloys are given by Weisbach as suitable for fusible plugs, together with their melting points. The second is what is known as Rose's metal, and very commonly used.

1 part lead,	1 part tin,	4 parts bismuth,	201° Fah.
5 " "	3 " "	8 " "	202° Fah.
2 " "	3 " "	5 " "	202° Fah.
1 " "	4 " "	5 " "	246° Fah.
1 " "	— " "	1 " "	257° Fah.
1 " "	1 " "	— " "	466° Fah.
— " "	2 " "	1 " "	334° Fah.
1 " "	3 " "	— " "	334° Fah.
— " "	3 " "	1 " "	392° Fah.

—*Boston Jour. of Com.*

To coat tin dishes to withstand the action of chemicals used in developing and toning photos, use a quick-drying asphalt varnish, as that for bicycles.

Thioketone, the Worst Smelling Substance Known.

An amusing instance of the inconveniences of carrying on chemical research in populated districts (*Brit. and Col. Drug.*) appears incidentally in a paper on Thioderivatives of Ketone, by E. Baumann and Fromm. By the reaction of sulphureted hydrogen on acetone in the presence of condensation agents they obtained principally trithio-aceton $C_9H_{18}S_3$, and small quantities of a non-volatile, definitely crystalline compound $C_{15}H_{28}S_4$, tetrathiopeuton. At the same time, however, an exceedingly volatile body was formed which possessed a smell so horrible that, in comparison therewith, ethylmercaptan, ethylenmercaptan, and other volatile sulphides must be considered as faint-smelling substances! The authors could not obtain the compound pure (for a reason which they mention further on), but there could be no doubt that it was the monosulphureted acetone C_3H_6S or thioketone. As they were once distilling the reaction product of 100 gr. aceton, concentrated hydrochloric acid, and sulphureted hydrogen, with the most perfect arrangements for condensation, so that no perceptible loss of the product occurred, the atmosphere of the surrounding district of the town was infected over an area more than 800 yards wide! Every attempt to obtain the substance pure brought down such a storm of protest and complaint against the laboratory that the authors were compelled to relinquish the research.

Armor Plate Tests.

An armor plate 4 feet square by 4 feet thick, manufactured by Messrs. Wm. Jessop & Son (Limited), Brightside Works, Sheffield, was recently subjected to a severe trial on board the Nettle, off Portsmouth. Three shots were fired at the plate from a 6 inch breech loader only 30 feet distant, with special charges of gunpowder and chilled projectiles. The first shot directed at the plate was fired toward the bottom, 12 inches below the center. It made a slight penetration, but was hurled back broken into fragments, leaving only a very small and almost imperceptible crack from the point of impact to the bottom edge. The second shot, fired at a spot equidistant between the center and the top left-hand corner, gave even better results. It hardly penetrated the plate at all, and was thrown back in several pieces. No crack appeared at all near the point of impact, but a slight start of an appearance of a crack was formed on the outside edge nearest where the shot struck. The results of these two shots were considered so remarkable that it was decided to fire a third, which was launched against the plate before it had recovered from the vibration of the second impact. This shot, which took effect 12 inches from the side and 12 inches above the center, caused two cracks, one extending down to the impact of the first shot, and the other going upward to the top outer edge. Nevertheless, the shot did not penetrate half way through the plate, but was returned into the arena almost pulverized to dust. The general opinion of those who witnessed the trial, we are informed, was that the plate was the best of its kind yet tested. The plate was manufactured of special steel recently patented by Mr. J. F. Hall, the works manager of Messrs. Jessop's works.—*Colliery Guardian.*

Hemp Silk.

Mr. Nayemura Sakusaburo, a druggist of Hikone, in Omi, Japan, has succeeded in converting wild hemp (yachyo) into a substance possessing all the essential qualities of silk. Nothing is said about the process, but it is asserted that trial of the thread has been made at the first silk-weaving establishment in Kioto and at other factories, with excellent results in every case. The plant in question grows on moors and hillsides. Its fiber is said to be strong and glossy, in no wise inferior to silk when properly prepared. Cultivation on an extended scale would present no difficulties.

ORNAMENTAL IRON WORK FOR AMATEURS.

Although artistic wrought iron work dates from very early times, it was never more popular than it is at present. This remark applies especially to movable articles such as tables, stands, racks of various kinds, fuel baskets, lamp supports, etc. Many of these articles of recent manufacture are copies of antique objects, while others are of modern design. As works of art they are fully equal, if not superior, to the specimens of earlier work.

Now, while no imitation can ever equal the original article, it must be admitted that imitations often

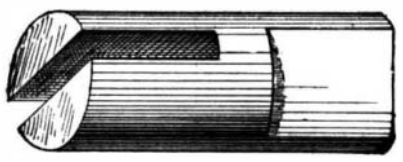


Fig. 3.—JAW FOR BENDING.

prove very satisfactory to those who can neither make nor purchase the real article.

The examples of iron work here illustrated are styled imitations, as they are made without forging, *i. e.*, the iron is bent either cold or hot, without the use of a hammer, while the iron bars or rods maintain their original cross section. Any one used to the hammer and anvil can, in addition to the curves, apply forged portions, or twist and forge the bars used in the scrolls.

The only special tool used in making articles of this class is the steel jaw shown in Fig. 3. Its slot receives the bar to be bent, and its flattened shank is designed to be held in an iron vise. A scroll is formed by placing the end of a bar in the jaw, and winding the bar around the jaw and upon itself, afterward unwinding the bar to open the spiral as much as may be required. After the scroll is complete, the inner straight end of the bar is cut off by means of a hack saw. The sharp angles may also be bent by the use of the jaw. It will facilitate the operation if the bar is heated red hot at the point of bending. A hammer may prove useful in this part of the operation.

The standard of the lamp support consists of a piece of gas pipe. The feet are attached by means of screws, and the different parts of the iron work are fastened together by means of small screws or bolts.

A rod is fitted to the gas pipe and has at its upper end a frame or cup for receiving the lamp. A clamping screw passing through the gas pipe holds the rod at the desired height.

An easy and satisfactory way of blacking the work after it is finished is to coat it with a thin varnish of stick or seed lac cut in alcohol, with refined lampblack stirred in to give it the required color. The varnish should be made quite thin to avoid any gloss.

It is obvious that grilles, gates, screens, doors, and other objects may be made from iron in this way with little trouble or expense.

Figs. 1 and 2.—IRON LAMP SUPPORTS.

A New Era of Prosperity.

It is the opinion of many close observers of the times that this country has entered upon a new era of prosperity. One of the chief reasons for this belief that they cite is that wheat values, which, with the exception of two or three instances of temporary abnormal inflation, have for a number of years past been unusually low, must in the future inevitably maintain a higher range, owing to the simple fact that our home consumption is increasing much more rapidly than the production of wheat—that there will be less new land to subdue, less bonanza wheat farming, and a greater diversification of crops in the future than in the past. As the prosperity of the country depends upon that of the farming community, it is easy to see that a steady, legitimate advance in the price of breadstuffs under the conditions cited would inevitably bring better times to the people. Increase of home consumption is the factor upon which the farmers and millers must mainly rely to enhance their prosperity. The foreign market will cut much less of a figure in the future than heretofore, and the sooner those who are banking so heavily upon it now arrive at an understanding of this fact, the more contented in mind will they be.—*The Modern Miller.*

Make an Agreement.

It is a difficult matter to deal with that class of men who will neither give nor receive a definite proposition looking toward compensation. If, on the one hand, you meet a man who says, "That will be all right; I guess we won't have any trouble about that part of it," set it down that there will be trouble on just "that part of it." If, on the other hand, you find a man who is always declaring, "You'll not lose anything by this; I'll see that it's all right," you may be sure it will be all wrong in the end. When two men of this sort get together, and the services are of such nature that to determine their exact value at the time of their inception is impossible, the end will be a misunderstanding, mutual dissatisfaction, possibly an estrangement. Yet there is no case in which a probable value cannot be got at. If you consider matters as a complete affair, and estimate the value of results as you plan them to happen, you can never be far wrong. If one cannot do that, he has no business to undertake to make contracts at all. It may be that there are times when a man may go into a business engagement without a definite idea of what his pay is to be, and there may be men who will always settle satisfactorily. But one is never safe to make engagements in such a lax way. False modesty always stands in the way of sensible business arrangements. But it has no place in business. As an old merchant said once to a writer: "We are friends, and I trust will always remain so. Perhaps it is against my interest to tell you so, but when you are making an agreement for the purchase and delivery of goods, don't think of your feelings toward each other at all. Buy of me as you would of a stranger; consider your own needs and profits, and don't hesitate to buy when you can do best." It should be exactly this way in making arrangements for employment. Treat the matter simply as business, pure and simple. You can't afford to do business without making proper arrangements for all points. These sensible suggestions from the *National Grocer* have more than a money value. "Business is business" seems sometimes like a heartless proverb, but it is a fact that no business is likely to prove so satisfactory as that which is done strictly on business principles. Here is where the great value of business education comes in. It impresses upon the mind at every stage of its course that "business is business."