



A SUGAR PLANTATION.

**A DAY ON A SUGAR ESTATE IN JAMAICA.**

The Caymanas Estate, one of the best estates in Jamaica, is within easy access of Kingston.

The estate, which is in reality three estates combined, contains about 1,000 acres of land on the plains, 2,000 acres of mountain land, and 500 acres of lagoon. There are 700 acres under cane cultivation, the rest being given up to cocoa-nut trees, logwood, and other agricultural produce. The estate gives employment to some five or six hundred hands, men, women, and children.

Work commences at six o'clock in the morning and lasts till dusk.

The period of sugar-making extends from the beginning of December till the middle of June, the cane being planted so as to ripen in succession during those months; for if it all ripened at once it would be impossible to find either the labor or the machinery to deal with it—the more especially in Jamaica, where the central factory system is at present unknown.

On a visit out of season—that is to say, when sugar is not being made—there is apparently little life about the place.

When sugar is being made, however, all is different. Cutters—each attended by his binder, usually a woman—cut down the rows of cane; the bundles are received into the wains, and are drawn by oxen to the yard in front of the boiling-house, where they are uncartered and deposited, one after the other, upon an automatic carrier working on an endless chain.

By means of the carrier they are deposited between the rollers, three in number, of the mill, by which the cane is crushed, and juice to the extent of 65 to 70 percent is extracted at the rate of 1,000 to 1,200 gallons an hour; the juice falling through a brass gauze filter into a small chamber, and the crushed cane, or megass as it is called, being conveyed away on another automatic carrier, to be subsequently used as fuel.

The juice, which is tested from time to time by the polariscope (which instrument is also used to ascertain the right time at

which to cut the cane), as it passes through the chamber mentioned above, is subjected to sulphur fumes, in order to clean it. Thence it passes up into a heater, which consists of a cylinder with 175 small perpendicular tubes, each surrounded by steam, in order that it may be at once brought to boiling-point to prevent acidity; for directly unboiled juice is exposed to the air it commences to turn acid. It now passes through wire gauze for the third time, to get rid of any small portions of cane which may have eluded the previous strainings, into a series of four tanks, where it is clarified with cream of lime. After staying there about fifteen minutes, the juice is drawn off into three 'eliminators,' where it is again boiled-up, skimmed, brushed, and allowed to settle; the clear liquid is drawn off with syphons, and the 'bottoms' are passed through filter bags. The clear juice is then run into a suction tank, where it is drawn off by a vacuum into three receivers, or 'triple effect' as they are called—perpendicular cylinders, about five feet in diameter, with 420 pipes in each. As the contents of each succeeding cylinder boils at a lower temperature than the one preceding it, the series is, in a way, co-operative, the waste steam from the one being utilized to boil the next.

As soon as the juice is sweet enough it is run off into a receiver below the vacuum pan, into which it is drawn in small charges, granulated, and the grains built on. After boiling in the pan for seven or eight hours, it has turned into an almost solid body of sugar and molasses, called masecuite. It is then put into boxes, and allowed to cool for from twelve to eighteen hours. Then it passes into a 'pug mill' with teeth to break it up; and next it undergoes one of the most important features of its complicated manufacture—the centrifugal machine, some 2½ feet in diameter, where it is whirled round at the rate of 1,700 to 2,000 revolutions a minute, which speed causes the molasses to fly out through the wire gauze of which the inner sides of the machine are composed. In the old days, when sugar was not so carefully prepared, the molasses used to run out of the casks into the hold of the ship, as the

sugar was being conveyed to England, and formed a valuable perquisite for the mate. The molasses from the centrifugal machine goes to the distillery to play its part in the manufacture of rum. Thus the whole process of converting newly-cut cane into sugar fit for table—of the more important features of which only a very brief sketch has been given—is carried on in a building no larger than about sixty feet by forty feet; and during the months of manufacture as much as ten tons is made in a day, or, taking an average, forty-five to fifty tons a week—enough to sweeten about 2,500,000 cups of tea.—*Pall Mall Budget.*

**SOAP-BUBBLES,**

AND THE FORCES WHICH MOULD THEM.

By C. V. Boys, A.R.S.M., F.R.S. of the Royal College of Science.

(Continued.)

**PRACTICAL HINTS.**

**PARAFFINED SIEVE.**

Melt some paraffin wax or one or two paraffin candles of the best quality in a clean flat dish, not over the fire, which would be dangerous, but on a hot plate. When melted and clear like water, dip the sieve in, and when all is hot quickly take it out and knock it once or twice on the table to shake the paraffin out of the holes. Leave upside down until cold, and then be careful not to scratch or rub off the paraffin. This had best be done in a place where a mess is of no consequence.

There is no difficulty in filling or in setting it to float upon water.

**NARROW TUBES AND CAPILLARITY.**

Get some quill-glass tube from a chemist, that is, tube about the size of a pen. If it is more than, say, a foot long, cut off a piece by first making a firm scratch in one place with a three-cornered file, when it will break at the place easily. To make very narrow tube from this, hold it near the ends in the two hands very lightly, so that the middle part is high up in the brightest part of an ordinary bright and flat gas flame. Keep it turning until at last it becomes so soft that it is difficult to

hold it straight. It can then be bent into any shape, but if it is wanted to be drawn out it must be held still longer until the black smoke upon it begins to crack and peel up. Then quickly take it out of the flame, and pull the two ends apart, when a long narrow tube will be formed between. This can be made finer or coarser by regulating the heat and the manner in which it is pulled out. No directions will tell any one so much as a very little practice. For drawing out tubes the flame of a Bunsen burner or of a blow-pipe is more convenient; but for bending tubes nothing is so good as the flat gas flame. Do not clean off smoke till the tubes are cold, and do not hurry their cooling by wetting or blowing upon them. In the country where gas is not to be had, the flame of a large spirit-lamp can be made to do, but it is not so good as a gas-flame. The narrower these tubes are, the higher will clean water be observed to rise in them. To color the water, paints from a color-box must not be used. They are not liquid, and will clog the very fine tubes. Some dye that will quite dissolve (as sugar does) must be used. An aniline dye, called soluble blue, does very well. A little vinegar added may make the color last better.

**CAPILLARITY BETWEEN PLATES.**

Two plates of flat glass, say three to five inches square, are required. Provided they are quite clean and well wetted there is no difficulty. A little soap and hot water will probably be sufficient to clean them.

**TEARS OF WINE.**

These are best seen in a mixture of from two to three parts of water, and one part of spirits of wine containing a very little rosaniline (a red aniline dye), to give it a nice color. A piece of the dye about as large as a mustard-seed will be enough for a large glass. The side of the glass should be wetted with the mixture.

**CAT-BOXES.**

Every school-boy knows how to make these. They are not the boxes made by cutting slits in paper. They are simply made by folding, and are then blown out like the 'frog,' which is also made of folded paper.

**LIQUID BEADS.**

Instead of melting gold, water rolled on to a table thickly dusted with lycopodium, or other fine dust, or quicksilver rolled or thrown upon a smooth table, will show the difference in the shape of large and small beads perfectly. A magnifying-glass will make the difference more evident. In using quicksilver, be careful that none of it falls on gold or silver coins, or jewellery, or plate, or on the ornamental gilding on book-covers. It will do serious damage.

**PLATEAU'S EXPERIMENT.**

To perform this with very great perfection requires much care and trouble. It is easy to succeed up to a certain point. Pour into a clean bottle about a table-spoonful of salad-oil, and pour upon it a mixture of nine parts by volume spirits of wine (not methylated spirits), and seven parts of water. Shake up and leave for a day if necessary, when it will be found that the oil has settled together by itself. Fill a tumbler with the same mixture of spirit and water, and then with a fine glass pipe, dipping about half-way down, slowly introduce a very little water. This will make the liquid below a little heavier. Dip into the oil a pipe and take out a little by closing the upper end with the finger, and carefully drop this into the tumbler. If it goes to the bottom, a little more water is required in the lower half of the tumbler. If by chance it will not sink at all a little more spirit is wanted in the upper half. At last the oil will just float in the middle of the mixture. More can then be added, taking care to prevent it from touching the sides. If the liquid below is ever so little heavier, and the liquid above ever so little lighter than oil, the drop of oil perhaps as large as a halfpenny will be almost perfectly round. It will not appear round if seen through the glass, because the glass magnifies it sideways, but not up and down, as may be seen by holding a coin in the liquid just above it. To see the drop in its true shape the vessel must either be a globe, or one side must be made of flat glass.

(To be Continued.)