

The cylinder is made to revolve rapidly, and the roots are thus scraped, the pulp falling into a vessel lined with lead, placed below. When two such cylinders are made to revolve 100 times in a minute by a sufficient power, whether water, wind or horses, two and a half tons of roots are ground down in two hours. It is necessary that this operation should proceed rapidly, or else the pulp acquires a dark colour, and an ineffectual fermentation takes place, which greatly injures the future results. As the pulp is ground, it is put into strong canvass bags, and placed under a powerful press to squeeze out the juice. The residue is stirred, and subjected to a second and third pressure, if necessary, till every particle of juice is extracted. As the liquor is pressed out, it runs into a copper, until it is two-thirds filled. The strength is ascertained by an instrument similar to the saccharometer used by brewers, called the *pèse-liqueur* of Beaumé*, which shows the specific gravity of the liquid. The fires are now lighted, and by the time the copper is full the heat should be raised to 178° of Fahrenheit's thermometer (65° of Réaumur), but no higher.

In the mean time a mixture of lime and water has been prepared by gradually pouring as much water upon 10lb. of quick lime as will make the mixture of the consistency of cream. This is poured into the copper when the heat is steady at 178°, and is well mixed with the juice by stirring it. The heat is then increased till the mixture boils, when a thick and glutinous scum rises to the surface. As soon as clear bubbles rise through this scum, the fire is suddenly put out by water poured on it or by a proper damper. The scum hardens as it cools, and the sediment being deposited the liquor becomes clear and of a light straw colour. The scum is then carefully taken off with a skimmer having holes in it, and is put into a vessel till such time as the liquor remaining in it can be pressed out. A cock is now opened about five inches above the bottom of the boiler, and all the clear liquor is drawn off. Another cock lower down lets out the remainder until it begins to appear cloudy; what still remains is afterwards boiled again with what is extracted by pressure from the scum. The clear liquor is now subjected to evaporation in another boiler which is wide and shallow. The bottom is but slightly covered with the juice at first, and it boils rapidly. As the water evaporates, fresh juice is let in. When a certain degree of inspissation or thickening has taken place, so as to show five or six degrees of strength on the *pèse-liqueur*, animal charcoal is gradually added till the liquor arrives at 20°. One hundred weight of charcoal is required for the juice of 2½ tons of beet, which is now reduced to about 400 gallons. The evaporation by boiling continues till the saccharometer marks 25° and a regular syrup is obtained. This is now strained through a linen bag, and the liquor is kept flowing by means of steam or hot air, and assisted by pressure. In two or three hours all the clear syrup will have run through.

There are many nice circumstances to be attended to, which can only be learned by experience, and an outline of the process is all that we undertake to give.

The syrup thus prepared is again boiled and skimmed until it is sufficiently concentrated, which is known in the following manner. The skimmer is dipped into the syrup and drawn out; some of the thick syrup which adheres to it is taken between the thumb and fore-finger and held there till the heat is reduced to that of the skin; the finger and thumb are separated, and if the syrup is of a proper strength, a thread will be drawn out, which snaps and has the transparency of horn or rather barley-sugar: this is called the *proof*. The fire is then put out and the syrup is carried to the cooler, which is a vessel capable of containing all the syrup produced by four operations or boilings. Here the sugar is to crystallize: as soon as this commences the whole is well mixed and stirred, and before it becomes too stiff, earthen moulds, of the well-known sugar loaf shape, and of the size called *great bastards*, are filled with the crystallizing mass, of which a little at a time is poured into each. When they are full, they are carried to the coolest place on the premises. As the crystallization goes on, the crust formed on the top is repeatedly broken, and the whole is stirred till the crystals are collected in the centre; it is then allowed to go on without further disturbance. In three days it is so far advanced, that the pegs which were put into the holes at the point of the moulds may be taken out and the

molasses allowed to run out. In a week this is mostly run off. White syrup is now poured on the top of the moulds, which filters through the mass and carries part of the colouring matter with it. The process that follows is exactly that in common use in refining West India sugars.

Although most of the operations are nearly the same as those by which the juice of the sugar-cane is prepared for use, much greater skill and nicety are required in rendering the juice of the beet-root crystallizable on account of its greater rawness, and the smaller quantity of sugar that it contains. But when this sugar is refined, it is impossible for the most experienced judge to distinguish it from the other, either by the taste or appearance; and from this arose the facility with which smuggled colonial sugar was sold in France, under the name of sugar from beet-root. Five tons of clean roots produce about 4½ cwt. of coarse sugar, which gave about 160 lbs. of double refined sugar, and 60 lbs. of inferior lump sugar. The rest is molasses from which a strong spirit is distilled. The dry residue of the roots, after expressing the juice, consists chiefly of fibre and mucilage, and amounts to about one-fourth of the weight of the clean roots used. It contains all the nutritive part of the root, with the exception of 4½ per cent. of sugar, which has been extracted from the juice, the rest being water. Two pounds of this dry residue, and half a pound of good hay, are considered as sufficient food for a moderate-sized sheep for a day, and will keep it in good condition; and cattle in proportion.

As the expence of this manufacture greatly exceeds the value of the sugar produced, according to the price of colonial sugar, it is only by the artificial encouragement of a monopoly and premiums that it can ever be carried on to advantage. The process is one of mere curiosity as long as sugar from the sugar-cane can be obtained, and the import duties laid upon it are not so excessive as to amount to a prohibition; and in this case it is almost impossible to prevent its clandestine introduction.

Another mode of making sugar from beet-root, practised in some parts of Germany, is as follows; and is said to make better sugar than the other process. The roots having been washed and sliced lengthways, strung on packthread and hung up to dry. The object of this is to let the watery juice evaporate, and the sweet juice, being concentrated, is taken up by macerating the dry slices in water. It is managed so that all the juice shall be extracted by a very small quantity of water, which saves much of the trouble of evaporation. Professor Lampadius obtained from 110 lbs of roots 1 lbs of well-grained white powder sugar, and the residuum afforded 7 pints of spirit. Achard says that about a ton of roots produced 100 lbs. of raw sugar, which gave 55 lbs. of refined sugar, and 25 lbs of treacle. This result is not very different from that of Chaptal.

To the Sons of Temperance, Hungerford,

COMPOSED BY A FEMALE.

Raise your Temperance banners high,
Ye worthy Sons of Hungerford;
And let them from afar descry,
That ye love the Temperance word.
Speed on! speed on! increase your number;
Gain in strength, and raise your name;
And shew the world that ev'ry member
Sons to seek immortal fame.
Support! support the glorious cause,
The cause of those who would be free—
Who, long enslaved by Bacchus' laws,
Seeing their danger, turn and flee.
May you who are thus united,
Stand as firm as the sturdy oak;
Nor ever be again excited
To wear the demon's cursed yoke.
Let religion be your standard;
Take the Bible for your guide!
Then the lost who long have wandered
Will approach and join with pride.
Then Hungerford will rise in glory,
While her Sons triumphant stand;
Ages hence will tell the story,
And praise your long united band.
Hungerford, April 18, 1851.

* The "pèse-liqueur" of Beaumé here referred to is an hydrometer, of which 0° corresponds to 1,000, the specific gravity of pure water at 55° of Fahrenheit; and 25° to about 1.215.