ways to contain cane sugar, obtaining about six per cent. of crystallized sugar and four per cent. of molasses. In 1796, enconraged with pecuniary aid by Frederick William II., of Prussia, Achard established an experimental factory at Cunern, in Lower Silesia. Here he worked up 7,000 lbs. of beets daily, obtaining six per cent. of yellow raw sugar, and three per cent. of molasses. These results were so satisfactory that Baron von Koppy established a factory at Olbendorf, and Herr Nathusius one at Hohensleben. Factories were established in Bohemia as early as 1802. Louis Napoleon states that while Achard's experiments were going on, the British government, alarmed lest the discoveries of Achard should injure the colonial interests of Great Britain, offered him anonymously 50,000 thalers (equal to $36,500), and subsequently 200,000 thalers (equal to $146,000), *if he would report that his experiments resulted unfavorably*. The offer was rejected with contempt, and the successful results of his experiments were made public. Achard showed that besides the sugar and molasses, the pulp would be a useful product as food for fattening cattle, whose manure would be valuable for other crops. The first Napoleon encouraged the industry by having 32,000 hectares (equal to 79,075 acres) of land put to beets, and appropriating 1,000,000 francs for the enterprise in 1811. The Russian government also encouraged the cultivation in Thule by a gift of 50,000 rubles, (equal to about $36,500) and a remission of the taxes on land devoted to beets. The industry was, however, almost entirely abandoned in Germany, but under government encouragement was developed in France, till in 1829 the product amounted to 4,000,000 kilos, or 8,800,000 pounds, and in 1835 to 40,000,000 kilos, or 88,000,000 pounds, (equal to 44,000 tons). The French harvest of 1856-66 yielded from the beet—

Sugar	$31,250,000
Spirits	6,750,000
Potash	2,500,000
Pulp	5,000,000
Total	$45,500,000

In the meantime it was revived in Germany and Austria, and extended into Russia, Belgium, Denmark, Holland and Sweden."

The European Sugar Industry in 1875, (from the *Sugar Cane*, July 1, 1876):

	Beet Root Factories.	Refineries.
France	552	49
Austria and Hungary	245	6
Germany	339	68
Belgium	151	37
Holland	32	15
Russia	267	10
Denmark	2	3
Sweden	4	7
Italy	3	2

The beet sugar enterprises in England failed, but in the United States one was begun by Messrs. Vaughn and Donaldson, of Philadelphia, in 1830, but failed for want of information. In 1838, D. L. Child of Northampton, Mass., made 1,300 pounds of beet sugar. For the next twenty-five years nothing appears to have been done in this direction. In 1863, Generet Brothers established a large factory at Chatsworth, Illinois, which has gone on through many discouraginging experiences, and was in 1869 moved in part to Freeport, Ill. In 1860 experiments were undertaken in California, which finally resulted in the formation of the Alvorado Sugar Co., which began work in 1870. Two other companies have since been organized in that state, and some of these companies promise to be successful.

DIFFICULTIES OF BEET SUGAR MANUFACTURE.

These have been found to be: 1st, Bad locations; 2d, Want of capital and practical experience; 3d, Want of information as to suitable soils.

The invention of new processes for treating the bee's and the juice in Europe, and the choice of the right varieties of beets, have enabled the farmers to produce roots, which yield eight per cent. of sugar.

THE PRODUCTION OF THE SACCHARINE JUICE IN THE CANE AND IN THE BEET.

By chemical analysis, it is proved to be exactly the same in both. Cane sugar, according to Prof. Youmans, as before stated, has the formula, C. 12, H. 11, O. 11. This is understood to be the composition of the juice after it is purified. Prof. Chandler remarks that most of the sugars are "carbo-hydrates," i. e., they contain hydrogen and oxygen in the proportions they exist in water, two atoms of hydrogen to one of oxygen; thus, cane sugar is C. 12, H. 22, O. 11. The beet sugar of commerce has, doubtless, the same formula.

When ripe, the stem of the sugar cane contains a dirty white pith or open cellular tissue, which is filled with the very pure saccharine juice. This is the sugar juice thus stored in nature's laboratory as honey in its cell. In like manner, the beet root consists of a mass of small cells containing a colorless fluid. Its composition averages, water, 82.6; cane sugar, 11.3; insoluble constituents, 1.1; soluble constituents, 5.

The greatest beet sugar production near Magdeburg, was 13.3 per cent., inferior beets, 9.2 per cent; average, 11.2 per cent. Twelve and one-half tons of beets yield on the average one ton of raw sugar.

The following analysis from fourteen varieties of beets are from S. W. Johnson's "How Crops Grow," giving the average water, 81.5; albumenoids, 0.95; sugar, 11.5; organic acids, 3.7; crude fibre, 1.3; ash, 0.85.

THE BEST VARIETY OF SUGAR BEETS.

The Silesian beet, a pear-shaped root, white in the body and light green on the top; is not the richest in sugar, but is most cultivated in France and Germany because it yields the larger weight of roots to the acre, grows vigorously, and produces the largest amount of sugar per acre. Its average weight is 1 lb. 5 oz. Four other varieties of white beets prove of almost equal value.

THE MANUFACTURE OF SUGAR FROM CANE OR BEET.

This consists in *extracting* and *purifying* the juice. Sugar cane is pressed between heavy rollers. Its juice is composed of water, 71.04; sugar, 18.00; other matter, 10.96.

By the old methods of lamination, as applied still on a great number of plantations, the manufacturer obtains—

	Pounds.
Crystallized (brown) sugar	65
Sugar in molasses	25
Sugar in the bagasse, or waste	90
Sugar in 1,000 lbs. of cane	180

By modern *improved* methods of lamination, he obtains—

	Pounds.
Crystallized sugar	108
Sugar in molasses	32
Sugar in bagasse, or waste	40
Sugar in 1,000 lbs. of cane	180

By the new process of diffusion or dissolving the cane juice in water—

	Pounds.
Crystallized sugar (white) obtained	130
Sugar in the molasses	40
Sugar lost	10
Sugar in 1,000 lbs. of cane	180

In beet sugar manufacture—1st, The washing or cleansing is effected in a