THE PRODUCTION OF BEET SUGAR IN OREGON AND WASHINGTON. THE SUGAR OF COMMERCE.

FACTS COLLECTED AND PREPARED BY REV. G. H. ATKINSON.

"There are two principal varieties of sugar," says Prof. Youmans. That which is extracted from the juice of the sugar cane, green corn stalks, beet roots and the maple tree is called cane sugar. It is the kind in common use. The other is obtained by the transformation of starch and dextrine, and is abundant in fruits, as the apple, plum, pear, cherry, and fig. It is especially abundant in grapes, and is hence called grape sugar—also starch sugar or glucose. The white, sweet grains in raisins are grape sugar. It also forms that portion of honey which solidifies. These two kinds of sugar differ in composition and properties.

RELATIVE COMPONENT ELEMENTS OF THESE SUGARS.

"Cane sugar has the formula: Carbon 12 atoms, Hydrogen 11 atoms, Oxygen 11 atoms." As the relative atomic weights are, hydrogen, 1; carbon, 6; and oxygen, 1; 171 pounds of cane sugar would be composed of 11 pounds of hydrogen, 72 pounds of carbon and 88 pounds of Oxygen.

But as the sugar of commerce is a hydro-carbonate, it contains 22 parts of H., 72 C., and 88 O., equals 182.

Grape sugar is represented by C. 12, H. 14, O. 14. By atomic proportion, 198 lbs. of this sugar contains of carbon 72 lbs., of hydrogen 14 lbs., of oxygen 112 lbs.

Cane sugar is dissolved freely by one-third its weight of cold water, and grape sugar dissolves slowly, requiring one and one-half times its weight of water. Two ounces of cane sugar are equal in sweetening power to five ounces of grape sugar.

ITS USES.

1st. It is a delicious element of diet.

2d. It is considered to act as fuel for the system, being directly consumed in respiration.

3d. It prevents the decomposition or putrefaction of organic substances. It preserves fruits by separating their water, and fixing it in an unchangeable syrup, and by excluding the air. It preserves meat and fish and requires a much smaller quantity to prevent putrefaction than of salt.

4th. It contains no nitrogen and can not make flesh, but Liebig says it makes fat which has no nitrogen.

AMOUNT OF CANE SUGAR MANUFACTURED.

In 1850, according to Dr. Carpenter, the annual production of sugar in various parts of the world, was estimated at about one million tons; or two billion pounds, which at ten cents per pound would cost the consumers two hundred million dollars.

In 1870, according to reports collated by Prof. C. F. Chandler, the sugar-cane product supplied 1,700,000 tons, or 59 $\frac{34}{100}$ per cent.; beets supplied 1,000,000 tons or 34 per cent.; the date-palm supplied 100,000 tons or 3 $\frac{49}{100}$ per cent.; sorghum supplied 50,000 tons or 1 $\frac{75}{100}$ per cent.; the maple trees supplied 15,000 tons or $\frac{52}{100}$ per cent. The whole amount was 2,865,000 tons, or 5,730,000,000 lbs., which at ten cents per lb. cost the consumers $573,000,000.

The total production of sugar in 1867 was 5,140,071,530 lbs, or 2,570,036 tons.

The *Sugar-Cane Journal* reports the average sugar crop of the world, in 1869–73, as follows:

	Tons.
Cuba	701,431
Java	175,623
Brazil	136,000
Mauritius	118,126
Porto Rico	95,532
Manila	81,816
British Guiana	63,922
Louisiana	61,863
Trinidad	51,199
Jamaica, Barbadoes, Martinique, Guadaloupe, Reunion, Peru, Mexico, Egypt, etc.,	178,189
Total from cane	1,663,701
Europe, beet sugar (over ⅓ of whole)	946,000
Whole number of tons	2,609,701

The beet sugar crop on the continent of Europe for

1872-3	was	1,142,397	tons
1873-4	"	1,110,166	"
1874-5	"	1,220,000	"
1875-6	"	1,205,000	"

or an average of 1,169,391 tons per year for four years, which equals 2,338,782,000 lbs., and which at ten cents per pound would cost the consumers $233,878,200.

According to the *Journal on Sugar Manufacture*, the consumption of sugar in the world, in 1875, was:

	Pounds.	Per H'd
England	1,826,000,000	50.6
United States	1,694,000,000	44.0
Holland	88,000,000	24.0
Belgium	110,000,000	22.0
Germany	673,000,000	16.5
Sweden	121,000,000	15.6
France	550,000,000	15.4
Austria and Hungary	374,000,000	10.5
Argentine Republic	66,000,000	9.8
Switzerland	24,200,000	9.0
Portugal	33,000,000	6.0
Italy	220,000,000	5.9
Spain	110,000,000	6.6
Russia	330,000,000	6.0
Turkey	55,000,000	3.3

The average per head in these fifteen nations was 16.4 lbs. But the average consumed per person in England and the United States was three times that amount.

The production doubles in about twenty years, showing a rate of five per cent. gain per year, which implies a like increase in the consumption per year.

THE CLIMATE REQUIRED FOR SUGAR CANE.

This plant flourishes best in the tropics, where the mean temperature is from 75° to 77°, but it can grow well where the mean temperature is 66°. Its limits are thus fixed within the zones on both sides the equator, about 30° North or South.

THE CLIMATE REQUIRED FOR SUGAR BEETS.

This plant flourishes best in the temperate zones. It thrives in Middle Europe and America, within the belt between 40° and 55°. In France, Belgium, Holland, Germany, Austria, Denmark and Russia it grows to perfection, and even as far north as Sweden, and as far south as Italy it grows well. It is cultivated with success in the northern belt of American states. Its habitat follows the sothermal line far to the north on the Pacific coast, as it does in Western Europe, and for the reason of the same mild climate. It proves to be to the northern or temperate regions a source of sugar, equal to that of sugar cane to the southern or tropical regions. Its value in commerce is the same as that from cane.

"At present," says Prof. Chandler, "more than one-third of all the sugar of the world is made on the continent of Europe from the beet."

ITEMS OF HISTORY ABOUT BEET SUGAR.

It was discovered in 1747 by A. S. Marggraf of Berlin. From the beet (*Beta Cicla*) he obtained, by means of alcohol, from 4.6 per cent. in the red variety, to 6.2 per cent. in the white. F. C. Achard, a pupil of Marggraf, forty-nine years later, made many experiments on beets, and found them al-