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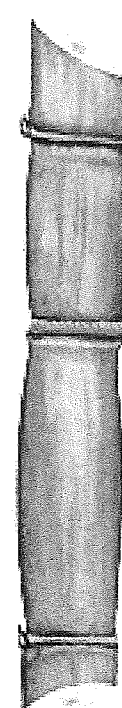
Chapter Ten is page after page of old photos, personal glimpses into the lives of GWS employees, reproductions of old advertisements, several covers and a short history of the Great Western Sugar Company newsletter The Sugar Press, as well as stories, poems and interesting trivia about the sugar company. It is a heartwarming journey through the past lives of those who proudly called themselves Sugar Tramps. The chapter gives the reader an opportunity to walk with those who left their footprints in the sugar.

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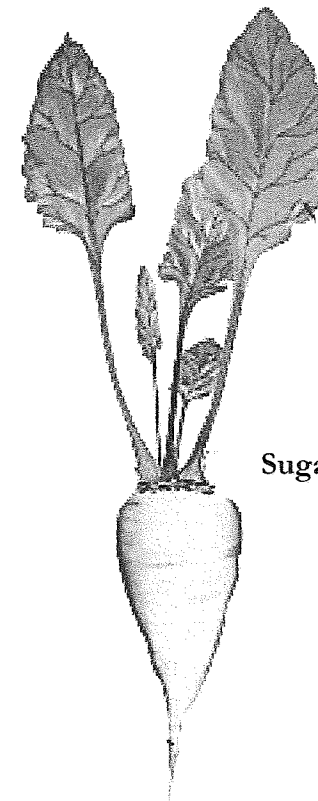
In memory of my father Harold W. Bates and my friend Charles Buechner who looked forward to seeing this book in print but were taken from us before its completion.

THE JOURNEY BEGINS...

CHAPTER ONE

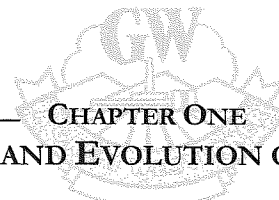


Sugar Cane



Sugar Beet

ORIGIN AND EVOLUTION OF SUGAR

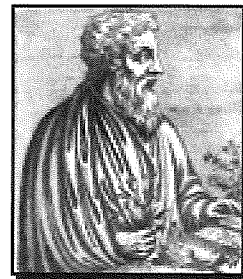

CHAPTER ONE
ORIGIN AND EVOLUTION OF SUGAR

Through the centuries sugar has become a resource so commonplace that few people even know of its humble beginnings. The history of sugar predates the founding of our Nation. Due to the evolution of sugar into an everyday commodity, by the mid-1800s sugar refineries could be found on both the eastern and western borders of America. The production of refined white sugar was the reason entire communities of German-Russians emigrated from Russia's Volga River region to America.¹ Years later, sugar was a reason people of Mexican-American and Japanese descent came to America to work. Sugar was also the explanation as to why during World War II, Italian and German prisoners of war interned in the United States, were allowed to work in sugar beet fields. And lastly, sugar was the sole reason the Great Western Sugar Company was established.

The genesis of sugar dates back to the second century. Due to its sweet taste, this simple substance called "sugar" has intrigued mankind for centuries. The first recorded reference to sugar is in the Old Testament, where it is described as *a substance unlike any other*. Although first communicated to the world through the Bible, the word "sugar" is actually of Arabic origins and refers to the "honey bearing reeds" of the sugar cane.² Only plants of the grain family rival the antiquity of the sugar cane plant.

Most historians agree that the first human consumption of sugar was in 500 BC when man discovered chewing the fibrous sugar cane produced a succulent sweet juice. Although there is evidence sugar was consumed in Polynesia sometime earlier, historical data traces the roots of processed sugar to India. Sanskrit texts from 500 BC indicate cane sugar production first began in northern India, where the process of boiling sugar cane into syrups and pastes was perfected. The resulting products were used predominately for medicinal purposes.³ From India, the processing method spread into China and Persia. Centuries later, about 600 AD, the Egyptians incorporated the refining of sugar into a manufacturing-type setting.

The recorded history and use of sugar expanded over the centuries. Greek physician Pedanius Dioscorides of Anazarbos (40-90 AD), a surgeon with Emperor Nero's army, spoke of a hard honey found in canes from India which was *brittle between the teeth, but of sweet taste*. In 70 AD, Dioscorides documented the existence of hundreds of plants that contained medicinal virtues, including sugar cane. For more than 1,500 years his recordings, known as *Vienna Dioscorides*, were highly regarded as the authority on medicinal practices.⁴



Pedanius Dioscorides
(credit: U.S. National Library of Medicine National Institute of Health)

¹ Timothy J. Kloberdanz, "Colorado's Germans From Russia: They Came Over the Clouds," *Denver Post Empire Magazine*, 30 May 1976.

² "Sugar Origins," *The Sugar Press*, December 1923, 28.

³ J. H. Galloway, "II.F.2 - Sugar," *The Cambridge World History of Food*, ed. Kenneth F. Kiple and Kriemhild Conee Ornelas (Cambridge: Cambridge University Press, 2000), <http://www.cambridge.org/us/books/kiple/sugar.htm> (accessed October 19, 2000).

⁴ "Vienna Dioscorides: Centaury & Wormwood," *What is an Herb, Panel 2*, <http://hsc.virginia.edu/hs-library/history/herb/vien1.html> (accessed October 19, 2000).

During the Middle Ages (circa about 500 AD), Arabs introduced sugar cane into Sicily and Spain. As cultivation continued to spread throughout northern India and westward along the trade routes, the sugar industry developed in the Mediterranean area as part of the Arabian agricultural expansion in the seventh century AD. With the Arabs' introduction of irrigation, combined with Mediterranean technology for extracting juices, processing cane sugar commercially on a small scale became a reality. As a result of the Crusades in the eleventh century AD, sugar was introduced to western Europeans when returning Crusaders spoke of a new spice with a pleasant taste. Recorded data first places sugar in England in 1099, where it was traded and imported for the next several hundred years. However, sugar was a luxury. In 1319, Londoners paid two shillings for a pound of sugar, which equates to about \$50 per pound at today's prices.⁵

It was Christopher Columbus who introduced the sweet luxury to the Americas. Historical records from 1493 reveal Columbus hand-carried sugar cane plants to the West Indies where, when planted, they thrived. Soon after, the Spanish began cultivating sugar cane on Hispaniola (island of the Antilles between Cuba and Puerto Rico), but encountered fierce competition from the Portuguese who were able to grow the cane with more success than their Spanish counterparts.⁶ From Hispaniola the growing of sugar cane spread to the Canary Islands, from where refined cane was transported by Portuguese sailing ships to Haiti.⁷ Then the Dutch arrived on the scene. Utilizing the privateering skills of Vice-Admiral Piet Heyn, the Dutch seized numerous Portuguese ships laden with cargoes of sugar.⁸ Heyn and his fleets also invaded and took control of Bahia (San Salvador), Sao Paulo (Angola), and Havana for the Dutch, all cities that had grown rich from the production of cane sugar. Throughout the 1600s, Amsterdam was recognized as the epicenter of European sugar trading and claimed to have more than 1,000 cane sugar refineries.

As the popularity of sugar increased, and the production of cane sugar became more commonplace, its value as an industry and trade item also increased – even though the technology to produce sugar remained stagnant. By 1750, in Britain alone, there were 120 cane sugar refineries, yet their annual combined output was only 30,000 tons. Due to small-scale production, constant labor shortages within the factories, and high production costs, refined sugar remained an item only for the wealthy and was often referred to as "white gold." The British government was well aware that vast revenue could be generated by sugar and, therefore, taxed it highly. In 1781, government taxes totaled more than \$638,000; by 1815, the figure exceeded \$5.8 million.⁹

Although there were negligible technological advances, due to the high profitability and trade opportunities, countries were fervent in their quest to dominate the world cane sugar industry. Long before American cane sugar refineries were first erected during the seventeenth century, raw cane sugar had become an important resource for trade between the New and Old

⁵ "How Sugar is Made – the History," Sugar Knowledge International (SKIL), 1998/2007, <http://www.sucrose.com/1hist.html> (accessed October 19, 2000).

⁶ Galloway.

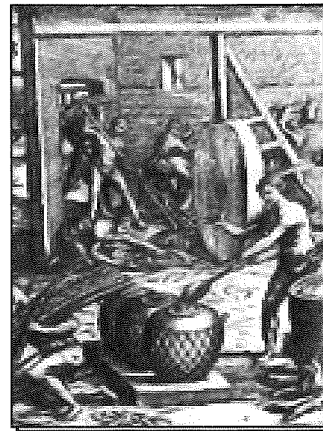
⁷ "Sugar Origins."

⁸ "Piet Heyn," <http://www.geocities.com/Tokyo/Garden/5213/heyh.htm> (accessed April 17, 2007).

⁹ "How Sugar is Made..."

Worlds. While the competition to produce sugar from cane was fierce, it was limited to specific regions of the world – those that had a combination of suitable climate, soil conditions, and a sufficient labor force to plant and harvest sugar cane. Cuba met all the criteria and almost overnight rose to the forefront as the leading sugar cane producer in the world.

Sugar cane cultivation did not begin in America until the late 1600s, when sugar cane was planted in Louisiana. With an abundance of land, forests to provide fuel for factories, and a climate suitable for growing cane, America's sugar cane industry grew relatively rapidly in terms of land holdings and production yields. However, this rapid expansion required an ever-

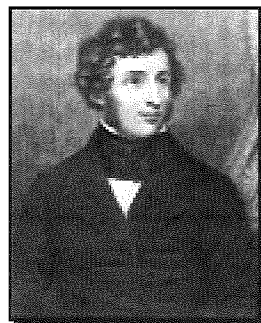


increasing labor force. For a time, Portugal satisfied the need by shipping its own indigenous people to America. However, Portugal had an unusually high disease rate, which eventually resulted in the decline of available Portuguese laborers. It was due to this decline that slave labor from Africa was introduced in America – more than 10 million people were enslaved and imported to work in the sugar cane fields.¹⁰ Slave-run sugar plantations characterized the American sugar cane industry throughout the 1700s.

African slaves process sugar cane
circa 1625
(credit: Wake Forest University History Department)

As the American colonists' demand for readily available and affordable sugar increased, businessman Nicholas Bayard saw an opportunity to not only fill their needs but to profit from them and constructed the first sugar refinery in America on Liberty Street in New York City.¹¹ Whether intentional or by happenstance, Bayard had created a new industry in America. Bayard not only achieved his goal to satisfy the colonists' need for sugar, he also attracted the attention of several wealthy and influential families as to the future value of processing sugar cane into refined sugar. America had embarked on a new journey, this time on its own shores.

However, first it is time to talk about the sugar beet and its evolution into the refined sugar market. Whereas the cane sugar industry evolved over several centuries and was clearly enshrined as a permanent and viable global industry, the idea of using sugar beets to make sugar



is a mere two-century-old idea, a relative *newborn*. The extraction of sucrose from sugar beets did not occur until 1747 when Andreas Marggraf (1709-1782), a German professor of chemistry, succeeded in proving the beet contained pure sucrose and successfully extracted a modest amount of sugar from the beet.

Andreas Marggraf
(credit: Friedrich Wohler; Encyclopedia Britannica Online)

¹⁰ Galloway.

¹¹ Kenneth T. Jackson, ed., "Sugar," *Encyclopedia of New York City: NY Food Museum* (New Haven and London: Yale University Press and New York Historical Society, 1995), <http://www.nyfoodmuseum.org/sugar.htm> (accessed October 20, 2000).

Although Marggraf published his findings, it was his student Franz Carl Achard (1753-1821) who was credited with increasing the sugar content of the cultivated fodder.¹² Through improved breeding of the sugar beet Achard developed the Silesian beet, which became the



Franz Carl Achard
(credit: Friedrich-Wilhelm Bollinger; Smithsonian Institution Libraries)

ancestor to all subsequent sugar beet varieties. His discovery shocked the world inasmuch as sugar cane was universally thought to have been the only source of sugar. Even with the remarkable discovery, it was nearly forty years before a substantial amount of sugar beets were planted with the specific intention to produce sugar, not animal fodder.

With the discovery of sucrose in the sugar beet came the opportunity for potential new trade and industry. But the prospect of processing beets into sugar was a finding that those with vested interests in sugar cane plantations attempted to dispel. They viewed Achard's discovery as nothing more than a curiosity, a fluke. Yet, Achard remained steadfast in his belief that sugar could be processed from the sugar beet. In the years preceding 1800, Achard became an unrelenting advocate for the beet sugar industry. By 1801, he had drawn the attention of the King of Prussia, the first prominent world leader to realize the sugar beet's true potential. In 1802, the King provided the necessary funds for Achard to erect what may have been the world's first beet sugar factory. It was built in Czechoslovakia and although not considered a financial success the refinery led to the erection of several small factories in the region. Shortly thereafter, Russia and Austria entered the beet sugar industry, building factories in late 1802 and 1803 respectively.

Then the Napoleonic Wars erupted and France became embroiled in a war with England. Due to the war, in 1806 Napoleon banned the import of British goods, whereby Britain retaliated by imposing a trade blockade upon Napoleon's empire, which significantly diminished the cane sugar supply from continental Europe and the British West Indies. The ensuing shortage of sugar became a national concern for France. In an attempt to rectify the shortage, Napoleon ordered French chemists to find an alternative sugar source; prior to the war, French chemists had unsuccessfully experimented with grape sugar as a cane sugar substitute. In 1806, with permission from Napoleon, the chemists borrowed research data from their German counterparts and began experimentation on sugar beets.

Finally, in 1811, one of Napoleon's chemists produced a substantial quantity of crystallized beet sugar. Napoleon was so delighted by the breakthrough that he immediately ordered his Minister of the Interior to demand that French farmers grow sugar beets. The Minister was also ordered to identify businessmen willing to erect beet sugar factories. From 1812 to 1813, millions of francs were poured into the new endeavor, resulting in the construction of 334 licensed, small beet sugar factories within France's borders. Unfortunately,

¹² Richard E. Irby Jr., "The Haunted Food," *Flagpole Magazine*, 16 February 1994, 8, <http://www.geocities.com/Athens/Acropolis/2691/sugar.html> (accessed October 20, 2000).

of that number, only 158 ever produced beet sugar.¹³ Although Napoleon has been credited with the proliferation of the sugar beet's popularity throughout much of central Europe, he was also responsible for its demise in Europe (except in France). When Napoleon met his defeat at Waterloo in 1815, the fledgling European beet sugar industry also collapsed, even though a handful of factories remained operational hoping for better times. The combination of war, dismal crop yields, low sugar content in the beets, and insufficient sucrose recovery by the factories all contributed to the decline of the beet sugar industry and the subsequent revival of the cane sugar industry, a more technologically advanced and efficiently run industry.

When the first beet sugar factories had begun operations, they used a process that extracted juice from sugar beets by grinding them in animal-powered mills; the resulting pulp was then placed into presses. The process proved to be time consuming and ineffective. In an effort to ward off the resurgence of the cane sugar industry and to find a more efficient means to extract the juice from sugar beets, in 1821 Frenchman Mathieu de Dombasle (1777-1843) proposed a beet slicing procedure in combination with water extraction. He called the process *maceration* (the same process is now called *diffusion*).¹⁴ Dombasle's processing breakthrough, in conjunction with improvements in other factory equipment, led to more efficient and cost-saving production methods and the advancement of sugar beet processing.

Furthering the progress of Europe's beet sugar industry during the 1820s was the arrival of cheap Russian grain into European markets. With plummeting European grain prices and the availability of Russian grain, western European grain farmers were forced to find alternative crops to grow; sugar beets became a feasible substitute. The farmers quickly discovered that sugar beets flourished in typically fallow land. In addition, the roots and tops from the beets that were left in the fields after harvest could be used as livestock feed. By providing fodder for livestock, farmers were able to increase their livestock numbers, which in turn increased manure production for the fertilization of the land. It was a win-win situation.

Yet, despite the proven benefits of the sugar beet in regard to the agricultural economy, the beet sugar industry remained competitively and economically far behind that of cane sugar. In an effort to promote and protect the tenuous beet sugar industry, in the 1830s the European government implemented tariffs on the importation of cane sugar, along with incentives to subsidize the exportation of beet sugar. With the infusion of government aid, the beet sugar industry was finally able to give the cane sugar industry some competition. By 1850, Germany ranked as the top producer of beet sugar; by the end of the century, it accounted for the production of over one-third of Europe's refined sugar demands.¹⁵ The 1850s also brought better times for the French beet sugar industry. With improvements in both factory and field operations, combined with new experimentation on sugar beets, France once again gained a foothold in the world sugar market. The French revival was aided in the mid-1850s when chemist P. L. F. Leveque de Vilmorin (1816-1860) discovered that through breeding, a higher quantity of sucrose could be obtained from the sugar beet.¹⁶ With a beet capable of producing

¹³ Galloway.
¹⁴ Ibid.
¹⁵ Ibid.
¹⁶ Ibid.

more sugar, better techniques to extract the sucrose soon followed. While research on sugar beets and technology for extracting sucrose from the beet continued at a frenzied pace in Europe, American chemists and scientists continued to lag far behind their foreign counterparts in the technical skills and knowledge to commercially extract sucrose from sugar beets.

Attempts had been made as early as 1838 to commercially produce beet sugar in the United States, and those efforts continued for several decades. But the industry did not fare well. Soon after a factory would open, it would close. Then, during the 1870s, American farmers began to seriously consider growing sugar beets as a replacement for sugar cane. In regions like the South Platte Valley of Colorado, it was believed the climate and soil were suitable for beets and with irrigation beets could become a viable crop for otherwise only minimally productive growing areas.¹⁷ Unfortunately, only a few Colorado farmers were willing to take a chance on the new crop since the beef market, which associated itself with beets and its fodder, was also relatively new and unsubstantiated.

Still, a small number of entrepreneurs were willing to take a risk, and by 1879 there was enough sugar beet acreage to warrant the erection of a factory, but in California not Colorado. The first beet sugar factory opened in San Francisco and proved capable of producing beet sugar in a profitable manner. Less than two decades later, there were more than thirty factories in operation in the United States. Undoubtedly though the biggest boost for the American beet sugar industry came in 1890 from Henry Oxnard and his three brothers--Benjamin, James, and Robert--who together erected several factories in Nebraska, Utah, and California.¹⁸



Oxnard brothers

(credit: Oxnard Convention and Visitors Bureau)

The Oxnard brothers theorized that with the farmers of the South Platte Valley in Colorado successfully growing beets, their refineries would have sufficient amounts of product to process. However, even with the close proximity of the Colorado sugar beet fields to the Oxnard factories, South Platte farmers thought the return on their crops was too low and began to search for capitalists to finance a beet sugar factory in Colorado.¹⁹

(Author's Note: In 1899, Henry Oxnard and investors established the American Beet Sugar Company, which today is known as the American Crystal Sugar Company.)

¹⁷ Steven F. Mehls, "The New Empire of the Rockies: A History of Northeast Colorado," vol. 16 of *Cultural Resource Series*, 1984, 140-143.

¹⁸ Kenneth Jessen, "Western Sugar Industry Started in Prussia," *Longmont Review*, 26 October 1977, 3A.

¹⁹ Mehls, 140.

The beet sugar industry valiantly tried to gain a foothold within the American sugar market that was dominated by the goliath cane sugar industry. As the beet sugar industry struggled and the cane sugar industry continued as a global success, New York industrialist William Havemeyer and his brother Frederick C. Havemeyer recognized the profits that could be wrought by owning cane sugar refineries. Hence, in 1857, they formed the Havemeyer, Townsend and Company in Williamsburg, New York. Recognizing that a deep-water port, underdeveloped land, and abundant cheap labor were the primary criteria for success, the brothers choose South 3rd Street in Williamsburg as the ideal location and erected their refinery.²⁰ By 1870, cane sugar refining was Williamsburg's most profitable manufacturing industry. A mere two years later, a remarkable 59 percent of imported raw cane sugar was being processed into refined white sugar in the Havemeyers' 3rd Street refinery; by 1887, the factory was processing an unprecedented 68 percent of the raw cane sugar imported by the United States.



That same year Henry Osborne Havemeyer (son of Frederick C. Havemeyer Jr.) established the Sugar Refineries Company (a.k.a. the Sugar Trust) in an effort to control the price of sugar and rights of factory workers, as five years earlier due to the intense competition among the cane sugar refineries, the state of New York had tried and failed to fix sugar prices and legislate factory workers rights.²¹ With Henry Havemeyer's astute leadership, the Sugar Trust succeeded where the State had failed, and consolidated most of the Brooklyn area cane sugar refineries.

Henry Osborne Havemeyer
(credit: Students of Saint Michaels College)

In 1891, the New York Supreme Court ruled Henry Havemeyer's consolidation illegal. Consequently, Havemeyer sidestepped the court's ruling, and went to New Jersey where he reorganized his Sugar Refineries Company into the American Sugar Refining Company. Havemeyer retained his headquarters on Wall Street in New York and continued to control the region's many cane sugar refineries. By 1900, Havemeyer and the American Sugar Refining Company had either eliminated the majority of its competitors or consolidated them. The American Sugar Refining Company dominated United States sugar refining, accounting directly or indirectly for 98 percent of the nation's cane sugar production.²²

Commonly referred to as the Sugar Trust (a.k.a. the Trust), in actuality the company was nothing more than a paper organization, with only one office and no corporate records other than a list of certificate holders. The Sugar Trust consisted of two committees, which oversaw the firm's operations, members of the Havemeyer family sat at the helm of both. The mercantile committee handled the purchase and importation of raw cane sugar, as well as the selling of refined sugar and related by-products; the manufacturing committee was charged with

²⁰ Jackson.
²¹ Ibid.
²² Ibid

assigning production quotas to each of Trust's factories.²³ The Sugar Trust and the Havemeyer family had complete control over their consortium of refineries.

As the cane sugar industry continued its success and domination, the beet sugar industry was quietly gaining recognition on the west coast and throughout the western United States. By 1901, there were thirty-one independent beet sugar processors. The Sugar Trust, which had become increasingly aware of their presence and possible competition, was not ignoring the up-and-coming factories. The continued emergence of new beet sugar refineries, along with the growing popularity of refined beet sugar and its low price, caused Henry Havemeyer ever-growing concern. Not being a person to tolerate competition for too long, on October 7, 1901, Havemeyer made his move. Utilizing the assets of the Sugar Trust, Havemeyer began to make offers to purchase the independent factories. If he failed to make an acquisition, the Sugar Trust would simply bankrupt the targeted company by implementing cutthroat price reductions within the sugar market.²⁴ Because so many of the independent refineries had been erected with capital from wealthy investors who intentionally planned to sell the factories for a profit rather than retain ownership, or were nothing more than schemes by capitalists to increase the land values around a factory, most were easy prey for acquisition by the American Sugar Refining Company.

Along with its acquisition maneuvers, the American Sugar Refining Company also produced an enormous surplus of refined cane sugar to sell within the beet sugar markets, thus eliminating any profits beet sugar producers might realize. Due to its massive assets, the Sugar Trust was able to undercut beet sugar prices to the point where the cost to produce beet sugar became higher than the selling price. Even the passing of the Dingley Tariff in 1897, which protected the domestic beet sugar industry through the implementation of a tariff on all imported raw cane sugar, could not deter or eradicate the maneuvering by Havemeyer; it was simply impossible for beet sugar refineries to realize a profit.²⁵ Havemeyer wanted total control of the beet sugar industry. He was determined to destroy any and all competition, have the ability to restrain sugar trade, and to further strengthen his hold on the United States sugar industry, both cane and beet.

Beet sugar producers were caught off guard by the attacks from Havemeyer. Warehouses normally leased for beet sugar storage, were suddenly unavailable as the Sugar Trust had contracted with warehouse owners and leased the facilities for cane sugar storage. Even the railroads were beguiled by Havemeyer's attempted takeover and were more than willing to lease railcars, extend freight rebates, and offer free storage to the Sugar Trust.²⁶ The beet sugar industry was virtually helpless. It had neither the funds nor the organizational power to fight Havemeyer and the American Sugar Refining Company; moreover, many of the beet sugar producers had borrowed funds so they could purchase beets from farmers. Worse yet, some of the producers had borrowed from the Sugar Trust, never suspecting the bottom was about to drop out of the beet sugar market.

²³ William John May Jr., *The Great Western Sugarlands: The History of the Great Western Sugar Company and the Economic Development of the Great Plains* (New York and London: Garland Publishing, 1989), 44.

²⁴ Ibid, 45.

²⁵ Ibid, 234.

²⁶ Ibid, 47.

In December 1901, Henry O. Havemeyer discreetly disclosed to Wallace Willett, editor of the prestigious sugar beet magazine *The Sugar Beet Gazette*, that he was deeply involved in a takeover of the beet sugar industry.²⁷ The American Sugar Refining Company's dominance of the cane sugar industry was well known throughout the United States and the world. Now the company was going to show its intolerance of any impending competition from the beet sugar industry. Havemeyer had begun an unrelenting movement to either eliminate or control the rise in popularity of the beet sugar industry. And for the most part he succeeded, except in Colorado where producers managed to survive Havemeyer's price-reducing tactics and the flooding of the sugar market with refined cane sugar.

Colorado producers had refused to acknowledge the price cuts in the sugar market and had the foresight to build additional warehouses to store their sugar. Even with its underhanded and often illegal tactics, the American Sugar Refining Company was unable to infiltrate Colorado's beet sugar industry. On March 24, 1902, a writer for *The Denver Republican* noted, "*the cheeky Trust wants the local people to grow the beets and supply most of the money to build the factory, and then give the Trust a voice in the direction of the factory and make it the selling agent for the sugar.*"²⁸

Not to be caught in the middle of any legal battles, and fully aware the U.S. Congress could repeal the cane sugar tariff at any time, Havemeyer only used local monies when purchasing a beet sugar company, thus eliminating any exposure to risk for the American Sugar Refining Company or himself. In addition, by using this approach the Sugar Trust could quickly drop any interest it had in the domestic beet sugar industry and still dominate the cane sugar market.²⁹ However, when Havemeyer was certain that the Colorado beet sugar industry was not going to acquiesce, his motivations changed. Certain that Colorado was ideally suited for beet sugar production, Havemeyer realized that if he wanted to maintain his dominance and control of the beet sugar industry, he would have to alter his plans and *buy into* Colorado's beet sugar industry rather than trying to destroy it.

Yet even with his shift in plans, Havemeyer's actions were not above board. He knew the Colorado beet sugar industry had the potential to inflict severe damage to the profits of the Sugar Trust, therefore his tactics to acquire sugar factories in Colorado had to be different from those he had used in other states. Havemeyer's new tactic was to threaten the local economies where beet sugar factories were located. Such tactics had worked in Utah and Idaho, so they would surely work in Colorado. But for Havemeyer to succeed would require the participation of an individual trusted by local business owners, farmers, and residents – Chester S. Morey, a Denver wholesale grocer and principal organizer of the Greeley Sugar Company fit the criteria perfectly. As far as Havemeyer was concerned, purchase of the Greeley independent was just a matter of signing the proper papers. Morey had been informed by Havemeyer's right-hand man, John F. Parsons, that the Sugar Trust wanted the Greeley Sugar Company to be run by locals; it would just stand to one side and collect dividends.

However, Morey's appointment as an agent for the American Sugar Refining Company had shocked his business associates and many friends. He attempted to soothe them by stating:

²⁷ Ibid, 49.

²⁸ qtd. in May, 53.

²⁹ May, 53.

"We will not sell out to the Trust... The Trust is not interested in this company [Greeley Sugar Company], at the present time."³⁰ But Havemeyer *was* interested, much more than Morey realized.

For undisclosed reasons, the Greeley Sugar Company sent Morey to New York to meet with Havemeyer and attempt to negotiate the sale of the company, but not at a loss, as the company was more than willing to remain an independent. Morey failed in his effort but was unconcerned as the Greeley Sugar Company could continue to operate without acquisition by the Sugar Trust. However, shortly after Morey returned to Greeley, Havemeyer asked him to again come to New York. Morey hoped a second trip would be more fruitful than the first, but it was not to be. Upon his arrival he discovered that Havemeyer had already acquired controlling interest of the Greeley Sugar Company through the purchase of company stock at a price \$25 higher per share than the going market value. All the stockholders had been bought out, with the exception of Morey and two others.³¹ Morey had failed in his representation of the independent sugar company; he would however, retain his position as manager, as well as continue as an agent for the Sugar Trust.

Using Morey as its front man, by the end of 1902 the American Sugar Refining Company had become the principal stockholder of four independent beet sugar factories in Colorado – Greeley, Eaton, Windsor, and Loveland. Once more, by using intimidation and unlimited assets, Havemeyer got what he wanted. With Morey as its ambassador, the Sugar Trust contacted the owners of other independent factories. Morey would make an offer on the Trust's behalf to purchase a company. If said company refused, the Sugar Trust would threaten to build a larger and superior factory alongside the existing independent. Such heavy-handed tactics resulted in privately owned beet sugar companies being only too willing to sell their controlling interest to Havemeyer, especially if they could walk away with a large profit. After all, the American Sugar Refining Company was a powerful icon in the sugar industry; there was nothing to be lost by selling out to it. The takeover of independent beet sugar factories by the Sugar Trust became a valuable addition to the industrial empire of the sugar conglomerate and, afforded it complete control over domestic cane and beet sugar prices.

From 1900 to 1902, beet sugar consumption had quadrupled and accounted for 13 percent of all sugar consumed by Americans; beet sugar consumption in the region between California and the Ohio River actually exceeded global demand. Early on Henry Havemeyer had recognized the potential for the beet sugar industry to produce high profits. By consolidating independent factories, and dominating the cane sugar industry, Havemeyer had become the "King of Sugar." Proud of his determination, use of force, and persistence, Havemeyer referred to himself as a "man of the Stone Age," commenting, "*Anything worth having was worth buying, and that anything could be bought if you put the bid high enough.*"³²

Havemeyer's principles and visions for continued success of the sugar industry differed from those of his predecessors only because of the times in which he lived. His goal was to perpetuate one of the world's oldest industries and to ensure that not only sugar cane, but sugar

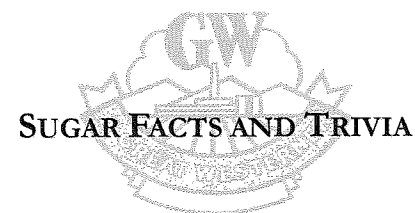
³⁰ qtd. in May, 56.

³¹ May, 56.

³² qtd. in May, 60.

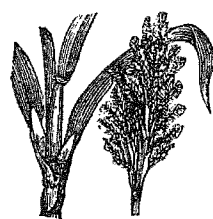
beets as well, would survive and have a permanent place in the history of food and related by-products. Although his tactics were often underhanded and the outcome always resulted in a financial profit for the American Sugar Refining Company, Havemeyer's control and dominance of the United States cane and beet sugar markets enabled both to survive and prosper. Moreover, both the cane and beet sugar industries were responsible for revolutionary developments in regard to process technology and production equipment, mechanized farm machinery, and the economic prosperity of urban and rural societies throughout the world.

The early visionaries--Dioscorides, Napoleon, Arab pioneers, the King of Prussia, Portuguese sailors, and innumerable inventors--were all people like Henry O. Havemeyer who never stopped believing in the virtue and value of sugar. It was because of the foresight and risks taken centuries earlier, that the Great Western Sugar Company was able to rise to prominence and claim a role in Colorado's economic and agricultural expansion and history.

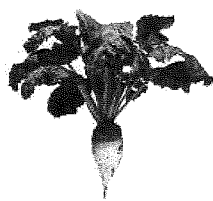


Today sugar consumption (cane and beet) is approximately 120 million tons annually, and is expected to increase at the rate of about 2 million tons per year. The European Union (EU), Brazil, and India are the top producers and in total account for 40 percent of annual global production. However, most of the sugar consumed worldwide is consumed within the country of production, with only approximately 25 percent traded on international markets.³³

- Sugar can be found in all fruits and vegetables; however, sugar cane and sugar beets produce the greatest quantities and are therefore used for the commercial production of refined sugar.



SUGAR CANE resembles bamboo cane and in the right climate will grow to a harvestable size in twelve months, and after being cut, will re-grow in another twelve months provided the roots are left intact. Typical sugar content in cane is 10 percent by weight, depending on the variety, seasonal conditions, and growing location. Typical yield is 42 tons per acre, equal to 4.1 tons of sugar per acre. Asia is the largest producer, followed by South America and North America (in particular Hawaii, Florida, and Louisiana).



The **SUGAR BEET**, which closely resembles a large parsnip, stores sugar in its bulbous root. Typical sugar content is 17 percent by weight, depending on the variety and growing location. Although the sugar content is higher than in sugar cane, sugar beet yields per acre are much lower than cane; sugar production is only about 2.9 tons per acre. The largest producers are Germany, France, and United States.

³³ "How Sugar is Made..."

- Plants produce sugar to store energy the plant does not need to utilize right away; much the way animals make and use fat. The process in plants is called *photosynthesis*. Sugar is a result of the absorption of carbon dioxide through the pores in a plant's leaves and water absorbed through its roots, combined with energy from the sun and a substance in the plant called *chlorophyll*.

- Sugar is produced in 121 countries; approximately 70 percent comes from sugar cane.
- What we call *sugar* a chemist calls *sucrose*, the most common food sweetener in the industrialized world. *Saccharides* are the general synonym for sugars. The simplest sugar (carbohydrate) is *glucose*.
- The average American consumes forty-three pounds of sugar per year.
- Other non-food uses of sugar include use in the fermentation process to make products containing alcohol, to slow the setting of cement and glues, leather tanning, as an ingredient in printing inks, and in the textile industry for sizing and finishing of fabrics.

Sugar is essentially pure sucrose and there is no difference between white refined sugar derived from sugar cane and that from sugar beets. However, there are physical differences as manufacturers produce crystals of varying sizes. Crystal size will determine how sugar dissolves in liquid and the amount contained in a spoon or cup measurement. Some crystals are less "white" than others, depending on how much processing has been performed on the sucrose. To the naked eye, pure sucrose crystals appear to be naturally white. There are several specialty white sugars:

- **granulated sugar** - crystals of varying sizes.
- **caster sugar** - a very small crystal size sugar, often referred to as *Super-fine*.
- **confectioner's sugar** - basically sugar dust.
- **sugar cubes** - lumps of sugar crystals glued together with a sugar syrup.
- **icing sugar** - finely ground granulated sugar containing not more than 5 percent starch or other anti-caking agents to prevent lumping.
- **liquid invert sugar** - granulated white sugar dissolved in water. Used in beverages, candy, ice cream; unavailable for purchase by retail consumers.
- **preserving sugar** - a large crystal sugar.

Brown sugar comes in a variety of types but is typically one of the following two:

- **sticky brown** - originally a mixture that came from crystallizing cane sugar, today it is still made in India and called *juggeri* or *gur*, which is a cane sugar mixture boiled until dry.
- **free-flowing browns** - a powder-like sugar that pours like granulated sugar.

Other types of brown sugar include:

- **Turbinado** - a semi-refined sugar partially refined by removing the surface molasses, resulting in a blond color with a mild brown sugar flavor; also called *Plantation Sugar* or *Sugar in the Raw*.

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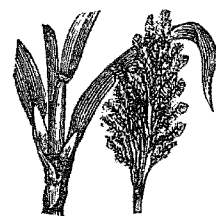
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SUGAR FACTS AND TRIVIA

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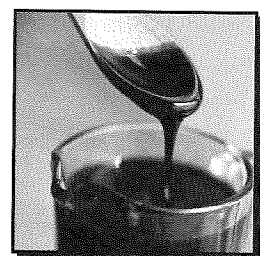
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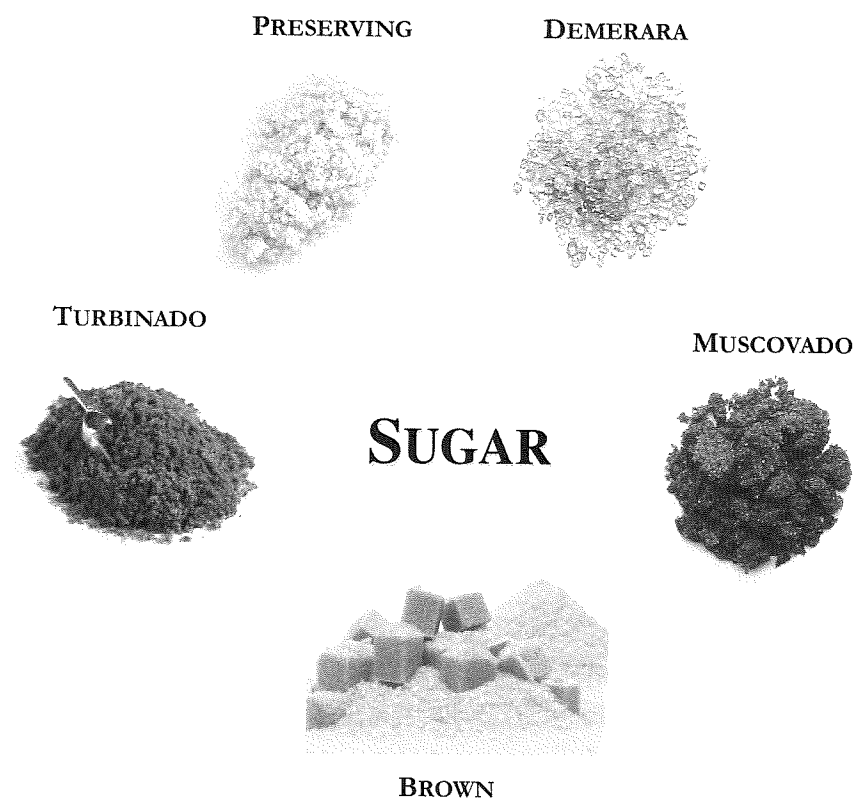
- **Turbinado** - a semi-refined sugar partially refined by removing the surface molasses, resulting in a blond color with a mild brown sugar flavor; also called *Plantation Sugar* or *Sugar in the Raw*.

- **Brown sugar** (light and dark) - refined to retain some of the molasses syrup and other impurities of sugar cane, which impart a pleasant flavor and clumps more than white granulated sugar because of its moisture content.
- **Muscovado or Barbados sugar** - a British specialty; a very dark sugar comprised of coarse sticky crystals with a strong molasses flavor.
- **Demerara sugar** - a light brown sugar with large slightly sticky crystals; popular in England.
- **Raw sugar** - dry brown sugar crystals obtained from the evaporation of clarified sugar cane juices; its color comes from the presence of impurities.

In modern refining practices, mixing a refined sugar with suitable syrup makes brown sugar. There are numerous types of syrups, which range from pure sucrose solutions (sold to industrial users) to heavily treated syrups, which will have different flavors and colors. The color of the sugar and the syrup will determine the color of the final product. The ratio of syrup to sugar, plus any drying, determines whether the product will be sticky or free flowing.

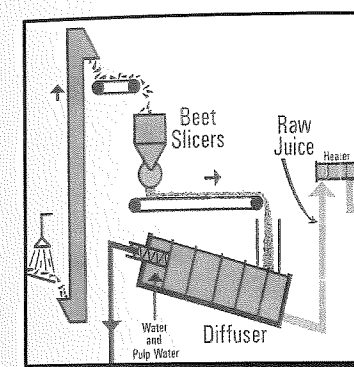


Molasses is a byproduct of sugar cane and sugar beet processing. Not all types of molasses are suitable for human consumption. Molasses in supermarkets meets *strict* standards for food use.

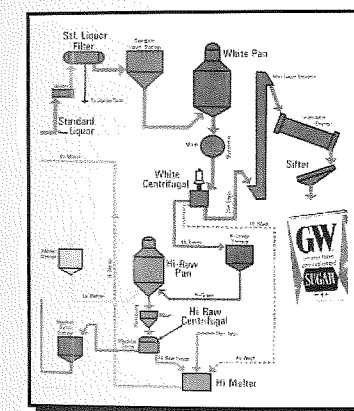


BEET SUGAR PROCESS³⁴

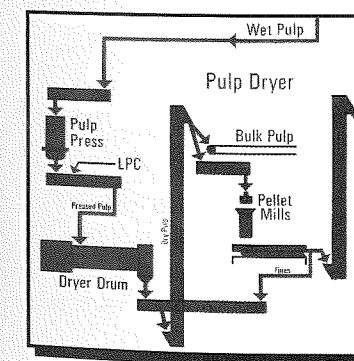
Sugar beets are an irrigated crop typically planted in March and harvested in October. Upon harvest the beets are transported by truck from the farm to a beet dump. At the dump each truckload is screened, sampled, and weighed. Then the load is dumped into a mechanized beet piler that strategically distributes the beets on the ground; mounds of beets can measure 22 feet tall by 120 feet wide by several hundred feet long. Each beet sugar factory will have several beet dumps in the vicinity where beets are stored until they can be processed.



Beet Handling - At the factory the beets are dumped from trucks into a wet hopper and floated into the factory through a flume. In the flume they pass through a rock catcher for removal of rocks, mud or sand and then travel through another section of the flume where trash, weeds and leaves are removed. The beets then enter a washer, are de-watered and conveyed on a hopper into beet slicers.

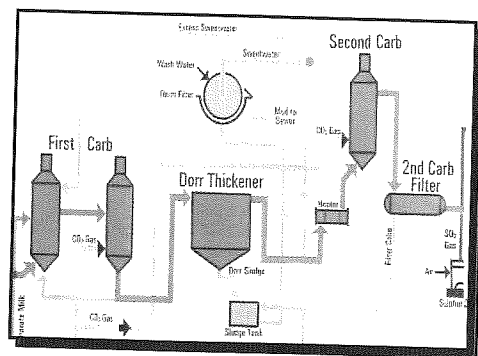


Diffusion - Beets are sliced with sharp knives into noodle-like pieces called *cossettes*. From the slicers the *cossettes* fall onto a conveyor belt where they are weighed and fed into the diffusion system. Here the sugar is removed by hot water washing (diffusing the sugar); when the *cossettes* emerge they still contain about 2 percent sugar. Hot water is fed into the diffuser and flows through the *cossettes* continuously to extract the sugar; the water emerges from the diffuser as sugar water, which is called *raw juice*. The extraction process uses osmosis, wherein most of the sugar passes through the porous membrane on the beets' cell wall while some of the non-sugars are retained by the cell.



Pulp Dryer - Spent beets (wet pulp) containing 90-92 percent water are sent to presses to remove as much water as possible. The pressed pulp (71-78 percent water) is sold as livestock feed or sent to a dryer for further processing. The water pressed out of the pulp is sent back to the diffuser to recover the residual sugar. If the pressed pulp is to be further processed, it is sent to rotary dryers and dried to 12 percent moisture. Pressed pulp can be sold in that state but is typically compacted into pellets for easier handling and longer storage capacity.

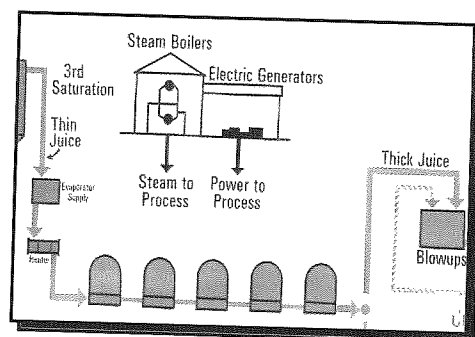
³⁴ Drawing by J. R. McAnally, produced by J. B. Powell, "Process for Beet Sugar: Basic Flow Diagram," (Denver: The Great Western Sugar Company, no date available).



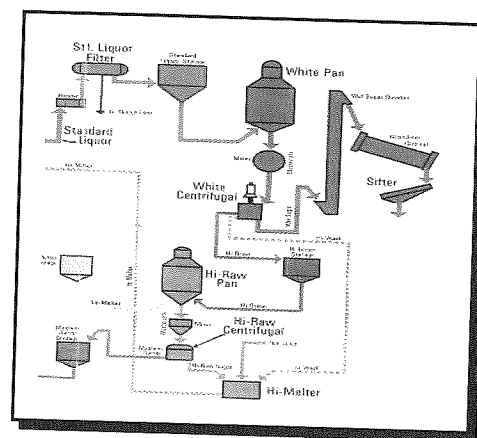
Purification and Filtration - Upon leaving the diffuser, raw juice moves through various stages of purification and filtration to remove non-sugars. Lime is added to the juice on its way to the first carbonation station, where carbon dioxide gas is bubbled through the limed juice and reacts with the lime to form calcium carbonate and to absorb non-sugars.

Next the carbonated juice goes to a clarifier where the calcium carbonate is settled out, leaving a clear juice which is sent to heaters and then on to a second clarifier. The calcium carbonate sludge left in the first clarifier is removed and fed into vacuum drum filters where it is washed to recover any residual sugar. Washed sludge, which typically contains about one percent of the sugar from the beets, is then sent to a lime pond. The wash water, containing recovered sugar, is called *sweetwater* and is sent to the lime house to be mixed with burned lime and then recycled back to the purification system.

In the second carbonation system, carbon dioxide gas is again bubbled through the juice, reacting with the residual lime to form more sludge. This sludge is also sent to drum filters and processed with that from the first carbonation. The clear juice moves on to a sulfitation process where sulfur dioxide is added to the juice to remove some color-forming materials that would carry through to the finished sugar. This process also adjusts the pH to allow for easier boiling in the evaporation pans later in the procedure.



Evaporation - The sulfitated juice is now called *thin juice*. It is heated and fed into evaporators. The evaporation system is four to six evaporator units that contain vertical internal tubes. Steam is fed to the outside of the tubes; the *thin juice* is inside the tubes. Heat evaporates some of the water from the juice helping it to concentrate. As the juice travels from one evaporator to the next, it changes from 13-15 percent solids to 60 percent solids by the end of the process. It is then called *thick juice*. The multiple effect process allows 2.5-2.8 pounds of water to be evaporated per every pound of steam fed to the first evaporator.



Crystallization and Separation - *Thick juice* is sent to the melter where sugars are dissolved through vigorous agitation and heat. The *melter juice* is then heated, filtered, and further concentrated in the concentrator to 70-75 percent solids. It is now called *standard liquor* and is fed to a pan where sugar is crystallized from the solution.

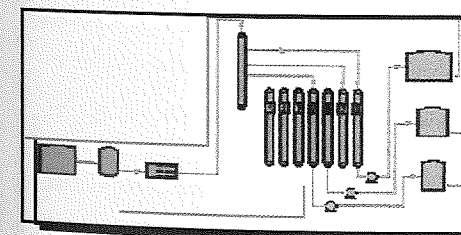
Crystallization takes place when water is evaporated from the liquor in a vacuum pan. Finely ground sugar is used to seed the pan, wherein each seed crystal grows into a typical-sized sugar crystal. More water is evaporated forcing more and more sugar to crystallize on each sugar crystal. The solution is concentrated to 92 percent solids and consists of sugar crystals surrounded by syrup of sugar-water called *white massecuite*. The massecuite is dropped into a mixer that feeds into centrifugals.

Centrifugals separate the sugar crystals from the syrup in the massecuite by spinning the sugar against a screen. Hot water washes the residual syrup from the crystals while the spinning partially dries the sugar. The sugar is then conveyed to the granulator for further drying and cooling. The finished sugar is sifted for lumps and moved to bulk sugar bins for storage. Bulk storage conditions the sugar before it is loaded for bulk shipment or packaged in various size containers – from restaurant size packets to 2,300-pound Super Sacks.

The centrifugals produce two syrups. The *high wash* is higher purity syrup that is recycled to the melter. The *green* is lower in purity, although it still contains a considerable amount of sugar. It is sent to the vacuum pans for processing where once more seed crystals are used. Another massecuite is produced, but the crystals are not a high enough quality to sell as white sugar (they resemble raw sugar) so they are sent to the melter to be re-dissolved and re-processed in the vacuum pan. The system is called the *high raw system*.

Syrup leaving the centrifugals is called *machine syrup*. It is even lower in purity than the green syrup but still contains sugar. Machine syrup is sent to a *low raw system* that contains one piece of equipment not in the high raw system – an additional vacuum pan is used to crystallize sugar but instead of feeding the massecuite straight to the centrifugals, it is sent to a crystallizer where cold water is used to continue the crystallization process for an additional forty-eight hours. After that the massecuite is sent to a reheater, where the sugar crystals are separated from the syrup called *molasses*. The molasses is about 50 percent sugar by weight. It can be further processed to recover approximately 80 percent of the sugar. About 10-15 percent of the sugar from beets leaves a sugar factory in molasses.

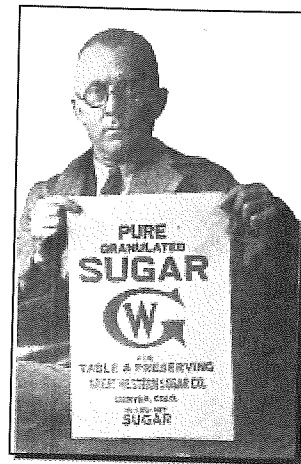
(Author's Note: The Great Western Sugar Company (GWS) processed molasses from its other factories into refined white sugar at its Molasses Desugarizing Plant in Johnstown, Colorado. No sugar beets were ever sliced at the Johnstown factory. Read more about Johnstown in Chapter 4.)



Molasses Desugarization - Typically in a multiple-factory company, molasses will be processed at a separate facility called a desugarization plant. Molasses must be treated to remove any non-sugars; non-sugars consist of calcium, magnesium and suspended solids.

Molasses is softened by replacing non-sugars with sodium, after which precipitates formed during the reaction are filtered out. The filtering process squeezes the softened molasses through filters while non-sugars remain behind. The softened molasses is then sent to four separators containing three columns each. The separators are loaded with resins that attract

certain chemicals while allowing other chemicals to pass. The difference in travel time is used to separate the molasses into a sugar fraction, a betaine fraction, and a residual molasses fraction. The fractions are then concentrated. The sugar fraction is processed into refined white sugar, while the betaine and molasses fractions are sold as byproducts. Sugar cane molasses can be used for rum production; beet molasses cannot. Beet molasses can be utilized in the fermentation of other types of alcohol.



THE TEN-POUND BAG...

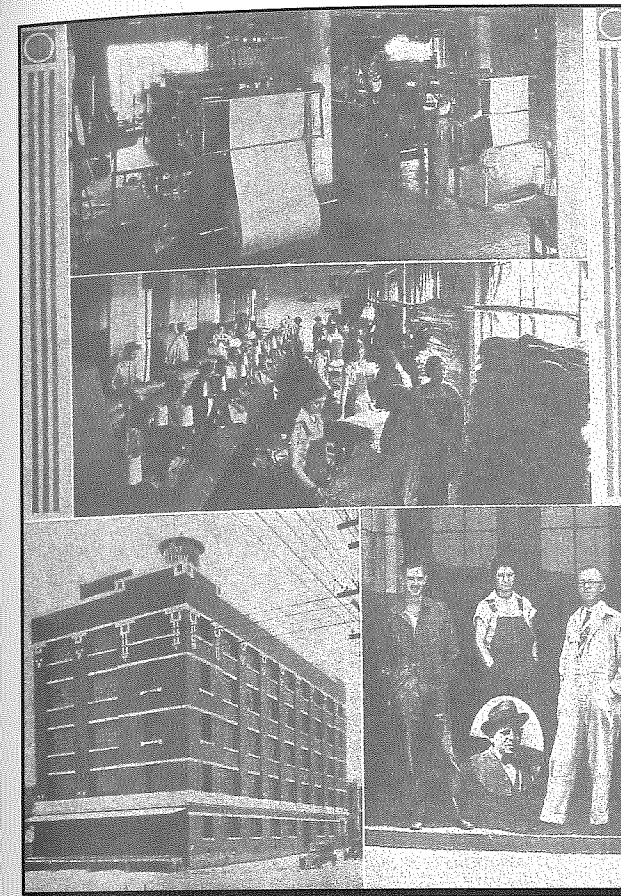
The Sugar Press, Spring Quarter, April 1933

GWS bag factory Superintendent, **C. P. CORNELL**, is pictured holding an empty 10-pound sugar bag. Cornell assisted in the development and design of the bag.

Obtaining the correct "blue" for printing on the bag was a major problem. Many shades were tried and discarded, until the best tone of royal blue was decided upon. A particular advantage to housewives is the fact that the reading matter on the bag is printed in wash-out ink. Every trace of ink is easily washed out and the cloth, which is good quality, can be used for other purposes. Mrs. C. P. Cornell found that an easy way to remove the printing was to rub the letters with lard, permit the bag to stand overnight, and wash it with soap and lukewarm water.

After years of practice making 100-pound bags, it was a new experience for the girls at the bag factory to try their hand at 10-pound "pockets." At the moment the factory is printing and sewing approximately 80,000 of these small bags a day, with individual operators averaging about 5,000 bags.

(article and photo credit: Overland Trail Museum)



LIKE A NEWSPAPER PLANT

The Sugar Press, February 1930

The big presses that print millions of Great Western sugar bags look like those you see in a newspaper plant. These pictures of the Bag Factory [Denver] were taken at the height of their recent campaign work.

Pictured in photo at lower right corner are from left to right:

VICTOR PHILLIPS,
MISS MAYME LABRIOLA,
GEORGE LOWE (inset),
and **C. P. CORNELL**, superintendent.

(article and photo credit: Overland Trail Museum)

As of December 1927, the total storage capacity of the twenty-one Great Western Sugar company factories was in excess of 5.9 million 100-pound bags of refined sugar.



EIGHTY SACKS IN FOUR MINUTES

The Sugar Press, December 1930
by H. D. Burk

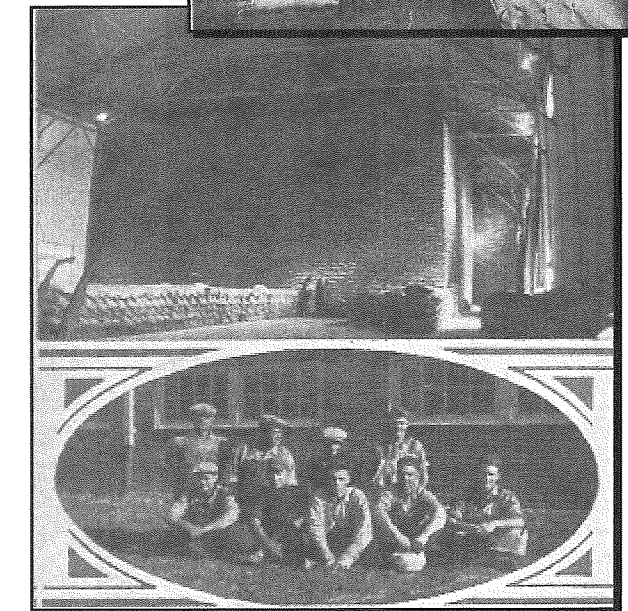
Sugar packers are not like poets, they have to be made instead of being born. The personnel of the GWS Minatare, (Nebraska) warehouse:

top row, from left to right:

L. B. LEWELLEN, HARRY LEACH,
REECE JOHNSTON,
and **LLOYD BINGHAM**

front row, from left to right:

JOHN RAGAN, JIM WHITAKER,
JOSEPH NEAL,
CECIL JEPSON and **FRANCIS NEAL**



(article and photo credit: Overland Trail Museum)