

From Sugar Cane
to Sugar Bowl



PROPERTY OF
IMPERIAL SUGAR CO.
Sugar Land, Texas
PRESIDENT'S OFFICE

PROPERTY OF
IMPERIAL SUGAR CO.
Sugar Land, T

PRESIDENT'S OFFICE



FROM SUGAR CANE TO SUGAR BOWL





History of Imperial Sugar Company dates back to 1843. That year plantation owner S. M. Williams built the first sugar mill in Texas. Site of that first mill is designated today by this marker on the refinery grounds.

ON THE COVER: Sugar Land, Texas, "the city that sugar built", is a prospering community of substantial homes, schools and churches. This aerial view shows the refinery of the Imperial Sugar Company, Sugar Land's modern shopping center and residential areas.

**Pure
Cane**

COPYRIGHT 1957
Imperial Sugar Company, Sugar Land, Texas
Printed and Manufactured in the U.S.A.

The Romance and History of Sugar

How Imperial Pure Cane Sugar is made

If the foods on our tables could tell us their histories—what entralling tales they would be! Tea from the marshes of Japan, fish from the icy waters of Alaska, dried fruits from the Garden of Eden!

But none has a more interesting history than the contents of the sugar bowl. Sugar is an ancient delicacy and a modern necessity.

It was mentioned by Chinese historians hundreds of years before Christ, and in centuries-old manuscripts written by Buddhist priests in India.

Historians believe that before 500 A. D. sugar cane was grown in only one place in the world—Bengal, India.

Conquerors marching triumphantly across nations; roving traders; pious priests and pilgrims all played a part in spreading the use of sugar around the world.

Raw sugar, a coarse substance yellow to brown in color, is stored in this vast warehouse before it is refined. Imperial's raw sugar warehouse can hold 40,000,000 pounds of bulk raw sugar.





Throughout the refining process, sugar is moved and handled automatically, never touched by hand. This conveyor belt, which moves raw sugar into the vast warehouse, is typical of the completely automatic equipment found in all units of the refinery.

"HONEY-BEARING REED"—When the victorious army of Alexander the Great reached India 300 years before the Christian era, the soldiers discovered sweet green stalks they called "honey-bearing reed". They took samples of the "reed" with them when they returned home—and Europe saw sugar cane for the first time.

The growing of cane began to spread, like a green tide, to many countries of Asia and Africa.

When the Moors brought their picturesque civilization to Spain in the eleventh century, they brought sugar cane plants with them. Spain became the first European country to cultivate sugar cane.

But all Europe now hungered for sugar.

Noblemen were demanding for their luxurious feasts the delightful sweet substance they called "honey from reed", "honey from bamboos" and "Indian salt".

The crusaders, returning from the Holy Land to far-away England, brought back pleasant memories of the wonderful sweet they found in Syria, Palestine and Egypt.

The most famous traders of the day, the rich merchants of the city of Venice, seized the opportunity to supply the growing demand for sugar. Their vessels plied the Mediterranean and other waters, carrying costly cargoes to and from the markets of the world. The Venetians soon were conducting a brisk trade in sugar, bringing it into Europe from Asia and Africa.



Artesian well water is treated in this large filter installation to assure absolute purity. This water is used to wash or dissolve sugar at various stages in the refining process.

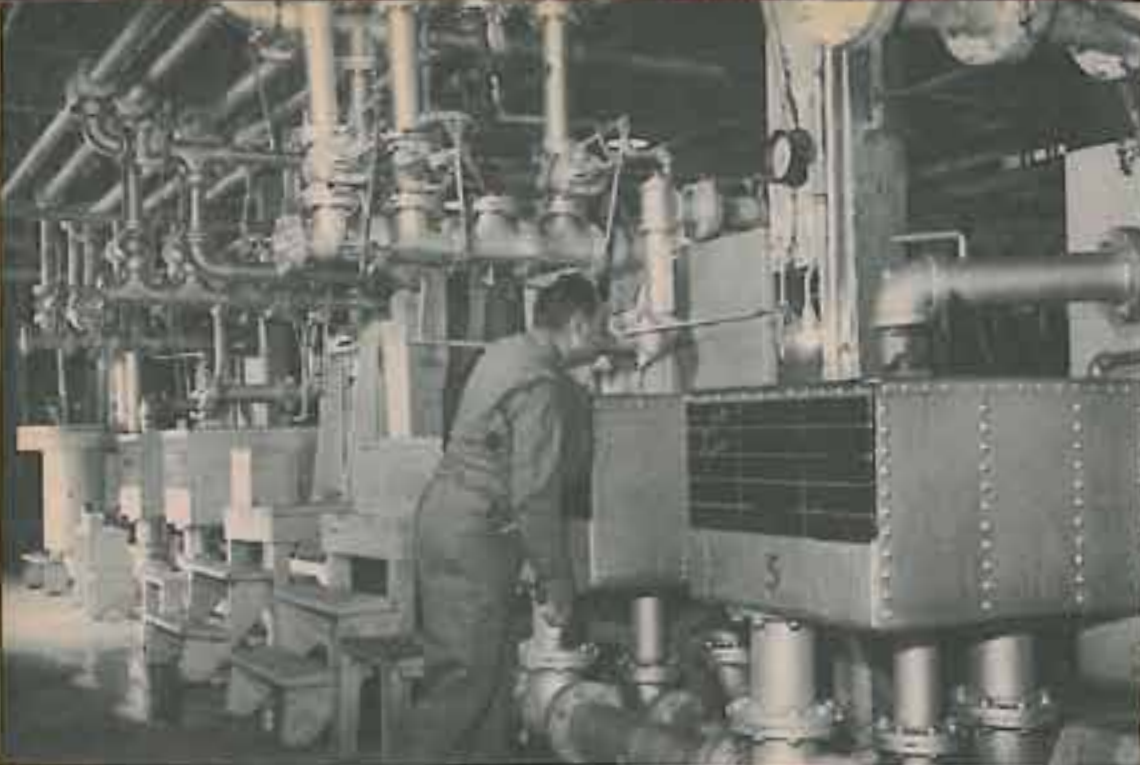
In 1420, a Venetian invented a new method of refining sugar, and it seemed that Venice's hold on the profitable sugar trade was stronger than ever.

Times changed; more and more people were using and wanting sugar. The Venetians asked an exorbitant price for it. Soon consumers were protesting. Why couldn't other countries import sugar from India themselves, perhaps by a shorter route than the Venetians used? Or, better still, why couldn't sugar cane be grown nearer the European markets?

VENICE LOSES CONTROL—In 1422, the Portuguese tried planting sugar cane in the Madeira Islands. The crop prospered there and in other localities. Venice began to lose control of the sugar industry of the Western world, and London became the leading market. The price came down. Londoners who had paid \$275 for one hundred pounds of sugar in 1482 were paying only \$53 per hundred pounds by the end of the fifteenth century.

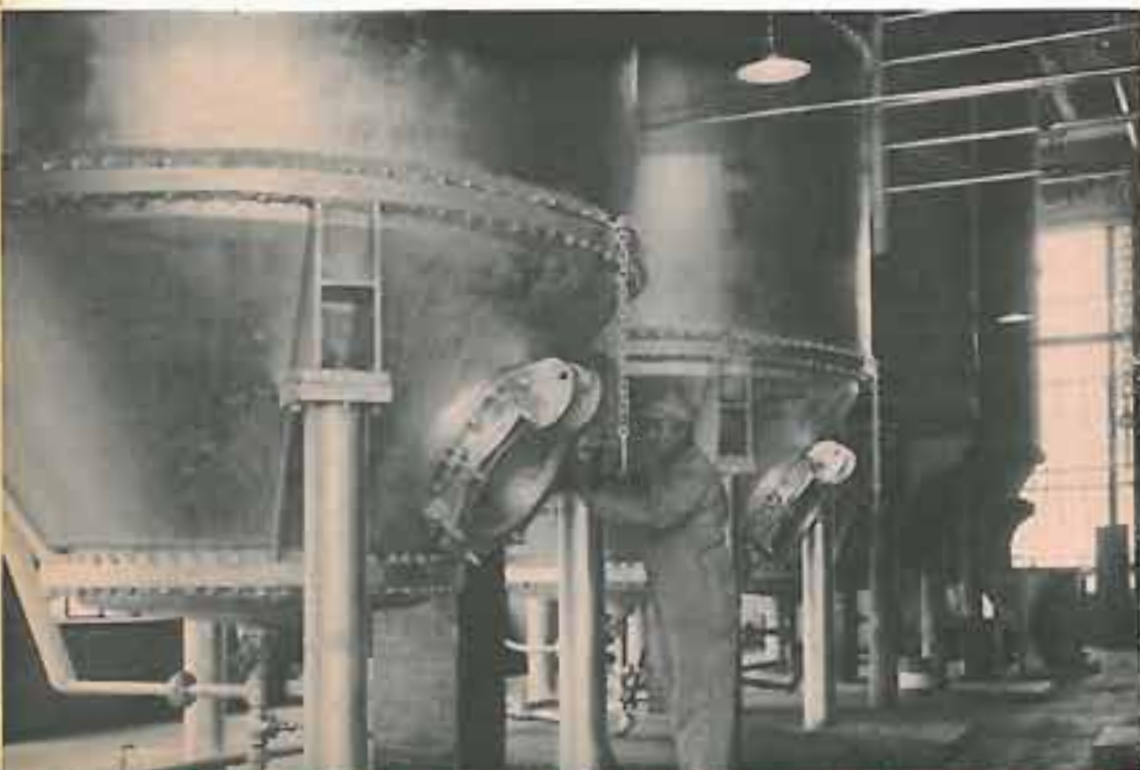
The idea persisted that a shorter route to India could be found so that sugar, as well as spices, silks and other items, might be imported less expensively. An explorer named Christopher Columbus, searching for this route, sailed west from Spain and stumbled on a new world!

Columbus himself brought sugar cane to the New World and planted it in Santo Domingo. Cortez, when he conquered Mexico, established two sugar plantations there. The cultivation of sugar cane continued to spread, from Mexico to Cuba, then to Brazil in 1532, to Peru in 1533, and to Argentina in 1620. By the



After raw sugar is dissolved in water, it is pumped, while in liquid form, into these filter presses. Here it is forced under tremendous pressure through giant filters which remove impurities.

Imperial has 30 of these bone charcoal filters, each more than twice the size of a railroad car. Here the sugar liquor is mixed with bone charcoal, which removes impurities and color. After filtering, the sugar liquor is 99.9 per cent pure.



seventeenth century, the sugar industry in tropical America was the greatest in the world.

England began using a great deal more sugar each year; consumption increased all over the world. Two of today's favorite beverages—chocolate and coffee—were introduced in the 1600's. Their popularity increased the demand for sugar.

The Jesuit Fathers brought sugar cane into Louisiana in 1711, but almost another century passed before it spread into Texas.

SUGAR COMES TO TEXAS—The history of sugar in Texas is so romantic as to be almost fanciful.

Today a vast industry and a city with the picturesque name of Sugar Land, Texas, are dramatic evidence of the important part sugar has played in the history and economy of the Southwest.

Texas once was famous for its "Sugar Bowl", a belt of sugar cane fields that stretched across several coastal counties.

The best known of the sugar plantations was the S. M. Williams place on Oyster Creek. It stood near a ford on the creek, used by travelers on the main road from Galveston to the West. Known for its hospitality and the romantic glamour associated with the Old South, the plantation was a favored stopping place for such early Texas notables as Austin, Bowie, Crockett, Fannin, Lamar and Wharton.

SETTLEMENT NAMED SUGAR LAND—On this plantation, in 1840, the first sugar cane was planted in Texas. The name Sugar Land was given to the little settlement that grew up around it.

The cane crops succeeded so well that in 1843 the first sugar mill in Texas was built on the Williams Plantation, approximately where the major part of the huge refinery of the Imperial Sugar Company now stands.

Other planters followed Williams' lead. Soon cane-growing and sugar-milling industries flourished along the Texas coast. Just before the Civil War 35 mills in Texas were grinding the cane grown in Fort Bend, Brazoria, Matagorda, Wharton and nearby counties.

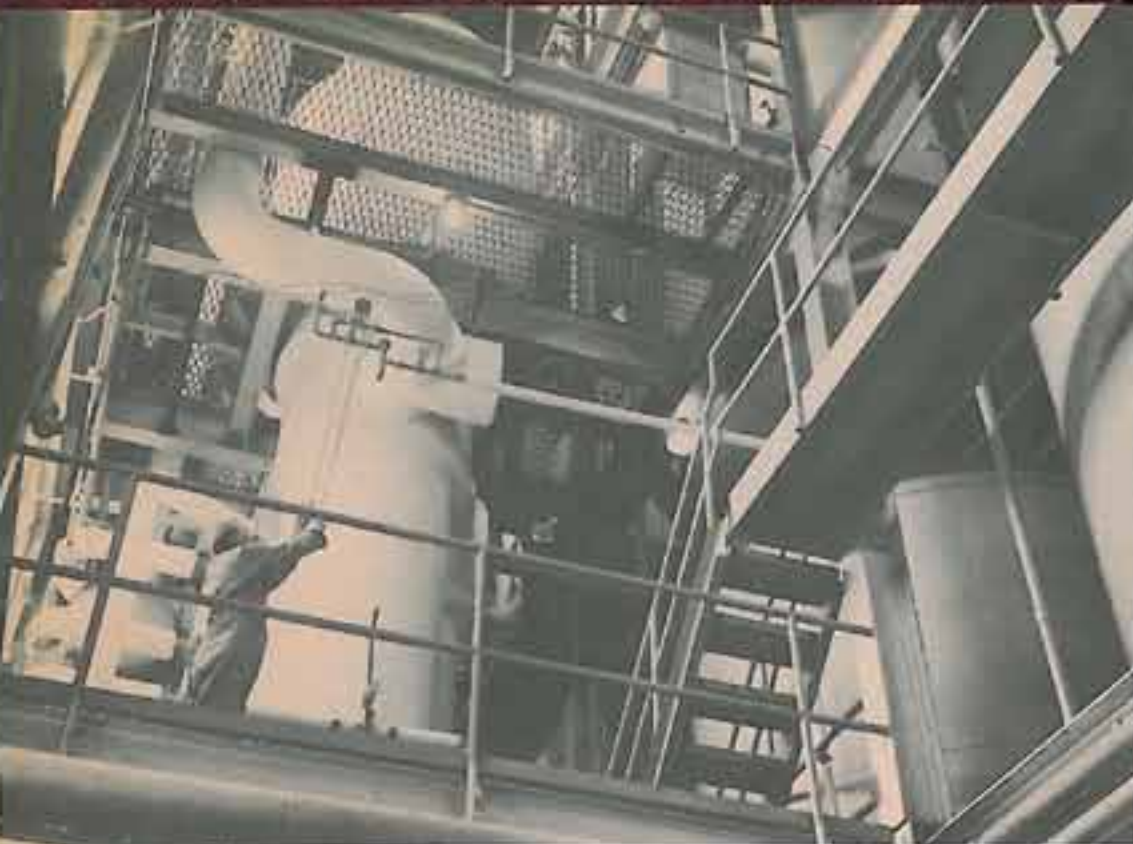
Like all plantation owners in the Old South, sugar growers in Texas depended on slave labor. With the end of slavery, many sugar mills were closed; many plantations were broken up. Then the early 1900's brought even higher labor costs, plant pests and diseases. A change in tariff rates led to stiffer competition from foreign sugar.

In 1928, the last cane grown in Texas was fed into the cane mill at Sugar Land. (That mill, the last of the old raw sugar mills in existence in the state, has since been dismantled.)

Colonel Edward H. Cunningham had bought the Williams Plantation and raw sugar cane mill. In the 1890's, when most of the sugar mills around him were in ruins, Col. Cunningham had expanded his own mill, equipping it to make refined as well as raw sugars.

FIRST RAW SUGARS IMPORTED—Soon there was such a demand for refined sugar from the Cunningham refinery that it became necessary to import raw sugars. The first cargo of Cuban raw sugar was brought through the port of Galveston in 1902. Capacity of the refinery at that time was less than 100,000 pounds of sugar per day.

In 1906, Colonel W. T. Eldridge of Sugar Land and I. H. Kempner of Galveston bought the Cunningham Sugar Company. The two decided to rename the refinery. Searching for a suitable name, Mr. Kempner remembered the old Imperial Hotel



At this evaporator station, some of the water is removed from the sugar solution, leaving it a thick liquor, in preparation for the first step in graining. Strict housekeeping standards are observed throughout the refinery, as evidenced by this gleaming machinery.

in New York, which he had visited as a young man years before. He had been deeply impressed by its grandeur and unmistakable stamp of quality. And the hotel's stationery had been decorated with a crown.

Imperial . . . a crown . . . seemed to express what they were seeking in a name and a symbol for a company which made refined pure cane sugar of unsurpassed quality. The new owners changed the name of their firm to Imperial Sugar Company.

The Kempner family of Galveston, in 1946, bought Col. Eldridge's share of the company. At this time the 600 stockholders and directors authorized the start of a multimillion dollar program of expansion and modernization, increasing the plant's capacity and production. Today, this ever-growing refinery has the capacity to produce 2,500,000 pounds of refined sugar in a single day.

Imperial Pure Cane Sugar, manufactured in this most modern, up-to-date refinery, is marketed not only throughout Texas, but also in the states of Arkansas, Oklahoma, Louisiana, New Mexico, Missouri, Kansas, Colorado, Iowa, Illinois, Wisconsin and Minnesota.

SUGAR CANE—To ride through a sugar cane field is an interesting adventure!

The tall, emerald green stalks are a mass of solid color. They grow closely together, forming walls of shining green. The stalks grow as high as ten or twelve feet and sometimes bend this way and that, so that it is difficult to move through the rows.

The plants resemble Indian corn, except that cane stalks are taller and have more leaves than cornstalks.

Sugar cane reaches maturity after 18 to 21 months of growing. It does best in a tropical climate, where sunshine and moisture are plentiful.

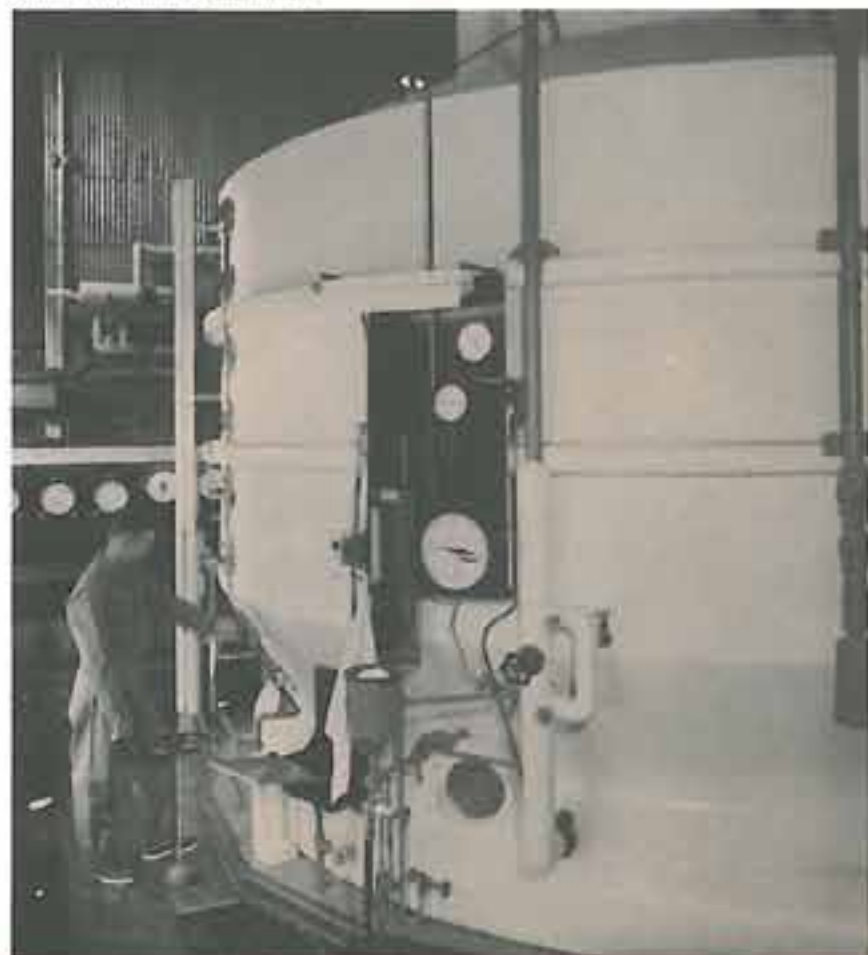
Harvest time on sugar plantations is late autumn and early winter, when cane reaches what is called "premature maturity". That means enough sugar has been developed in the stalk and the cane is ready to be processed into raw sugar.

In the United States sugar cane is grown along the coasts of Louisiana and Florida. However, the growing of sugar cane has not always been a profitable crop for planters in the United States, due to overproduction in other countries. Most of the raw sugar refined in this country is imported from Puerto Rico, Cuba, the Philippines, and Hawaiian Islands.

HARVESTING SUGAR CANE—Scores of men work on cane plantations to harvest the sugar cane and start it on its way to the mill.

Today's growers use harvesting machines to cut down the ripe cane. But sometimes, if the growth of cane is too dense or the terrain is rough, mechanical cane cutters cannot be used. Then the stalks must be cut by hand. Crews of men

In this and other giant vacuum pans, the sugar liquor is boiled to the first point in the process of actual crystallization.





This section of the Imperial refinery, with its row of big vacuum pans, is called a "pan floor". Here both white sugar and brown sugar, in liquid form, are boiled to the crystallization point.

chop their way through the thick green wall, their long knives flashing in the sunlight. Each stalk is cut off close to the ground, for most of the juice is found near the bottom of the stalk.

The cane is stacked, then loaded in trucks (or in ox carts, in some countries) and delivered to the raw sugar mill.

CANE BECOMES RAW SUGAR—The production of raw sugar is an industry in itself.

Most raw sugar mills are found on the islands where cane is grown: Puerto Rico, Cuba, the Philippines, and Hawaiian Islands.

It's the job of these mills to extract the sugar from the cane stalks, but their product—raw sugar—is not edible. It is shipped to refineries, like Imperial Sugar Company, to be converted into the glittering white, pure cane refined sugar that fills the world's sugar bowls.

The juice in a sugar cane stalk is about 15 per cent sugar. Here, briefly, is how that sugar is extracted from the stalks in a raw sugar mill.

The cane first passes through a *cutter*, a machine with knifelike parts which slashes the stalks into bits.

These bits go through a *shredder*, which chips up the cane still more.

The shredded cane goes through a *crusher*, and the first juice is squeezed from the cane.

To get every drop of juice, the cane then goes through several sets of giant rollers, which exert a pressure of from 300 to 600 tons on the shredded cane.

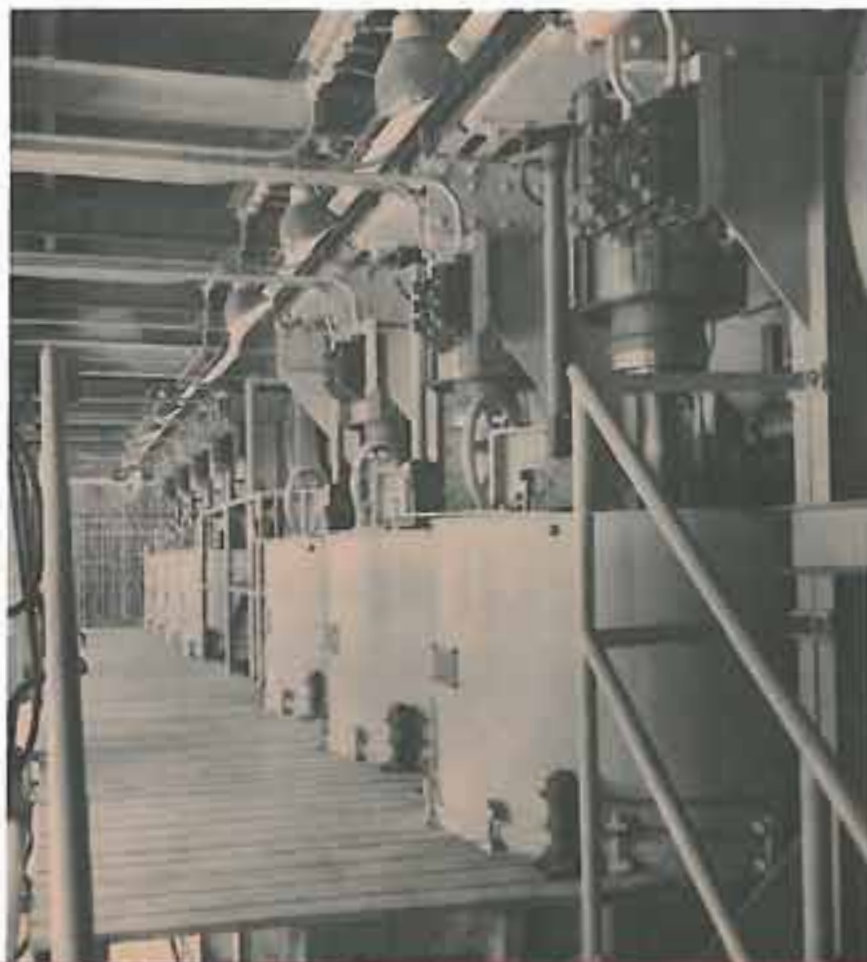
When all the juice has been extracted, the left-over part of the cane is a pulpy fiber called *baggasse*. This is often used as fuel in the mills. Some bagasse is used to make mill board and, more recently, in the manufacture of paper.

The raw juice squeezed from the cane goes through several more steps before it becomes raw sugar.

It is poured through huge strainers. Then comes the step known as *clarification*. The juice is treated with milk of lime, heated to a temperature of 220 degrees Fahrenheit, then poured into tanks, where impurities settle to the bottom and are removed.

The juice then passes through an *evaporation* process which changes it into a thick syrup.

Centrifugals whirl the crystallized sugar mixture at high speed to separate crystals from syrup. Every two minutes the whirling, perforated baskets inside these centrifugals spin off nearly three tons of pure sugar.



"STRIKING THE PAN"—Now the syrup is boiled in *vacuum pans* until it *crystallizes*, or forms hard grains of sugar. "Striking the pan" means emptying this mixture of crystallized sugar and syrup into a tank called a *mixer*. From here, it goes into *centrifugal machines*, which spin the sugar at high speed until the crystals are separated from the syrup.

The syrup is boiled again and forms more crystals. When it no longer yields crystals of sugar, the final syrup is drained off. Known as blackstrap molasses, this left-over syrup is used in livestock feeds and in making rum and alcohol.

When the coarse, dark brown raw sugar leaves the centrifugals, it is either sacked in burlap bags or shipped in bulk to refineries.

Imperial now imports all of its raw sugar in bulk. Huge ocean freighters, their holds filled with thousands of tons of loose, bulk raw sugar, arrive regularly at Texas ports, their cargoes destined for the Imperial refinery.

At Galveston, Texas, a completely automatic system for unloading the raw sugar works like a mechanical marvel.

Aboard ship, big clamshell buckets are swung by the ship's tackle and winches into the holds to scoop up the sugar and lift it out to five huge hoppers on the pier. The raw sugar flows from the hoppers onto a 400-foot continuously moving conveyor belt running parallel to the side of the ship. It is moved to another series of belts which carry it to waiting boxcars, for the trip to the refinery.

At Sugar Land, Imperial's warehouse for storing bulk raw sugar is bigger than

At the last step in the actual refining process, wet sugar is tumbled and dried in heated air inside rotating granulators like this one. The gleaming white crystals fall in a steady stream inside the machine, creating the illusion of a snow flurry.



a football field—big enough to hold 40,000,000 pounds of bulk raw sugar, in one enormous pile. Raw sugar is moved in and out of the vast building mechanically, by a complicated system of conveyors.

Every working day of the year, a freight train full of raw sugar arrives in Sugar Land from the port of Galveston.

Late every afternoon, another freight train chugs out, loaded with some two-and-a-half million pounds of refined pure cane IMPERIAL BRAND sugar, packaged in bright, cellophane-wrapped boxes and colorful kraft paper bags, packaged in the world's first completely air-conditioned sugar packing room.

In just one day, the hungry refinery consumes the entire trainload of raw sugar and turns out a mountain of refined sugar—2,500,000 pounds!

The Imperial refinery is a giant operation, sprawling over 15 acres, generating in its own power plant enough electricity every day to supply the normal needs of a city of 75,000 people.

Tall buildings jut out of the prairie. There is machinery almost fantastic in proportion—giant filters, each more than twice the size of a railroad tank car, a storage bin six stories high, whirling vats large enough to spin off nearly three tons of pure sugar every two minutes.

When the raw sugar arrives at the refinery, it contains about four per cent of impurities, which must be removed by the refining process.

Briefly, refining consists of washing the raw sugar, melting it into a syrup,

In Imperial's air-conditioned packing plant, an average of 125,000 pounds of sugar can be packaged every hour by completely automatic machinery. Carsons and bags dance in an endless line as the machines fill almost 400 packages a minute.



running it through filters to remove impurities and color; recrystallizing the clear, pure syrup; and drying and packing the sugar.

To begin the process, the imported raw sugar is loaded into a lump-breaking machine.

Then the sugar is emptied into a machine known as a *mangler*. Here the raw cane sugar is mixed with syrup and whipped into a thick consistency.

Next, the soft, doughy mass is heated, and fed to *centrifugals*—much like those in the raw sugar mill—where it is whirled at a tremendous speed to loosen impurities clinging to the raw sugar crystals.

Now water is sprayed on the crystals. This preliminary operation is known as *affining* the sugar.

Next the sugar is poured into giant steel tanks called *melters*. It is dissolved in water, becoming a stream of liquid sweetness.

It goes now into other tanks, known in sugar refinery language as *blow-ups*. Milk of lime is added to correct acidity in the raw sugar and to separate the impurities. Diatomaceous earth is also added here as a filter aid. Jets of live steam come into play to heat and agitate the mixture.

The liquid sugar is then pumped, under pressure, through *filter presses*, in a painstaking process to remove impurities.

Now the sugar, still in liquid form, is moved to a towering eight-story building which contains 30 *bone charcoal filters*. Each filter is more than twice the size of a railroad tank car. Bone charcoal is mixed with the liquid sugar, and the mixture is sent through the filters.

The bone charcoal absorbs practically all remaining impurities and color. When the sugar liquor leaves the filters, it is 99.9 per cent pure.

GRAINING—If you've ever boiled a pan of sugar and water on your stove, and watched the syrup form glassy, hard lumps of sugar, as it reaches crystallization, you will have some understanding of the next step in the refining process.

When the liquid sugar leaves the bone charcoal filters, it goes into *evaporators*, where it is concentrated into a thick liquor.

A refinery's "cooking utensils" are huge *vacuum pans*. At first, only a small portion of the thick liquid sugar is introduced into the pan and brought to the boiling point. As soon as tiny crystals begin to form, more liquid is added and the crystals gradually increase in size.

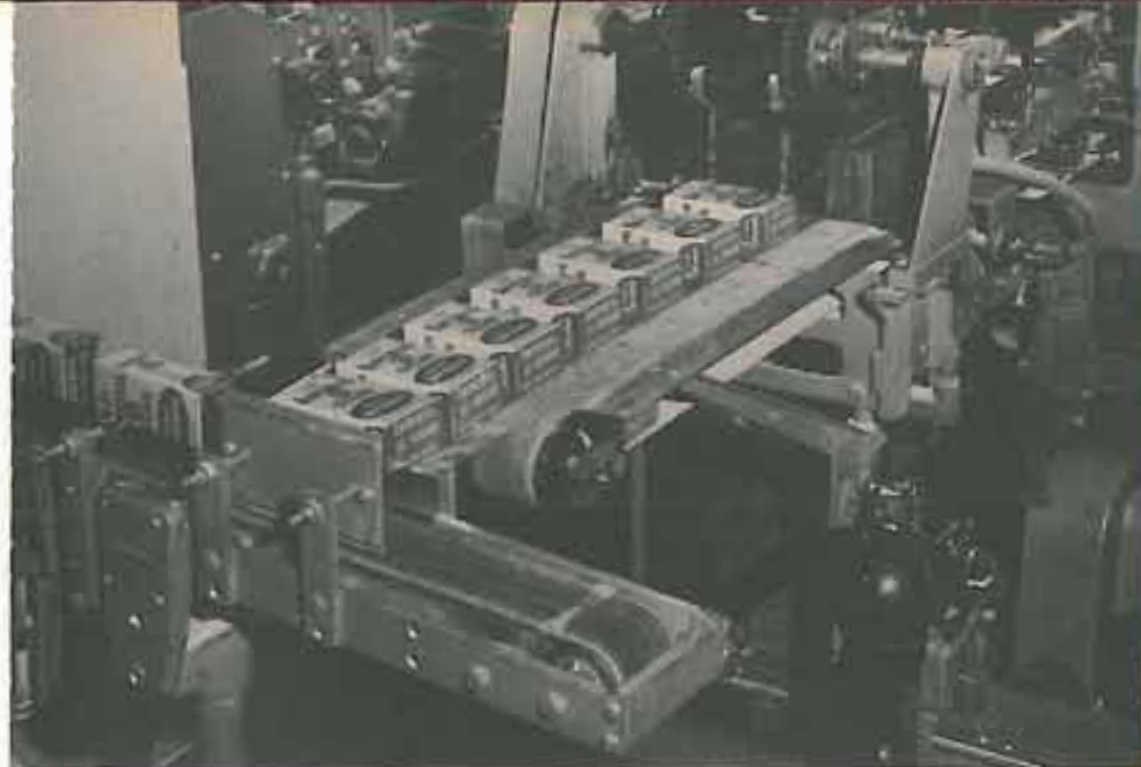
When the great vats are full, syrup and crystals are discharged into a *mixer*. From the mixer, the sugar mixture (called *massecuite* at this stage) again goes into the powerful spinning centrifugals.

This time the centrifugals separate the crystals of pure sugar from the heavy syrup. At the Imperial refinery, every two minutes, around the clock, the whirling, perforated baskets in these centrifugals spin off nearly three tons of pure sugar from the heavy syrup.

The sugar crystals are sprayed with pure superheated artesian water as a final purification.

Next, the sugar is fed into rotating *granulators*, long cylinders placed at a slant so the sugar flows easily through them. A current of heated air, and steam-filled drums inside the granulators, dry the sugar as the gleaming white crystals fall through the cylinders in a steady stream. This is the last step in the actual refining process.

The refined sugar now moves to the top of another refinery unit. It is sifted through constantly rotating silk screens to make sure that Imperial customers will



Here are cartons of brown sugar which have just been filled and sealed, entirely by machines. Each carton is wrapped with heavy cellophane, a heat-sealed outer covering which helps keep the sugar moist and flavorful at all times in any climate.

Packing plant employees watch closely to see that bags are filled, weighed and sealed properly. This view shows funnel-like equipment (near the ceiling) through which refined sugar flows from storage bins to packaging machines.



always get a constant and uniform grain. Then the sugar falls into an enormous storage bin lined with stainless steel. The bin is six stories high, large enough to hold more than two million pounds.

Now the sugar is ready to be packaged. As it goes from the storage bin to the packaging area, the sugar is screened again to insure uniformity of grain.

PACKAGING—Packaging of Imperial sugars is a story in itself.

The refinery has the world's first completely air-conditioned consumer sugar packing plant, a great room walled with plastic-like material as an aid to sanitation.

An average of 125,000 pounds of sugar can be packed every hour by completely automatic machinery. Cartons and bags dance in an endless line. Row on row of automatic packing machines in continuous operation, fill almost 400 packages of sugar every minute!

The machines that fill the cartons are almost human—real robots of the refinery. For instance, the machines will pick up a single piece of wax paper from a stacked supply . . . fold the paper into shape to line a package . . . pick up and fold a printed carton around the liner . . . seal the bottom of the carton . . . fill the carton with *exactly the right* amount of sugar . . . seal the moisture-proof liner and close the carton . . . wrap the filled and sealed carton with a covering of moisture-proof, heat-sealed cellophane . . . deposit the carton along with others like it in a larger carton for shipment to the consumer.

All the human operator has to do is to see that there is a plentiful supply of cartons, wax paper, cellophane, and sugar!

These symmetrically stacked bags of pure cane sugar in Imperial's refined sugar storage warehouse await shipment to grocers. The Imperial refinery has the capacity to supply 2,500,000 pounds of refined sugar in a single day.



Above: Laboratory tests are made by trained chemists and bacteriologists at key points throughout the refining process. Strict quality control assures that all Imperial pure cane sugars meet the highest standards of purity and quality.



Right: Liquid sugar is a special product developed by Imperial for industrial users such as bakers, bottlers and confectioners. Stainless steel tank trucks deliver the liquid sugar to food processing plants.

Below: Bulk sugar bins are used by food manufacturers to transport refined sugar in bulk form to their own plants. Each bin holds 1,000 pounds and protects the sugar against all temperature and weather conditions.



In fact, from the time the raw sugar enters the Imperial refinery, through all the various processes, until the refined sugar is sealed in its container ready for shipment—the sugar is never touched by human hands.

The sugar is moved from one unit of the refinery to another by means of conveyors, elevators, and an intricate network of pipelines. Strict standards of cleanliness are observed throughout the giant refinery.

Careful supervision of every step, plus scientific laboratory tests by trained chemists and bacteriologists at key points along the way, assure consumers of the purity and perfect quality of Imperial's pure cane sugars.

LIQUID AND BULK REFINED SUGAR—A comparatively new product of the Imperial refinery is liquid sugar. Just as its name implies, this is pure, refined sugar in liquid form.

Food processing plants—ice cream plants, candy manufacturers, soda water bottlers, and bakeries—use the liquid sugar.

To make it, completely refined sugar is mixed with water in a solution that is 67 per cent sugar and 33 per cent water. The solution is heated to 168 degrees Fahrenheit until the sugar dissolves. The liquefied sugar is then filtered, and cooled as it passes through a series of pipes on its way to stainless steel storage tanks.

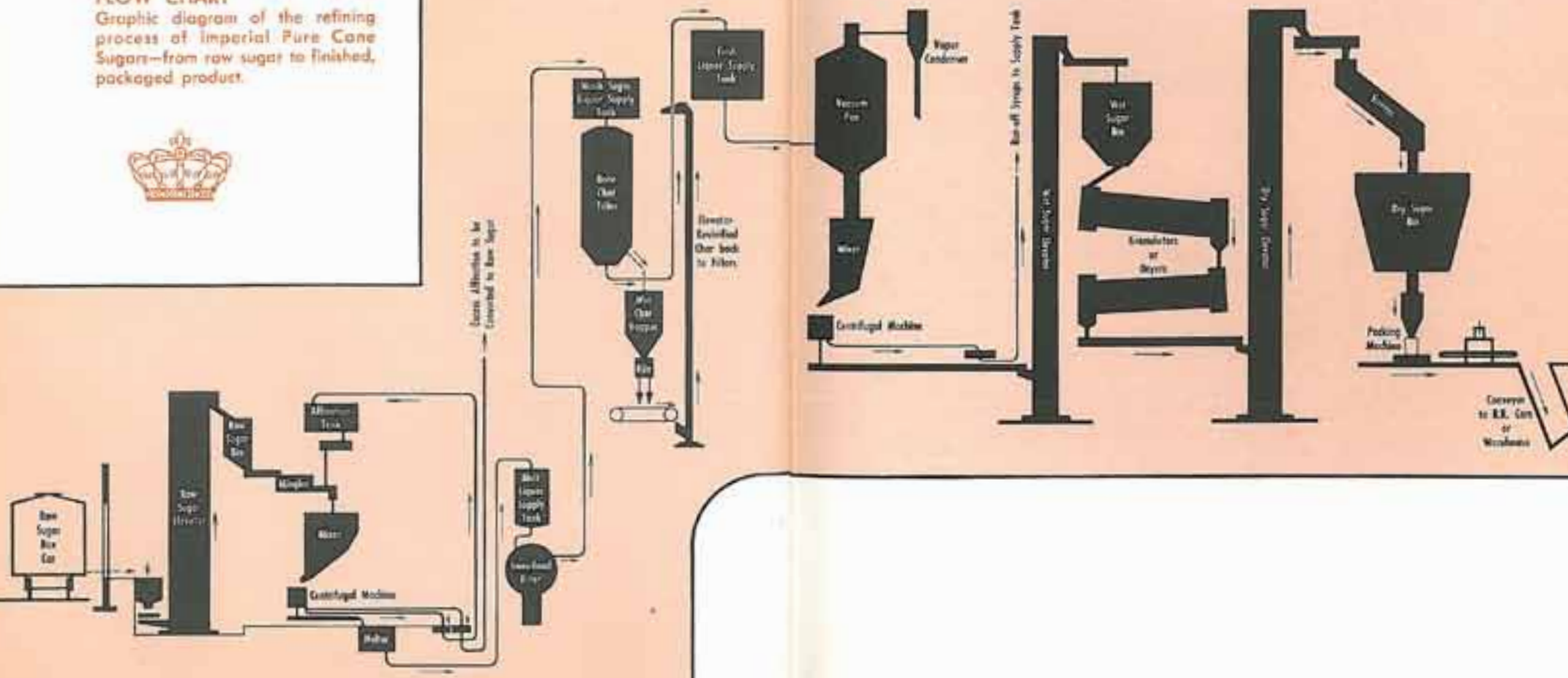
A fleet of stainless steel tank trucks delivers the liquid sugar to food processing plants throughout Texas and the Gulf Coast area. Similar to the way other liquids are handled, the liquid sugar is piped from Imperial's tank trucks into storage tanks of the food processing firms.

When the food manufacturer is ready to use the sugar, he opens a valve. Liquid sugar flows into the proper container, like water from a faucet.

From the time it is manufactured at Sugar Land until final use in food products

FLOW CHART

Graphic diagram of the refining process of Imperial Pure Cane Sugars—from raw sugar to finished, packaged product.





Eldridge Memorial Hospital is considered a model of small hospital planning. The hospital's facilities serve residents of the community, employees of Imperial Sugar Company, and Sugarland Industries.

which reach your table, the liquid sugar is kept completely enclosed in stainless steel tanks, pipes, or the stainless steel tank trucks. These modern methods insure absolute purity, mean more efficiency and eliminate waste for the food processor.

Another service to food manufacturers is the delivery in bulk of large amounts of refined sugar in granulated form. Imperial uses especially built "hopper" trucks and "hopper" boxcars to deliver hundreds of pounds of loose, pure cane sugar to these users.

This bulk delivery method eliminates handling of sugar in sacks and has many advantages for the food processor. As in the case of liquid sugar, bulk refined sugar is kept tightly closed in pipes, hoppers or other special containers. Bulk refined sugar is never handled by hand, from the time of manufacture until final use.

THE CITY THAT SUGAR BUILT—Out of Sugar Land's total population of nearly 3,000, more than 1,000 work for Imperial or Sugarland Industries. The latter is an enterprise related to the refinery. Sugarland Industries operates a shopping center, a cotton gin, a dehydration and mixed feed plant, a bank, a center for farm and ranch supplies, and truck and cattle farms.

There are many husband-and-wife teams among Imperial employees. Often two or even three generations of the same family work for the refinery.

A close relationship exists between the community and the companies (Imperial and Sugarland Industries). For instance, the companies have donated more than 15 acres of land to the Sugar Land Independent School District as sites for new school



Typical of the progressive outlook of this modern community is the striking architecture of Sugar Land's Methodist Church.

buildings over the years.

Sugar Land's community hospital stands on land similarly donated. Called the Eldridge Memorial Hospital, it is considered a model of small hospital planning. Any employee of the companies may receive medical care and hospital services in return for small monthly dues. The hospital serves other residents of the community at regular hospital rates.

Company houses are available to employees at reasonable rents. Or, employees may build their own homes in any one of several subdivisions. Imperial has helped development of residential areas by making land available to developers at a cost far below its actual value.

Sugar Land churches have received gifts of real estate from the companies.

Imperial has encouraged other industries to locate in Sugar Land by leasing land or buildings and leasing industrial plants.

Two college scholarships have been established by Imperial. The I. H. Kempner, Jr., scholarship to Louisiana State University covers four years of study of sugar chemistry and sugar engineering. It is available every other year to a male graduate of Sugar Land High School. A four-year scholarship to Prairie View A & M College is awarded every other year to the boy or girl graduate of M. R. Wood High School who ranks first scholastically.

These ties and many others link the unique community of Sugar Land—the city that sugar built—and the Imperial refinery.

