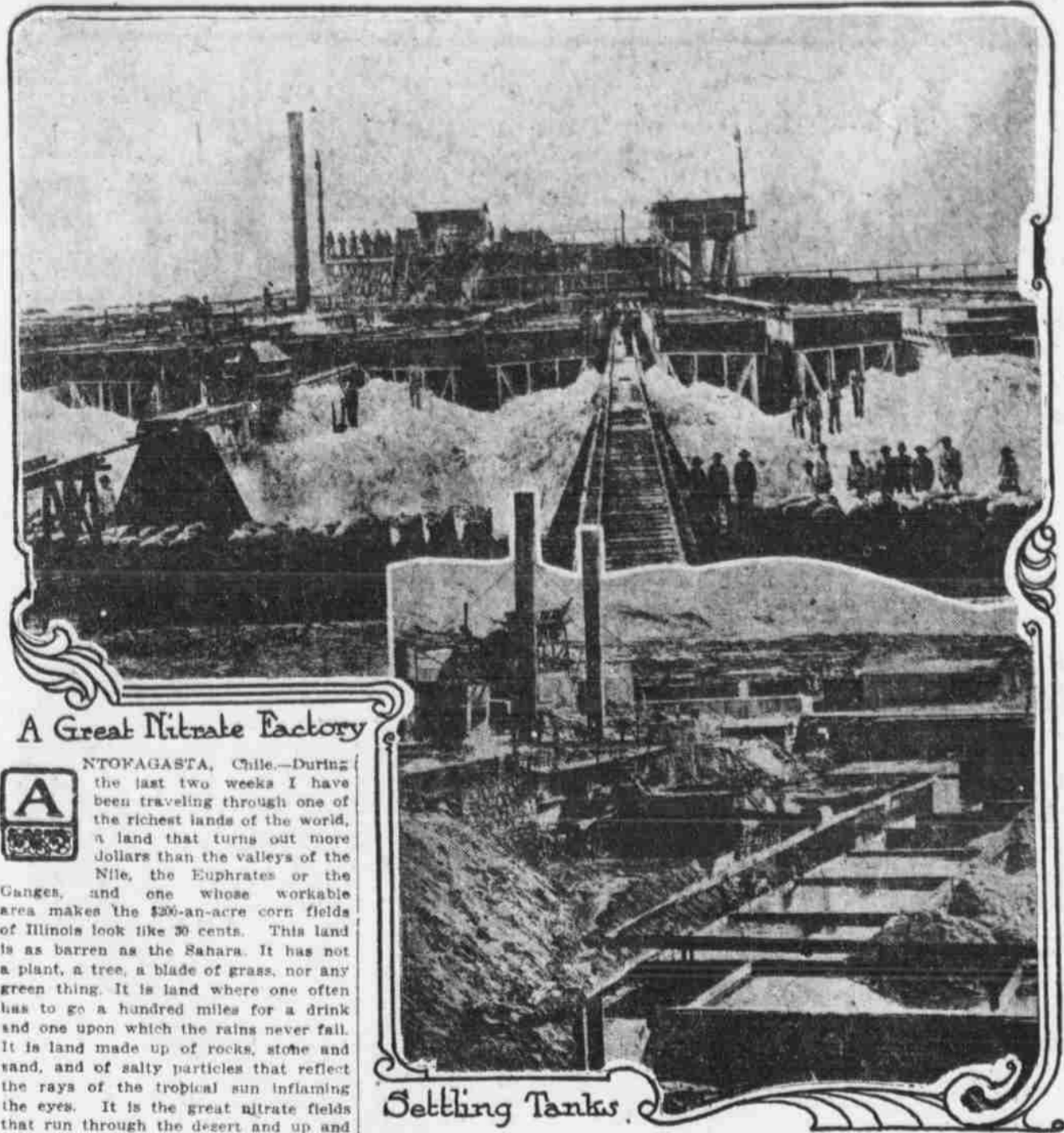


# Life in the Great Nitrate Desert



A Great Nitrate Factory

**A**NTOFAGASTA, Chile.—During the last two weeks I have been traveling through one of the richest lands of the world, a land that turns out more dollars than the valleys of the Nile, the Euphrates or the Ganges, and one whose workable area makes the 1200-acre corn fields of Illinois look like 30 cents. This land is as barren as the Sahara. It has not a plant, a tree, a blade of grass, nor any green thing. It is land where one often has to go a hundred miles for a drink and one upon which the rains never fall. It is land made up of rocks, stone and sand, and of salty particles that reflect the rays of the tropical sun inflaming the eyes. It is the great nitrate fields that run through the desert and up and down this west coast from below Antofagasta to the Peruvian boundary.

For a generation and more these nitrate fields have made Chile richer than any other South American country, and today they bring to its annual revenues an amount equal to \$40 for every family in the republic. Since 1880 the total revenue from nitrate export duties has been over \$400,000,000 in gold, and if the present rate of production continues during the next twenty-five years the amount will be three-quarters of a billion more. Today the nitrate fields are paying from 50 to 80 per cent of all the government expenses, and, in addition, are yielding fortunes to those who exploit them.

**Chief Nitrate Point.**

Antofagasta, where this letter is written, is one of the chief nitrate ports. It is 2400 miles from the Panama canal, and it will soon have a procession of nitrate ships sailing northward to the United States and Europe. Today the vessels are still going around by the Strait of Magellan, and the distance thus saved will be thousands of miles. The bulk of the nitrate exports are now controlled by an American syndicate known as the Nitrate Agencies, Limited. This company exports in the neighborhood of 1,000,000,000 pounds of nitrate a year and controls about one-fourth of the product. Its ships are always loading at the nitrate ports and starting out for the United States, Europe or far-off Japan. The syndicate has considerable British capital, but it is under American managers and its methods are entirely American. The controlling influence and largest owners are W. R. Grace & Co. of New York and London, a firm that has its nitrate deposits and factories scattered throughout the desert from here to Peru.

But first let me tell you something about nitrate of soda. It is one of the richest fertilizers on earth and it has doubled the crop of many an American farm. It is used largely in Germany, where it is employed in raising sugar beets, and in the United States, which is now buying more than 1,200,000,000 pounds of it every year. We take about one-fifth of the product, and now that the canal is completed, shall probably take more. Among the other large consumers in Europe are Great Britain, France, Holland and Belgium. It is largely used in the Hawaiian Islands and also in little Japan, the latter country now importing about 5,000,000 pounds every month.

**Looks Like Salt.**

Nitrate of soda when taken out of the ground and purified looks just like white salt. It is made up of small crystals or grains, and it is in this shape that it is shipped to the markets. It is put up in boxes of 200 pounds each, and is carried from the ports out to the steamers in lighters.

The nitrate beds begin at some distance below Antofagasta and they run northward to beyond the port of Iquique, a distance of 400 or 500 miles. It is claimed that there is some nitrate in Peru, but so far the percentage has been so low that the deposits are not worth the working.

The nitrate beds are found right out in the desert. They lie at an altitude of several thousand feet above the sea, on the western slope of a range of low hills that run along the coast. They are from twenty to 100 miles back from the coast and the belt in which they lie is seldom more than ten miles in width. It is therefore not hard to get the stuff to the seaboard and the most of the haul is down hill.

The bed of nitrate is not regularly and evenly distributed throughout. Much of it is in pockets. There is one salt field in the province of Tarapaca that covers an area of more than 150 square miles, but there are others where the beds of good nitrate are confined to a few hundred acres, and the purity of the ore varies greatly.

**Near to the Surface.**

As a general thing the nitrate is clean to the surface. It crops out here and there, and it seldom extends for more than twenty feet below the surface of the desert.

As to whence these great fields of nitrate come, there are many different theories. One is that this part of Chile was once the bed of an inland sea, and that the nitrate came from the decaying of the nitroscopic seaweed. Another theory is that the ammonia which arose from the vast beds of guano in the islands of the west coast was carried by the winds to the mainland, where it condensed and united with the other chemicals of the soil to form the deposits. A

third supposition is that the nitrates came from certain electrical discharges of the Andes which combined with the air so as to make nitric acid, the acid being deposited in these beds in the form of nitrate of soda.

**Come from Lagoon.**

None of these theories is satisfactory, and yet the scientists have little better to offer. Dr. Walter S. Tower of the Chicago university says they have come from a great lagoon which was formed in this region by the rising of the land in such a way that it formed the home of a world of bird life. The lagoon was shallow and the birds waded through it and fed on its shores. Their droppings formed guano, and as evaporation went on this combined with other chemicals in the water and soil and the result was nitrate of soda. At any rate, the nitrates have been preserved by the dryness of the desert, which has no moisture to leach them out of the soil.

I wish I could take you out into the country and show you how these great deposits of valuable fertilizer are taken out of the earth. Where the mining is done the land looks as though it had been plowed up by giants. The earth lies in mammoth clods of all shapes and sizes, and beyond are nothing but bleak and bare sand. There is no sign of vegetation nor life of any kind. All is sand and salt rock. The rock is of different colors, in some places white and in others yellow, gray, lemon colored or green. The nitrate lies in beds or strata at some distance under the surface; and the method of getting it out is to bore a round hole a foot in diameter through the layers of sand and rock above it and blow it out with blasting powder. The powder is made on the spot, and that out of nitrate similar to that which it is to blow up. The only things required in addition are charcoal and sulphur. The explosion breaks up the earth for a radius of forty feet around the charge, and the charges are put in in rows so that the mining can be done in trenches. After the rock has been broken, it is dug up with picks and crowbars. It is broken up into lumps of such size that they can be loaded upon the cars, and be taken to the factories where it is further reduced by machinery made for the purpose.

**Seldom Found Pure.**

Nitrate is seldom found pure in nature. As it lies in the desert it is mixed with other rock, and the best of the deposits contain only from 40 to 60 per cent of pure nitrate of soda. If the ore contains more than 20 per cent it is called caliche, and if less than that it is costra. The costra lies on the top, and the caliche is usually found underneath. Before the stuff can be used it must be refined and the laws require that the salts exported must be 95 per cent or more pure. It is such salts that form the nitrate of soda of commerce.

There have been but few changes in the methods of nitrate reduction since I visited this region, now more than fifteen years ago. There are many more officinas, as the nitrate factories are called, and the methods of working are just about the same. The average officina is a collection of great buildings with tall smokestacks rising above them. It has thousands of dollars' worth of costly machinery, vast tanks for boiling the nitrate rock and crushers like those of a smelter that break the rock to pieces. It has settling vats, in which the liquor containing the pure nitrate of soda is left, until it has dropped its burden of valuable salts, and also arrangements for bagging the salts and shipping them down to the seacoast over the railroad.

Some of the largest plants of this kind cost millions of pesos and some of them employ hundreds of men. Some have an output of a half million pounds of nitrate per day, and there is one which markets in a good season as much as 200,000,000 pounds per annum.

**Done Scientifically.**

The work of the big nitrate factory is scientifically done. The rock is crushed just so fine and boiled just so much and no more. The boiling tanks are usually situated in a building high above the ground. Each is big enough to form a bathtub for an elephant. It is equipped with coils of steam pipe that keep the temperature of the fluid within at just the desired point. The caliche, or nitrate ore, is carried up an inclined railway and dumped into the tank. Then the water containing a certain portion of nitrate of soda in solution is allowed to flow from

tank to tank, so as to act to the best advantage on the salts within. Experiments have shown just how much water and how much salts should be used, and everything is done by the rules that experience and science have proved best for the reduction. It takes three or four hours of boiling to make the liquid of the required density, and when it is run off it looks for all the world like a pale maple molasses or thick lemon syrup. It now goes into the crystallizing tanks, where it lies for ten or fifteen days. During this time the soda all drops to the bottom and the tank is half full of what looks like pure white sugar or salt. The mother liquor, which floats on top, is now drawn off and returned to the boiling tank to be used over again, and the salt is shoveled out upon drying floors, where it remains until the moisture has all disappeared. It is now fitted for export and is bagged up and taken on the cars down to the seacoast.

**Future of Nitrate.**

In my talks with the nitrate experts of Chile I have learned much as to the present extent of the fields and their future. The Antofagasta manager of the Nitrate Agencies, Limited, estimates that there is enough salt in sight to run the world for eighty years more at the present rate of consumption, and there are others who say that the nitrate fields will last for more than a century. There are three provinces whose deposits are estimated at more than 500,000,000,000 pounds. Others of the estimates are lower, some claiming that there are now left only about 200,000,000,000 pounds. These estimates do not take into account the new fields which are sure to be found nor the possibilities of working over the dumps about the officinas, which will contain a large percentage of nitrates.

Indeed, one of the great opportunities for the inventors of the future lies right here in these arid deserts of Chile. The caliche as it is brought from the mines seldom averages more than 25 per cent of nitrate of soda, and by the present methods of reduction fully 5 per cent is left in the refuse. That means that 40 per cent of the nitrate contents are still in these great dumps surrounding the officinas, and that if this can be saved it will add to the world 40 per cent of all the nitrate so far taken out of the earth. Such a product would be worth hundreds of millions of dollars. These fields have been mined since 1850, and in 1880, at the time of the Peruvian war, they were already taking out millions of pounds every year. In 1890 the output was more than 1,000,000 tons, and in 1911 the exports were more than 2,500,000 tons, and the value of the output was something like \$100,000,000. This work has been going on steadily at the present rate for more than a generation, and in a less degree for a generation and more before that. All this time only 90 per cent of the product has been saved. The other 10 per cent still lies in the dumps, and in this rainless country there it will continue to lie until the "open sesame" of some inventor's brain unlocks the robber cave of nitrate and thus enriches himself and the world.

**To Get at Low Cost.**

And still the most careful study is taken to get out the nitrate at the lowest possible cost, and to save every cent in product and labor. Said one of the great officina managers to me:

"Our profits are a question of small savings. The difference of a cent in the cost of the reduction of each 100 pounds would mean a profit of at least \$1,300 a month. We have to watch everything, and especially the matter of labor. Our workmen have to come from the outside, and their wages are very high for this part of the world. The present average is about \$2 per day, although boys are paid less than \$1. There are altogether about 40,000 hands employed in the reduction of nitrate and some of the larger works have from 500 to 1,000 apiece. We have to provide houses for the men, and also heat, light and water, although the cost of these are deducted from their wages."

FRANK G. CARPENTER.

**A Sure Cure.**

"Doctor," said he, "I'm a victim of insomnia. I can't sleep if there's the least noise, such as a cat on the back fence, for instance."

"This powder will be effective," replied the physician after compounding a prescription.

"When do I take it, doctor?"

"You don't take it. You give it to the cat in some milk."—Pittsburgh Chronicle-Telegraph.

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