phenomena extend all the way across the country—which would be powerful enough to raise huge blocks weighing many tons to the tops of hills and mountains hundreds of feet high, or to transport them over the great distances many of them must have come. Nor does it explain why these drift bowlders, so plentiful around New-York, suddenly cease a few miles south of the city, so that while thousands of them are found north of a line from Staten Island to a little below Morristown, practically none are found south of it.

Another theory—the one now universally accepted as true—is known as the glacial or continental ice sheet theory. It has found acceptance because it explains not only the presence of the drift bowlders, but also a number of other interesting phenomena closely connected with them as well. For example, numerous clearly marked straight scratches on the exposed bedrock of the country, even on the highest hilltops, all running in the same direction, southeast and northwest; a line of peculiar and oddly shaped hills and mounds set in great irregularity and confusion, though with a perceptible trend, across Lower Brooklyn, Staten Island, into New-Jersey near Elizabeth, Newark, Short Hills, Summit, Morristown and beyond; the presence of several beautiful lakes in New-York and New-Jersey, such as Lake Hopatcong and Greenwood Lake; some curious marsh lands in Northern New-Jersey, and other features.

The ice theory is briefly as follows: Many thousand years ago, perhaps two hundred thousand or more, the earth's climate gradually became much colder than at present, owing largely to the slow change in the shape of its orbit. The change of climate brought about long and severe winters and short summers, and the winters' snows were so heavy i nthe northern parts of the continent above the Great Lakes that they did not entirely melt in the succeeding summers. The accumulation of snow in these regions finally became so great, many thousand feet thick, that of its own weight and the summers' rains it was compacted into solid ice. When ice is subjected to great pressure in large masses it acts much like a thick and heavy liquid; it shapes itself to the configuration of the land, it follows the turns of winding valleys, it flows to lower levels and in effect becomes a semi-solid river, just as the glaciers in Switzerland and elsewhere are seen to be to-day. This was true of the ice during the Glacial Age, only instead of resembling a river it was more like a mighty sheet from one to two miles thick, covering the whole of the northern part of the continent. Although it pushed its way over the country to the southward with great slowness, its enormous weight and power must have stripped the land of every living thing, driving all animal life before it, crushing all trees and vegetation and tearing and pushing the soil and loose bowlders in its course. This encroaching ice sheet seems to have worked its way from the highlands of Canada down to the latitude of New-York and there stopped, like any other glacier, because at this point, under the influence of milder temperature, it melted as fast as it flowed.

Appreciating the great bulk and irresistible force of the ice sheet, it is easy to understand how it would smooth and polish and round the rocks big and little as it rolled them along, and how it might freeze some into its lower portions and thus, shod with a substance harder than itself, plough up the soil and smooth or scratch the surface of the bedrock. It can also be seen how the ice might pick up and carry along large bowlders and rock masses, even tearing off the projecting corners from the hillsides. These bowlders are then either borne along to the edge of the glacier or, if the ice should happen to melt from a change in the climate, they are dropped where the ice leaves them. Hence it is that these great bowlders are found in such unexpected places, belonging to entirely different formations from the rocks on which they stand and having been transported often many miles to their present positions. It is possible to understand also how all the loose material pushed along by the ice and embedded in it would be dropped at its southern edge as it melted, gradually forming in time a series of mounds or hills to mark its limit. This line of hills is actually found stretching across the country from New-York to Puget Sound. Geologists call it the terminal moraine.

While the ice was transporting bowlders the waters beneath it, due to its melting, which is always a feature of glaciers, were busy spreading about the sand and gravel which the ice had ground and carried with it. Sometimes this portion of the drift was spread so thick as to change completely the appearance of the country; this is the case near Suffern, N. Y., where the many low and irregular gravel hills are entirely the result of glacial action. At times also this is of considerable economic value, as the accumulations of gravel, especially when they fill an old hollow or valley which existed before the ice came, form excellent gathering grounds for water and good wells can always be located there. In Indiana and Illinois the drift is especially valuable for this reason, and for several years has been carefully studied by the United States Geological Survey with reference to its water supply.

RECLAIMING A DESERT.

VAST IRRIGATION SCHEMES TO FERTILIZE MORE THAN A MILLION ACRES IN SOUTHERN CALIFORNIA AND ARIZONA.

Los Angeles, Cal., Sept. 23.—The most remarkable series of irrigation projects ever wrought out in the United States are rapidly taking form on the Colorado River, the greatest stream in the Southwest, which carries sufficient water to irrigate eight million acres of land. On the California side of the river is the vast Colorado Desert. Across the international line in Mexico, on the peninsula of Lower California, the desert extends to the southward. On the eastern or Arizona side of the river the desert extends from Yuma to the head of the Gulf of California and beyond.

FIRST IRRIGATION.

The series of projects now being executed, and which have led to the production of crops this year for the first time, includes three irrigation canals in Arizona, leading from the river, for the irrigation of about one hundred and fifty thousand acres of land, a considerable portion of which has been brought under cultivation in the last few months. Another project is that about Indio, where sixty wells have been drilled in an artesian belt discovered a little over a year ago, and which has led to filings being made on about one hundred thousand acres, several hundred acres of which territory is under cultivation at present.

The greatest of the projects, however, is that of the Imperial company, which has entered upon the gigantic task of irrigating five hundred thousand acres of land in San Diego County, Cal., and three hundred thousand acres in Mexico, and which delivered its first water in June of the present year. The water now deliverable to the Imperial lands is sufficient for the irrigation of more than one hundred thousand acres, and to this additions are being made rapidly. Several hundred acres were planted in June, on the arrival of water, and fully fifty thousand acres will in all probability be sown in alfalfa during the coming winter. Before water was placed on any of the land under this system over eighty thousand acres were filed on by settlers under the Desert Land law and the Homestead law, and hundreds of people are now rushing into the country anxious to take advantage of the opportunity held out by the government to acquire cheap land under the insurance of crops provided by irrigation.

From the present rush into the delta it seems probable that within a year or so the entire area of irrigable land on the desert in the United States will be taken up. The average holding will be about one hundred acres, implying that some 7,500 families will find farm homes on the delta within the next year or two. The land on the California side of the river constitutes what has long been known as the Colorado Desert, the most perfect type of desert in the United States, and not second to the great African desert in the distances between sources of water supply. Many a person has perished here of thirst since the Spanish conquistadores made its existence known to the world, and such deaths have continued at intervals of a few months up to the time of the development of the irrigation system.

The popular conception of a desert is a wide expanse of light, drifting sand. That is erroneous. There may be drifts of sand, and there are here, in places, banks of sand off the edge of the desert. But the main floor, hundreds of thousands of acres in extent, is not of sand, but of a sedimentary deposit, made by the great Colorado River—the dust and shavings, as it were, produced by the carving out of the Grand Canyon of the Colorado. The soil is compact, and teams driven over its unbroken surface trot along at ease. Yet it is easily worked, and chemists who have analyzed it declare that it even exceeds in fertility the soil of the delta of the Nile, while the water of the river carries greater fertilizing properties than does the water of the Nile. An illustration of the productive power of the soil is the growth of sorghum, planted in June, which is being harvested in September, the stalks being nine and ten feet high and the yield running six tons to the acre. The earliest melons grown in the United States this year were planted in February at Indio, a few miles from Imperial, this being the first year of extensive cultivation of land there. The growers realized from $100 to $400 an acre for their crops.

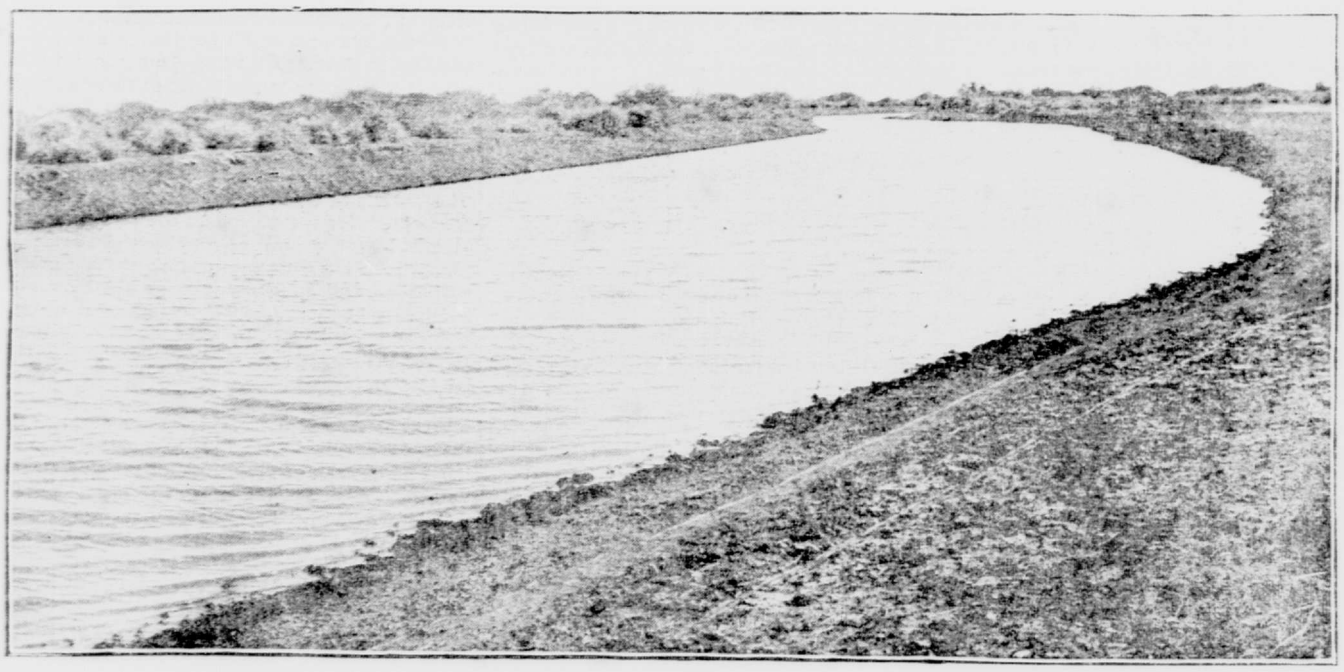
While this delta is known as the earliest producer of fruits and vegetables in the United States, and as a natural home of the date and raisin, the majority of farms will find other utilities because of the limitations of the markets and the immensity of the tract. The greatest industry will be the raising and fattening of cattle. For this reason alfalfa, sorghum and other varieties of cattle feed will be the leading products. The cattle industry has been waning of late years because of the encroachments on the ranges of the West by settlers, and in consequence the price of beef has steadily advanced, until cattle raising under favorable conditions is one of the most profitable industries in the country. This condition has led to the creation of a branch industry, that of maintaining cattle fattening grounds. Cattle are brought from the ranges, often poor and scrawny, and placed on alfalfa grounds to be fattened. This is a profitable method of marketing the farmer's crop, while the cattleman is benefited in getting a higher price a pound for his stock.

One cannot comprehend easily what a vast tract of land this is. The eight hundred thousand acres to be irrigated by the Imperial company alone is of oval form, ninety miles in greatest length. It borders on the Indio country on the northwest, and is only separated from the Arizona land being irrigated by the Colorado River. Including all these lands, there is a stretch of country about one hundred and fifty miles in length from the southeast in Arizona and Mexico to the northwest, where it approaches close to the present cultivated portion of Southern California, the whole including more than a million acres.

No such gigantic irrigation work has ever before been attempted in the United States, and it seems not inappropriate that the capital of this new empire, which is springing up on the delta, should be known as Imperial City. It is true that it has not assumed large proportions yet, but something of its prospects may be seen from the vast tract surrounding it, much of which must be placed under cultivation in the next four years to perfect the titles which are being acquired from the government. The development of this land is giving the city of Imperial a rate of progress which few towns have acquired so early in their existence. While a year ago there was not a habitation within many miles of this spot, not a drop of water but that which had been hauled for miles, there is now a community of several hundred people, a hotel, a newspaper, a church, a school, and other evidences of civilization.

While long under consideration, the consummation of this project awaited the action of George Chaffey, civil engineer, and member of the Institute of Mechanical Engineers of London, now of Los Angeles. He was well equipped for the task. He had developed some large irrigation projects in Southern California and had then gone to Australia, where he planned and successfully carried out one of the greatest irrigation works the world has known. His experience in those fields fitted him eminently for the crowning work of redeeming hundreds of thousands of acres of desert land in Southern California; and that the Imperial system is serving water now for the irrigation of thousands of acres after less than two years of active work on the project is an illustration of the energy he brought to the task.

While people are going to the desert from all parts of the country to take advantage of the opportunity offered to acquire land from the government under this system, most of the settlers are from Southern California, being those who have long had practical demonstration of the great value of irrigation. People who are studying the situation are agreed that not less than one hundred thousand persons will be added to the population of Southern California within five years because of this series of irrigation projects, and the movement thus becomes of great importance.



MAIN IRRIGATION CANAL.

A MEXICAN GHOST STORY.

From The Memphis Appeal.

A curious story comes from a small town in the State of Puebla. A missionary priest named Padre Pimentel, who is staying there, stated in a sermon he preached that he was visited by a youth named Daniel Diaz, who begged him to go to his house and confess his sister, who had been dead five years, "and who had appeared to him, beseeching him to call on the missionaries to assist her out of purgatory."

The padre says that, despite the fears which were aroused by this strange request, he determined to go, and took for his companions Mariano Mellado and two sacristans. On reaching the house, which was a gloomy place, he was conducted to a cheerless room, where he seated himself, and immediately became aware of a floating vaporous figure, while at the same time he heard "creaking of bones." The wretched young woman made her confession, and, on being absolved, disappeared suddenly.

The padre states that the awful experience brought on a severe illness, but that since his recovery he has determined to make the fact known, that others may not be exposed to the same long durance in purgatory for want of absolution.

The news of this occurrence has spread like wildfire, and the missionaries have been the recipients of handsome contributions since it took place.

FROM EXPERIENCE.

From The Chicago News.

Mrs. Enpeck—I learned to-day that "Bob" Smith and Mary Jones were secretly married ten months ago. Just think of it! Married nearly a year and nobody the wiser!

Mr. Enpeck—Oh, I don't know. I'll bet Smith was a whole lot wiser before he had been married a month.