to Mexican ports have trouble in even securing ballast to get out of those ports, and have to traverse the Gulf and United States coasts to secure loads for the return trip. Their owners are willing and ready to supply facilities for the exportation of live stock and frozen meats if assured of a sufficient traffic to justify them in the expense, for they prefer reloading direct for Europe to going elsewhere for freight. The time required to return direct from Mexican ports is but little more than from New York and Baltimore, and is sufficiently short to warrant good service in transportation of live stock, and the cost would practically be the same as from United States ports. The United States is beginning to export beef and stock from Galveston to Europe, which is practically the same distance as from the Gulf ports of Mexico.

Mexico could export annually and easily after the next ten years 400,000 of fattened cattle, which would increase considerably the amount of our exports, and this trade would greatly assist the development of many other industries.

The desired result in question could be hastened by mixing good foreign labor with the native labor. The latter would be better fed, clothed, and educated, as well as encouraged, taught, and compelled to do better work, and thus the country's physical and mental welfare would be greatly promoted.

Sheep.—The same conditions apply to the sheep and wool industry. It is a great mistake for the Mexican sheep-owners to raise a class of sheep that yield each only from one to two and one-half pounds of very coarse and inferior wool, annually, while they themselves wear goods manufactured from foreign wools, and the domestic-cloth manufacturers are also under the necessity of importing largely of fine wools. Mexico possesses natural resources for producing all the wools of every grade that she needs, with a large quantity over for export, not to speak of choice grain-fed mutton for domestic and foreign consumption.

The custom of killing so much poor stock is a terrible waste of resources, as one well-fattened animal will render twice as much as a thin or poor one.

Products of Cold and Temperate Regions.—I will not speak of the products of the cold and temperate regions of Mexico, such as Indian corn, wheat, oats, barley, and others, because their cultivation is well understood in the United States, and I could say here nothing new to the American reader, but will only state that they all grow very well in the proper regions of Mexico.

FRUITS.

We produce in Mexico a great many tropical fruits that are not sent to the United States because there is no market for them for the reason that they are not known here. Some of them are delicious,

and with the facilities of communication, I have no doubt that they will become known and a taste will be developed for them in this country. I will speak here only of such of our tropical fruits as come to the United States.

The advantage of tropical fruits growing in their proper zone and climate is immense, as the expense of planting and cultivating them outside of their proper limits is very great and there is always danger of their destruction.

Oranges.—Orange trees, like any other fruit trees, depend in Mexico on the rain, and, except in a private garden or private grounds, are not irrigated. While the orange tree is a hardy plant, it thrives best and yields the most luscious fruit in the tropics. Elevation exceeding 2500 feet is not, as a rule, desirable for orange culture.

The advantages of irrigation in orange culture are great in the subtropical regions of Mexico. The fruit of the irrigated orange tree is of a very superior quality, while the tree itself has a longer lease of life and is less subject to attacks from insects and diseases of a fungoid nature. One of the conditions primarily requisite to the growing of a marketable orange is that the trees be watered at judiciously regulated intervals during and for a short time after the blossoming season. Attacks from insect and fungoidal pests, which are most disastrous, and to which the trees are peculiarly subject during the blossoming period, are rendered even more dangerous by the prevalence of a considerable amount of humidity in the atmosphere which is always conducive to the development of parasitic germs or fungoidal spores. An abundance of moisture in the ground but a comparatively small amount in the air is the condition most to be desired during and just after the blossoming season. This is to be had by irrigation, but, generally speaking, not without it. Under irrigation, the soil is also much less subject to deterioration, owing to the superior fertilizing properties of water taken from wells and streams. Rain water, aside from containing a small percentage of ammonia, which it receives from the air, only acts as a medium to transmit the nutriment from the soil to the tree, while water taken from wells or streams holds in solution the renewing materials which are directly communicated to the plant proper.

In the more elevated orange districts of Mexico, the trees should be watered about once every twenty days during the dry season.

In some places our oranges are as sweet as if they had been preserved in sugar, and this, notwithstanding the fact that no attention is paid to their cultivation, that they grow almost wild, and without irrigation.

I think that the distillation of orange blossoms would prove very profitable. The production of flowers per tree is given at from 22 to 55 pounds in the case of sweet oranges, and from 60 to 100 pounds per tree from the bitter variety.

In flavor and productiveness the Mexican orange is unsurpassed. In the majority of the districts but little care or attention is given to the cultivation of the trees. Scientific orange culture in Mexico is practically unknown. The introduction from other countries of different varieties of the plant for experimental purposes is just being commenced.

The price of oranges in Mexico at the present time, in districts reasonably near lines of transportation, is about $11 per thousand, Mexican money, on the tree. It is the practice of the producer to sell the fruit on the trees, the buyer picking, packing, and shipping it at his own expense.

About one hundred trees are usually set out to the acre, the average yield being from 800 to 1000 oranges to the tree. I know of trees in Mexico which have a record of having produced 10,000 oranges. This, however, is very exceptional.

A properly cultivated and prudently managed grove at the end of five years' growth should prove as profitably as a coffee plantation of the same size, at the end of five years.

The production of the orange trees begins in the third or fourth year and increases up to the twelfth, and, in some cases, to the fifteenth or sixteenth year. It is considered best to cut the fruit up to the fifth year, not permitting it to mature.

A book prepared by Frederico Atristain, entitled *Cultivo y explotacion de Naranja*, and published by the Department of Fomento of the Mexican Government, contains a great deal of reliable information on the subject of orange culture in Mexico.

After an orange tree has been yielding sweet oranges for many years, it very likely exhausts the substances of the earth which give the sweet taste to the fruit, and it begins to lose its sweetness, until finally, if the land is not manured, as is almost always the case in Mexico, the oranges become bitter.

A recent cyclone, which lowered considerably the temperature in Florida, destroyed in one day, I understand, about 12,000,000 orange trees, thus causing ruin or serious loss to thousands of men engaged in that large industry, while the orange region in Mexico is entirely free from frosts and consequently from such dangers.

Lemons.—In the hot and temperate regions of Mexico lemons grow very well. There are some districts of the country, like Soconusco, where the natives plant the lemon trees very close together, for the purpose of making a hedge or fence, and, notwithstanding that the trees have not the necessary conditions of sunlight and air for their proper development, they grow very well. I do not know of any place in Mexico where lemons have been cultivated for commercial purposes; but I am sure they could be made a very lucrative industry.

Limes and Shaddocks.—Lime trees prosper very well in Mexico, bearing large amounts of delicious fruit. I have not seen in the United States any of our limes, at least such as are imported here are not like ours, and I have no doubt that if known our limes would find a good market in this country. The lime should not be planted at an altitude exceeding 1000 feet. We grow also a very large kind of shaddock, which we call "toronja," and which is not imported in this country, but which if known here would find a good demand. It grows very luxuriantly and attains at times a very large size, even eight inches in diameter, having a very thick peel.

Bananas.—The banana thrives anywhere from the sea-level to an elevation of 5000 feet, and is one of the many Mexican fruits which yield to the planter an immense profit. The whole Mexican coast produces the banana spontaneously and in very great abundance. On the lands near the sea, at an elevation of 600 to 700 feet, large plantations of bananas can be started at a cost of five cents per plant, including all expenses. At the end of the first year, the plants begin to bear, and 1000 plants, which have cost $50, will produce $1000 as a minimum. The following year the yield is double that amount, and almost without expense. At the end of one year, the plant produces one bunch which is worth in the United States from 75 cents to $1 gold, the cost to the farmer being not more than 25 cents per bunch in Mexican currency. After the first year, the sprouts from the old plant grow up and give double the first year's yield.

There is perhaps no tropical plant easier of cultivation than the banana. The suckers having been planted out at the commencement of the rainy season, they will grow vigorously, and produce fruit in about a year. The land must be kept free from weeds, and an occasional turning up of the soil will prove beneficial. Before the plant throws out its flowering stem, suckers will make their appearance above the ground, and these will require careful attention. While the plant is young, all the suckers except one should be cut away, the best plan being to sever them with a sharp spade. Thus all the vigor of the plant is thrown into the fruiting of the first stem, and the growth of the one to supplant it, and, in this way, fine large bunches can be reckoned on. The second stem usually produces a finer bunch of fruit than the first, but, as the land becomes exhausted, the bunches of course decrease in size, and this shows the necessity for manure in some form or other.

Bananas are used extensively as shade for young coffee and cocoa trees, and in places where an export banana trade has been established, the formation of a cocoa plantation is a very inexpensive matter, as the return in fruit from the bananas will pay for the cultivation of the cocoa until the trees are able to give a small crop.

The important feature, and the one upon which the success and profit of the industry depend largely, is that of cheap and certain transportation facilities. That requisite is easily obtainable; for instance, there are extensive and cheap lands for sale along the Tampico branch of the Mexican Central Railroad, from which the fruit can be shipped either all by rail, or by rail to Tampico, and thence by boat.

We have many kinds of bananas in Mexico, of different sizes, colors, and flavors, ranging in length from two to eighteen inches, and from one-half of an inch to three inches in diameter. The largest, which in some places are thought unfit for food, are in others, like Soconusco, considered the best; very likely on account of their different quality. When roasted the latter are very juicy, and taste exactly as if they had been preserved in sugar. Some people on the coast live almost entirely on bananas, this fruit forming their principal food. The banana is likewise a tropical plant, and thrives best on the lowlands.

Pineapple.—The Toltecs and Aztecs knew how to cultivate the pineapple, and when the Spaniards conquered Mexico, they found the fruit in the markets of the towns on their way from Veracruz to the great Tenochtitlan. "From time immemorial," Sir Henry Dering says, "the pineapple has been cultivated in Amatlan, a town five miles south of Cordoba, from where the ancient Mexicans used to get their main supply." Now it is grown in tropical Hidalgo, Puebla, Veracruz, Tabasco, Chiapas, Oaxaca, Morelos, Guerrero, Michoacan, Colima, Jalisco, and Tepic. "Besides the fruit being very delicious and wholesome," Sir Henry Dering says, "a fine wine and vinegar are made of the juice. The leaf furnishes a fibre of extraordinary strength and fineness, making it even more valuable than the fruit. The fibre is made into ropes, cables, binding twine, thread, mats, bagging, hammocks, and paper. A pineapple rope three and a half inches thick can support nearly three tons. A textile fabric as fine and beautiful as silk is made of this fibre too. It is believed that the fine cloth of various colors used by the upper classes among the Aztecs was made of the pineapple fibre. The modern Mexicans do not manufacture it much now, except in the Isthmus, where the Zapotec Indians still make a cloth from it and from wild silk. One cause for its disuse is the slow and wasteful manner in which it is separated." Pineapples will grow at elevations of from 2000 to 3000 feet above the level of the sea, but the best and most delicate fruit is produced on the lowlands.

Cocoa-Nut.—We have in our lowlands near the sea many kinds of palms called corozo, bearing different kinds of fruit, growing in large bunches and the fruit very abundant, being in the shape of a small egg, very rich in oils, and making also a very good food, although it is hardly used now for any purpose. The palm tree bearing the cocoa-nut grows, of course, very luxuriantly, and does not require any care after it is once planted. The cocoa-nut prefers the sea-coast and high temperature. The saline breezes from the sea are very beneficial to it. I have not seen in Mexico the species of palm bearing the date, perhaps because it has not been planted there; but I am sure that we could raise it, as we have several sections with a climate similar to that of Egypt and Asia Minor, where the date palm grows so well.

Mangos.—The mango is a very fine fruit, but requires a cultivated taste, and is generally disliked the first time it is eaten. It has a very large bone, although that is not the case in fine qualities, called Manilla mango, which has a very thin one and a great deal of pulp. The mango occasionally comes to the United States, but being a very frail fruit, has to be taken from the tree when very green. It does not ripen well, and, if taken when beginning to ripen, it reaches its destination in a decayed condition.

Alligator Pear.—The alligator pear is one of the most delicious fruits that we raise in Mexico, and is properly called vegetable butter, being a good substitute for butter. It is not eaten by itself; the most usual way to eat it is in salad. We have several kinds and sizes of this fruit. The seed of the alligator pear is oval-shaped and quite large, about 4 inches in length by 1½ in diameter, and of some oily substance, which, I have no doubt, has some good medicinal properties.

Mamey.—The same is the case with the seed of the mamey, a fruit unknown in the United States, having a red pulp, and a very large seed covered with a thin shell. The Indian women extract an oil from that seed and use it for their hair, and I think it must have many more useful medicinal properties.

A great many other of our fruits have seeds containing substances which I have no doubt will be found, when analyzed, to be very valuable to therapeutics.

Zapote.—The zapote is one of our tropical fruits which does not come to this country. I have just heard that the seeds of the zapote have recently been found by a Mexican doctor to be a very good narcotic, which does not produce the ill effects of the drugs now in use.

Papaya.—This fruit, which grows in our hot lands resembles the melon in shape, pulp, and seeds, but its color is of a yellowish-red. It was considered a very common fruit, but recently it was found to be a powerful digestive, and it is already used in Europe as a medicine under the name of Papaine.

Flowers.—Mexico is a favored country for flowers. They grow wild in a great many places, and they can be raised at very little cost, as there is no need of hot-houses or any other expensive appliance to cultivate them. The Indians in the small towns around the City of Mexico

make a business of raising flowers, and they sell handsome bouquets, as artistically made as any in this country, for a mere trifle. A bouquet which, for instance, in New York would cost $5 in winter, could be had in the City of Mexico all the year round for 25 cents; and I look forward to the time when flowers will be exported in large quantities from Mexico to the United States if the protective policy of the country does not interfere.

IRRIGATION.

At the time of the Spanish invasion of Mexico, the Indians in those parts of the country where the population was greatest were dependent upon irrigation for a large part of their cereals, and for cotton, which played so important a part in their economy. As the same method had been employed from time immemorial in Spain, it followed that on the partition of the soil among the Spanish conquerors, irrigation became an important factor in their agriculture; but with expansion of population large tracts of land have come to depend entirely upon the rain.

In recent years Mexican agriculture has depended almost altogether on the rainfall, except in a few places well supplied with water, and where irrigation is both cheap and easy; but the inhabited portions of the country have been depleted of their timber by the natives for the purpose of using the wood for fuel or lumber. In more recent years, the building of railroads has increased considerably the demand for wood both for sleepers and for fuel for locomotives, and the consequence is that a great change is taking place in the climatic conditions of the country and that fuel is exceedingly high. In no other country is there so much timber—a good deal of it not yet full grown—consumed annually as in Mexico. The consumption of timber for railroad purposes alone, not to mention that used in mines, smelters, and as fuel in cities and towns, is incalculable.

Competent authority in Mexico, among whom is the Inspector of Manufactories, created for the purpose of insuring the collection of the internal-revenue tax, considers that only in the Federal District of Mexico the consumption of wood exceeds 4000 English cords daily, used as fuel in the factories, railroads, and other plants of that city.

The consumption of charcoal by private families in the old-style open cooking grates is at least 500,000 pounds in the Federal District of Mexico, which is equivalent to 2,500,000 pounds of wood taken from the scanty forests of the central plateau, and that consumption would be very much reduced if, instead of those old-fashioned grates, iron cooking stoves should be used; and to encourage their use, when I was last in the Treasury Department of Mexico, I was instrumental in reducing considerably the duties on the same.

Another cause of the destruction of the forest in Mexico consists

in the primitive way in which the Indians raise their crops. They own in common a large tract of land, and they begin to till near their towns, commencing by destroying the forests and planting every year in a different locality, because, more especially in the lowlands, the vegetation springs up so rank after the first year's crop that it is very difficult to keep the ground clear of weeds. In this way they clear new land every year, going farther and farther from their town, until sometimes their crops are raised at a distance of as much as thirty or forty miles from their homes. The natural result is the destruction of the forests around the towns and at some considerable distance from the same, and consequently the diminution of the rainfall. I was greatly struck, on my last visit to Mexico, in 1896, by the scantiness of water at an Indian town called San Bernardino, in the sierra district, about five miles north of Teotitlan, the county seat of the district, which I had visited in November, 1855, and found then exceedingly abundant in rainfall and consequently in water, as well as all the mountains north of that place, which extend for about eighty miles to the lowlands on the Gulf of Mexico. On my recent visit, however, I found a great scarcity of water: a small stream of probably not more than one-half an inch in diameter, carried in very primitive wooden troughs, was all the water the town had, and that only during the rainy season, the people being obliged to go a considerable distance for water in the dry season; this being only one illustration of what the destruction of the woods is doing in Mexico.

The city of Oaxaca, at the foot of the Sierra, used to be, in my young days, very well supplied with water, using for that purpose several streams coming from the mountains; but during the last dry season the scarcity of water has been such as to cause a real water famine.

The diminution of the rains, together with other atmospheric phenomena, which takes place from time to time, produces in some years drought that prevents the crops from being raised; as the country produces at present only the corn necessary for its consumption, which cannot be kept from year to year on account of its being eaten by insects. This diminution was very disastrous before the railroad era, causing serious famines. Since the railways were built, we import in such years corn from the United States, spending several millions of dollars in providing ourselves with that staple. All that will be changed, and we shall be able to produce cereals enough not only for home consumption, but even for export, when we begin to use irrigation. The configuration of the country allows dams that will retain sufficient water both for irrigation and manufacturing purposes, to be built at comparatively little expense.

Large tracts of land in Western Asia, Northern Africa, and Southern Europe—countries which, according to historians, were once densely