

THE CHILEAN STRAWBERRY, AS GROWN IN ECUADOR

The region of Ambato, Ecuador, has long been famous for its strawberries, which ripen throughout the year. The variety does not appear to be distinct from that grown in Peru and Chile, but the fruiting season is longer than in the latter countries, because of the equable climate which prevails in the Ecuadorean Andes. The berries are remarkably uniform in shape, and have unusual shipping qualities. They are here shown natural size. In the center is a flower: it will be noted that it has both stamens and pistils, though *Fragaria chiloensis*, when cultivated in France, is said not to produce stamens. (Fig. 13.)

THE FRUTILLA, OR CHILEAN STRAWBERRY

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IN THE development of our cultivated strawberries, the frutilla (*Fragaria chilensis* Duchesne) has played a major rôle. Large-fruited strawberries were not known in Europe previous to the introduction of this species in 1714. Up to that time, European horticulturists had contented themselves with the native wood strawberry (*F. vesca*), the Hautbois (*F. moschata* or *F. elatior*), and the Virginian strawberry (*F. virginiana*), which latter was not introduced from America until after 1600. All of these are small-fruited, though of good flavor and quality. By crossing with *F. chilensis*, horticultural forms were developed which combined large size with delicate flavor, especially in those cases where *F. virginiana* entered into the combination. The varieties thus obtained were the progenitors of the cultivated sorts now grown not only in Europe, but also in North America and elsewhere.

Fragaria chilensis is considered to be indigenous along the Pacific coast from Alaska to southern Chile, though the differences which separate some of the South American forms from those of North America are great, and further study may show that more than one species is involved. Regarding its occurrence in Alaska, Georgeson¹ writes, "It grows along the coast from Muir Glacier to Prince William Sound, and probably also in other places, but throughout this region it is quite abundant. Its favorite soil is the sand and gravel along the old beach line just above the reach of high water. It here disputes the possession of the surface with grasses and weeds of many kinds and is quite able to hold its own against them."

Farther south, on the coast of California, the species occurs abundantly in certain parts. Albert F. Etter² says, "In this region they are found only along the coastal bluffs and on sand dunes on the ocean shore. Of all fruit-bearing plants they are among the hardiest, being able to fight for existence among rough grasses and weeds, battling against harsh exposure and gales, and even salt spray from the breakers. . . . The foliage is dark green and heavy, tough and leathery in texture. The blossoms are large to very large, the male and female blossoms being borne on separate plants. This peculiar character, however, does not hold in the forms of the species found in other parts, those from South America being bisexual. The foliage of the southern form is also very distinct, being light green and fuzzy. Even such close points as Cape Mendocino and Point Arena have very different forms, while those from Alaska would hardly be recognized. The fruit varies as much as the plants in different regions. That from Chile and Peru is very large and often irregular in form, borne on long trusses, and of light pink or white color. . . . At Point Arena the fruit is borne on long trusses, is almost red, and is soft and fragile. At Cape Mendocino the fruit is pink, and borne on a very short truss."

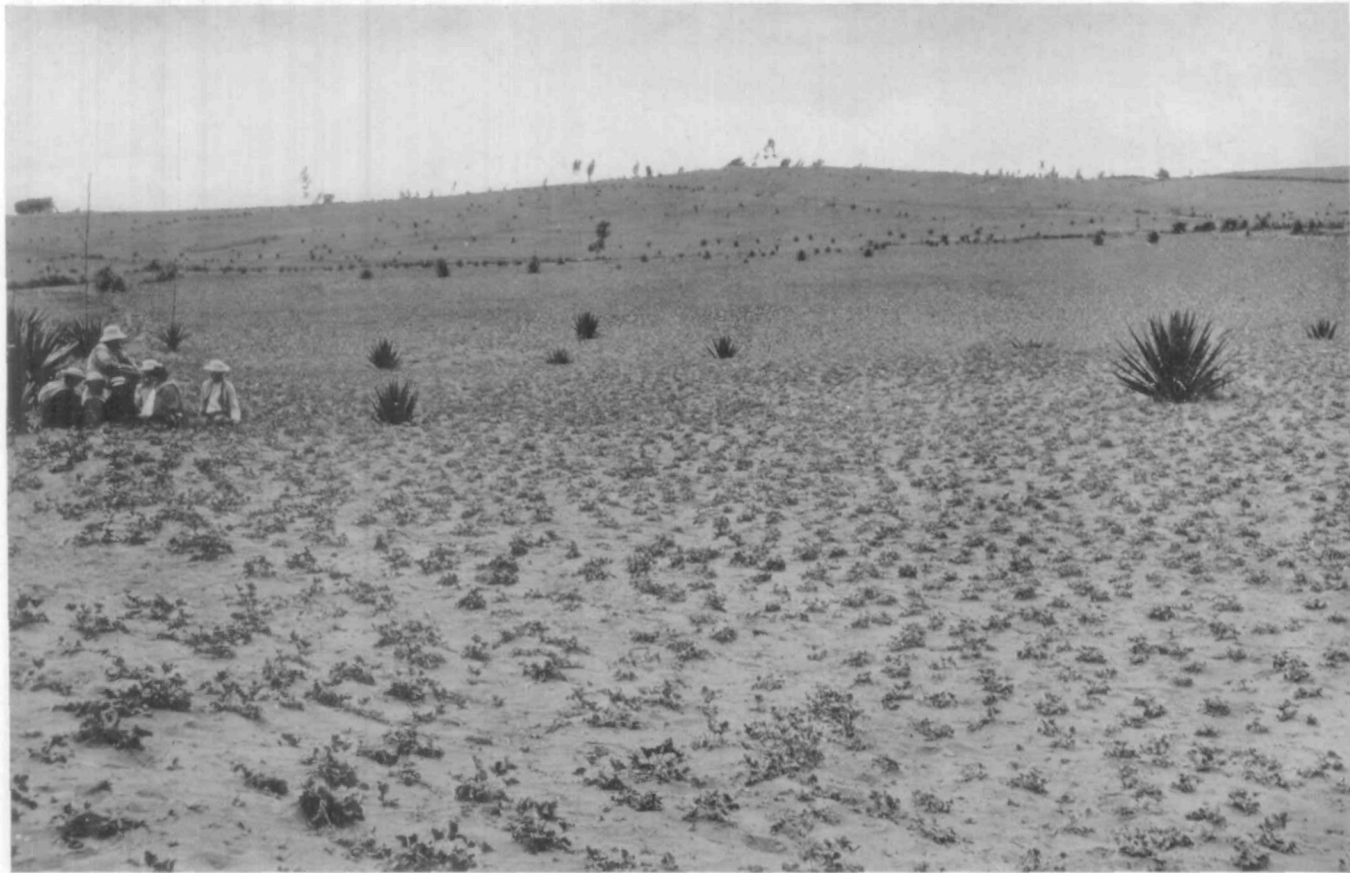
EARLY HISTORY IN SOUTH AMERICA

Nowhere in North America is *Fragaria chilensis* a cultivated plant. On the western coast of South America, however, it forms, in certain regions, an important culture, and has done so for several centuries. Frezier, who introduced the species into Europe, wrote in 1717 of its occurrence in Chile,³

¹Georgeson, C. C. Annual Report, Alaska Exp. Sta., 1909.

²Ettersburg Strawberries, published by the author at Ettersburg, California, 1920.

³Frezier, M. Relation du Voyage de la Mer du Sud. Amsterdam, 1717.



THE STRAWBERRY FIELDS OF GUACHI, ECUADOR

Probably the most extensive strawberry plantations in South America are those located at Guachi, near Ambato, Ecuador. This region lies at an elevation of about 9500 feet; the climate is dry, cool, and equable, and the soil is a very sandy volcanic loam. Little cultural attention is given the plantations, and they are never irrigated; nevertheless, they produce, throughout the year, fruits of large size and delicious flavor. It will be noted that the plants have a dry, stunted appearance; this is one of the characteristics of *Fragaria chiloensis* as grown in Ecuador. When planted on rich soil, and irrigated abundantly, it makes luxuriant growth, but produces few fruits. (Fig. 14.)

"They cultivate fields of a species of strawberry different from ours in having more rounded, thicker and more hairy leaves; the fruits are commonly as large as a walnut, and sometimes the size of a hen's egg; they are whitish red and a trifle less delicate in flavor than our wood strawberries."

The historian Garcilaso de la Vega⁴ records the introduction of the species into the highlands of Peru shortly after the Conquest. "Another fruit which they call Chili," he writes, "was brought to Cuzco in the year 1557. It is of very good flavor, and much used for presents. It is borne upon a low plant, almost trailing on the ground; it has little grains outside like the fruit of the madroño (*arbutus*) and is the same size, not round, but rather long, in the shape of a heart."

The Spaniards also carried the plant into Ecuador, though I have been unable to find any record of the exact year in which it reached that country. Father Velasco,⁵ writing in 1789, calls it *frutilla*, or *freza* quitense (Quito strawberry), and says that the fruit is two or three times the size of the European strawberry. He adds "It is produced through the entire year, and although it is common in several provinces, in no other is it so abundant, nor so excellent, as in that of Ambato." Later writers, also, have praised the strawberries of this favored portion of Ecuador. Richard Spruce,⁶ though mistaken as to the botanical identity and origin of the species, comments in the

following interesting manner upon it: "The Everbearing Andean Strawberry, from the highlands of Mexico, is doubtless one of those varieties of *Fragaria vesca*⁷ commonly cultivated throughout the Andes within the tropics, where the perpetual spring of that favoured region has had the effect of rendering the strawberry perennially fruitful, and many of the deciduously-leaved trees of Europe evergreen. In the equatorial Andes the province of Ambato is famed for its strawberries, which equal in size and flavour some of our best varieties, and are to be seen exposed for sale in the market-place of Ambato every day in the year."

THE STORY OF ITS INTRODUCTION INTO EUROPE

The introduction of *Fragaria chilensis* into Europe, because of the important part it was destined to have in the development of cultivated strawberries, is worthy of more than passing notice. M. Frezier, a French officer, visited Chile in the year 1712, and spent some time in the region of Concepción, where he had opportunity to become familiar with this fruit. The classic Duchesne⁸ gives the following account of his return to France and the successful introduction of the plant into that country:

"It is to the zeal and perseverance of this alert traveler that Europe owes this fine race of strawberries; I quote from his letter to me: 'I have returned,' says M. Frezier, 'in a merchant

⁴ In the "Comentarios Reales," of which the first part was published at Lisbon, in 1609, and the second part at Cordoba in 1617. This is one of the classic works on the history of Peru.

⁵ Velasco, Juan de. Historia del Reino de Quito en la America Meridional. Written in 1789, and published at Quito (Imprenta del Gobierno) 1844.

⁶ Notes of a Botanist on the Amazon and Andes, London, 1908.

⁷ While Spruce, who traveled in Ecuador during the years 1857-1860 (though his notes were not published until 1908), erred in considering this to be the species cultivated near Ambato, it is worthy of note that the true *F. vesca*, a native of Europe, has become naturalized in many parts of the Andean region, where it was doubtless introduced by the Spaniards at an early date. In the vicinity of Bogotá, Colombia, it grows abundantly at elevations between 6000 and 9000 feet, chiefly along roadsides and about cultivated fields, and the fruit is sold in the markets of the city nearly every day in the year. In Ecuador it occurs both wild and cultivated, but the fruit is not much used, the plant being esteemed more as an ornamental than for its berries. These are rarely more than half an inch long, and while somewhat dry, and at times possessing a slightly bitter taste, they are very good when stewed or made into a rich preserve, which latter is one of the favorite desserts of Bogotá. In parts of northern Ecuador *F. vesca* is called *frutilla*, but in the southern part of the country, where the true *frutilla* is grown, the correct Spanish name *fresa* is current.

⁸ Duchesne fils, M. Histoire Naturelle des Fraisiers. Paris, 1766. The first published monograph of the cultivated strawberries, and a work of great importance.

vessel of Marseilles, owned by the brothers Bruny, and on which they had placed as supercargo their nephew M. Roux de Valbonne, who, after the Captain, had charge of the fresh water which was carried on board, and which is very precious on a voyage of six months duration, through the Torrid Zone; so that, if he had not been generous enough to have the plants, which were in a pot of soil, watered, it would not have been possible to keep them alive until we reached Marseilles.⁹ Five of them arrived in good order, of which he took two, while I reserved three for myself. On my arrival at Paris, I gave one of these to my friend M. Antoine Jussieu, to be planted in the Royal Garden; one to M. le Pelletier de Souzy, our minister of fortifications, and the third I retained." Frezier later published, in his "Relation du Voyage de la Mer du Sud" a drawing of the plant and its fruit, with the title, "Fragaria chiliensis, fructu maximo, foliis carnosis, hirsutis, vulgo frutilla" and below, "Fraise du Chili dessinée de grandeur naturelle."

Duchesne remarks that, after the introduction of these five plants, "the *frutillar* was soon disseminated throughout Europe." In his discussion of the establishment of the species in France, he accounts for only three of the five specimens brought by Frezier. The two which were taken by M. Roux de Valbonne do not again figure in the story. Very soon after its introduction, the species was cultivated commercially in the vicinity of Brest, but in 1766 its importance had greatly declined, according to Duchesne, because the plants were unproductive. Evidently many of them were pistillates, instead of hermaphrodites; in fact, Duchesne thinks that all of them may have been so, and that fruit was only produced when they were supplied with pollen from one of the other species then cultivated in France. So far as I have observed, the plants cultivated in Chile, Peru and Ecuador always produce perfect flowers; can it

be that the unaccustomed climatic conditions to which they were subjected in France caused them to abort the stamens?

At this point it is of interest to consider the derivation of the name given to the species. Frezier, who published his book in 1717, calls it "Fragaria chiliensis," while Duchesne, who monographed the strawberries in 1766, changes it to "Fragaria chiloensis." The island of Chiloe, which lies off the coast of Chile between latitudes 42 and 44 S., approximately, is one of the regions in which this large-fruited form occurs as an indigenous species, and the logical assumption would be that the specific name *chiloensis* was formed from that of the island; yet Duchesne says nothing to this effect, and the fact that Frezier, in his earlier work, uses the form *chiliensis* shows that he, at least, desired to name the species after the country, Chile, instead of for the island, Chiloe.

Several authors give *quelghen* as the indigenous name of the fruit. *Frutilla* is the term universally employed for the species by Spanish-speaking people on the western coast of South America; the Spanish name of the European strawberry, *fresa*, is reserved for the fruit of *F. vesca*. A strawberry field, if the plants are of the *chiloensis* species, is termed a *frutillar*, and there is a town by this name in southern Chile. In the United States the names Chilean strawberry, sand strawberry, beach strawberry, and probably several others have been applied to the species.

PRESENT STATUS OF FRAGARIA CHILOENSIS IN SOUTH AMERICA

The horticultural importance of this strawberry in South America is considerable. I have not been in Argentina to determine whether or not it is cultivated there, but on the western side of the continent it is grown in nearly every country. Beginning in the north, it is cultivated in the vicinity of Bogotá, Colombia, though not extensively so. In the months of Decem-

⁹ The 17th of August, 1714, according to J. H. Blanchard, who gives a detailed account of the Frezier voyage in the Journal of the Societe Centrale d'Horticulture de France, XII, p. 628, Paris, 1878.



A GROUP OF ECUADOREAN STRAWBERRY PICKERS

Fragaria chiloensis is the most remarkable of all strawberries, in so far as shipping qualities are concerned. It is the custom, in Ecuador, to throw the fruits into boxes such as the one here shown: they are then carried six or seven miles on mule-back to the city of Ambato, where they are sorted by hand, and packed in baskets holding two to six quarts, for shipment by train to Quito or Guayaquil. There is probably no other strawberry in the world which would tolerate this sort of handling. (Fig. 15.)



THE CHILEAN STRAWBERRY IN THE HIGHLANDS OF PERU

In the valley of the Rio Urubamba, not far from Cuzco, the ancient capital of the Incas, the Chilean strawberry is grown on an extensive scale. Many of the plantations, including the one here shown, have been made upon *andenes* or agricultural terraces which were constructed in prehistoric times. In this region, which lies at an elevation of about 9000 feet, *Fragaria chiloensis* does not fruit throughout the year, as it does in Ecuador. This photograph was taken near the village of Yucay, looking down the valley toward the town of Urubamba. (Fig. 16.)

ber and January the fruits are occasionally offered in the markets of that city, prepared for sale in a unique fashion: they are gathered with long stems, and then tied together one above the other to form strings a foot or two in length. The common name *fruta de Chile* is applied to the species in this region.

I have not seen the species in the western part of Colombia, but farther south, in the highlands of Ecuador, it is extensively cultivated, mainly in the region of Guachi, a settlement not more than six or seven miles from Ambato. Here the plants bear fruit throughout the year,—a characteristic which they do not exhibit in Peru and Chile, probably because of the utter lack, in Ecuador, of well-defined seasons.

Guachi lies at an elevation of 9500 to 10,000 feet, and is a series of rolling hills, almost devoid of trees, with a soil which can be characterised as a very loose, fine, sandy loam of volcanic origin. The strawberry plantations cover an area of at least 60 acres; the plants are never irrigated, and the rainfall is probably not more than 15 inches per annum. The temperature is rarely higher than 65° or 70°; and seldom lower than 35° F. above zero. Severe frosts are unknown. Three times a year the fields are cleaned of weeds with a heavy hoe, this being the only cultural attention which they receive. The plants never grow to large size. The natives assert that when irrigated they make luxuriant growth, but do not yield abundantly nor is the fruit large and sweet; and this has, indeed, been observed by me to be the case when plants from Guachi are taken to Ambato and there grown on rich loamy soil under good cultural conditions.

The fruit is harvested at Guachi once a week throughout the year. There are, however, three seasons when the most abundant yield is obtained, these being in February, in August, and in December. The method of handling the berries is primitive; they are carried to Ambato in wooden boxes holding 30 to 35 quarts. Women in the market place grade them by hand, and pack them in baskets of

varying sizes, for sale to passengers on the Guayaquil—Quito trains which pass through the town, or for shipment to these and a few other points.

In size, shape and other characteristics the strawberries of this region are remarkably uniform. They are oblong-conical in outline, sometimes oblong-ovoid, and from one to two inches in length. When fully ripe they are light red in color, with firm, meaty, pinkish white flesh. The flavor is perhaps not quite so aromatic and sprightly as that of some of our best North American and European strawberries, but it is very delicate and pleasant. For canning and shipping purposes the Guachi strawberry far excels any of our own. What sorts have we, may I ask, which could be thrown into boxes holding 30 to 35 quarts, carried seven or eight miles on mule back, worked over by hand and packed in two to six-quart baskets, and then shipped down to a tropical seaport, there to be kept in the market for two or three days at a temperature of 70 to 85 degrees? Even with such treatment as this, the Guachi strawberry holds up well, retaining its shape and texture to an extent altogether unknown among northern strawberries. This same characteristic shows up strongly when the fruit is canned or preserved; the berries retain their form and size nearly as well as do peaches,—far surpassing in this respect any of our North American strawberries—and have a very delicate flavor. In comparing a tin of the preserved fruits brought from Chile, however, with a good North American pack, and with preserved strawberries of the Portia variety, George M. Darrow and myself both thought chiloensis, as represented by this sample, not so richly flavored as the best of our own sorts. It has delicacy, and, in the fresh state, a delightful, though rather faint, aroma; but it has not sufficient acidity to make a really excellent canned fruit.

CULTIVATED IN THE HIGHLANDS OF PERU

In Peru, there are numerous plantations of *chiloensis* in the valley of the



A STRAWBERRY FIELD IN CENTRAL CHILE

Near the town of Quillota, not far from Valparaiso, *Fragaria chiloensis* is extensively cultivated to supply the canning factories which have been established in this region. Here is shown a young peach orchard in which strawberries have been planted as a secondary crop. Chilean growers irrigate their strawberry fields, and as a consequence, the plants make more luxuriant growth than they do on the dry plains of the Ecuadorean highlands; but the fruit produced is perhaps not so highly flavored as that of Guachi, Ecuador, nor do the plants bear throughout the year as they do in the latter region. The ripening season in central Chile extends from the first of December to the end of January. (Fig. 17.)

Rio Urubamba, not far from the city of Cuzco, at elevations of 9000 to 9500 feet. Several of the best are near the village of Yucay, on large *andenes* (artificial terraces) built in the days of the Incas. Here the plants are more vigorous in growth than at Guachi, but the fruiting season is not nearly so long; I am told by T. E. Payne of Calca that the first fruits ripen about October 20, and the last ones about the end of January. The crop is marketed in Cuzco. I was not able to see ripe fruits grown in this region, but from descriptions given me I judge they differ very little from those of Ecuador.

In central Chile there are numerous plantations, from which the fruit is either shipped to the markets of Santiago or used for canning and preserving. In one field which I examined, not far from Santiago, the plants were exceedingly robust and vigorous in appearance, both leaves and flowers standing upon stems six to ten inches long. The appearance of such plants is quite different from those of Guachi, Ecuador, where the leaves rarely stand more than three or four inches above the ground, and where the plants have a dried-up, starved appearance, but where, nevertheless, excellent fruit is produced throughout the year. In Chile, as in Peru, only one crop is obtained. The principal season in the vicinity of Santiago and Quillota is said to be December and January.

Two varieties are commonly recognized in Chile,—the common, light red one, and the *frutilla blanca*, whose fruit is ivory white to very pale pink. The red form is cultivated far more extensively than the white. From having examined the canned product, I judge that the size and character of the Chilean-grown fruits is not markedly different from that of the Guachi berries, but I am inclined to believe that the latter may be a little sweeter and more delicately flavored. There are several canning factories in central Chile, which turn out preserved strawberries as well as strawberry jam.

Because of the fact that no attention

has been given to isolating good varieties of this berry, and because of the general confusion which surrounds horticultural matters in western South America, it is impossible to state just how many distinct forms of *chiloensis* exist in the several countries above considered. Certain it is that few well defined varieties are generally propagated or recognized by the inhabitants. In this connection it may be mentioned that a given variety of strawberry may sometimes change its shape and character when grown in different climates. Klondike, for example, is conic in Florida, globose farther north, and long conic and necked in California. Marshall bears but one crop in New England, but fruits throughout the summer in California. We can not assume, therefore, that the long fruiting season of the Guachi strawberry really constitutes a difference between that variety and the one grown in Chile; it is doubtless an effect of the almost total absence of well-defined seasonal changes, either of temperature or rainfall, which prevails on the Equator.

PROBABLY THE WORLD'S OLDEST CULTIVATED STRAWBERRY

Fragaria chiloensis of western South America is certainly one of the oldest cultivated strawberries in the world. I have seen no reference in literature to its horticultural status at the time of the Conquest: the indigenous inhabitants may have cultivated it since time immemorial, and even if they did not, it can safely be assumed that it has been grown in gardens since the colonization of Chile by the Spaniards. In all this time only two well-defined varieties seem to have appeared, the red-fruited and the white-fruited. The first-named has been cultivated continuously in the highlands of Peru since 1557,—nearly four centuries. This offers a rather striking refutation of the argument that strawberry varieties "run out." Those which have been produced by hybridization may change their character or "run out" in a relatively short time,—I do

not know the facts of the case,—but certainly it cannot be said that the red-fruited form of *F. chiloensis* which is cultivated in Peru and Ecuador shows any signs of so doing!

Duchesne writes of this species that it is more robust, and larger in all its parts, than any of the other strawberries, and that it makes the slowest growth of all, some plants not flowering until they are five years old. It does not produce runners as freely as the horticultural varieties now grown in North America. The flowers, particularly those which appear at the beginning of the season, stand high above the ground on thick, hairy stems, and are fully an inch in diameter. When a field of this species is in full bloom it is almost as fragrant as an orange grove.

Fletcher,¹⁰ in describing the principal characteristics of *F. chiloensis*, says: "The plant is large, stocky, densely hairy, with large blossoms. It throws out a moderate number of short, stout runners mostly after the fruit has matured. The roots are rather thick, fleshy, and usually are more superficial than those of *F. virginiana*. When a plant grows in the same place for several years the crown does not divide low down, as in *F. virginiana*, but makes several large crowns high up, all attached to the main root stalk. The plant is pushed upward out of the soil and new roots form above the old ones."

We have it on Duchesne's authority that the stamens are abortive, and that no pollen is produced. This certainly is not true of the species as it grows in South America. The fruits, because of their large size and unusual texture, have been, and will continue

to be, of great interest to strawberry breeders in North America, Europe, and other regions. It is doubtful if the varieties which are cultivated in South America will be of great value to us, for commercial purposes, until they are crossed with forms better adapted to our climatic conditions. There is no region in the United States with a climate approximating that of Guachi, Ecuador; the distance which separates us from the Equator precludes all possibility of such a thing. We can not, therefore, expect the Guachi variety to fruit throughout the year in any part of this country.

Certain sections of California are very similar to central Chile, in so far as climate and soil are concerned. The region of Santiago has about the same summer climate as Los Angeles, and a winter which is sometimes, but not often, a few degrees colder. The Chilean varieties may, therefore, succeed in southern California, but if they produce fruit only during two or three months of the year, as they do in Chile, they will not be commercially valuable to us. They will, however, be useful to breeders, and from this point of view the value and importance of the horticultural forms from South America cannot be over-emphasized. They will give size, texture, and perhaps, ability to resist drought, to many of our important strawberries of the future. One breeder goes even further: Albert F. Etter of California, whose work in strawberry improvement is noteworthy and entitles him to speak with more than ordinary authority in such matters, ventures the prediction that the "most exquisite flavors the strawberry will ever know will be derived from the various forms of the *chiloensis* species."

¹⁰ Fletcher, S. W., *The Strawberry in North America*, New York, 1917.