

Origin of the Cultivated Races of Avocados

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Some twenty years ago, when I first began to explore tropical America for promising horticultural forms of the avocado, on behalf of the Office of Foreign Plant Introduction of the U. S. Department of Agriculture, I began also to look for wild avocados, hoping that ultimately we might learn more about the origin and history of this interesting and important fruit.

Since then, nearly every year has added a few new facts: from time to time some of these have been published, while others have lain in my files, waiting for the day when we could attempt a general treatment of the subject with the feeling that all necessary data had been brought together. It is becoming pretty obvious that this day will never arrive, at least during my own lifetime. I do feel, however, that the picture is considerably clearer than it was twenty years ago, and it seems worth while to set forth what we know about the subject at this time.

THE PROBLEM

Horticulturally, we are concerned with three fairly well-defined races of avocados, which we have long been accustomed to term the West Indian, Guatemalan, and Mexican. Did these three originate from one common wild ancestor, and have they become differentiated through long cultivation in separate regions? If they did originate from a common wild ancestor, is this to be found in the wild state today, and if so, where, and what is it like?

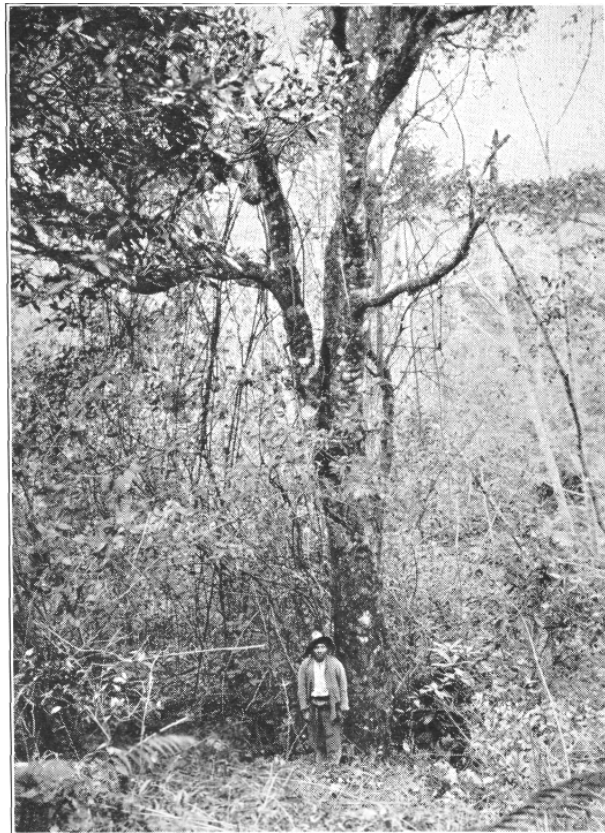
Or, on the other hand, did these three races originate, so far as horticulture is concerned, in three distinct wild forms; and, if so, what are these forms and where are they found? Are they distinct species of *Persea* or are they merely geographical expressions of a single species, *Persea americana*?

GEOGRAPHIC DISTRIBUTION OF THE AVOCADO

The first thing to be done in attacking this problem, was to get an accurate idea of the geographic distribution of the avocado at the time of the Discovery of the New World. With this information in hand, our search for wild forms could be confined to territory in which there was at least a possibility of finding them. Early botanists, basing their statements on the fact that the avocado was cultivated in the West Indies by the time serious botanical work began to be undertaken in that region (XVII century), made the assumption that it was native there as well as on the mainland of tropical America, and this belief seems to have persisted pretty generally until G. N. Collins, in 1905, reviewed

most of the accounts written by the early chroniclers, and showed conclusively that the tree was unknown in the Islands until after the Spanish conquest.

In preparing the botany of the avocado for Professor Bailey's Standard Cyclopaedia of Horticulture, about 1910, I summarized the state of our knowledge at that time by saying: "Certainly indigenous in Mexico and Central America, extending perhaps to northern South America." When I wrote this, we did not have much real evidence regarding the existence of the tree in a wild state anywhere in tropical America. I think everyone felt that it **must** be indigenous in Mexico, just because it was known to have been cultivated there in pre-Columbian times by the Indians. If any botanist had mentioned trees still growing in an indigenous condition, thereby establishing satisfactorily the native character of the tree in Mexico, I am not aware of it. It seemed reasonable to believe the tree was native there, and we did so.



THE WILD AVOCADO OF TECPAN
*A tree growing alongside a small ravine at Chichavac, near Tecpan,
Guatemala. Elevation about 8500 feet above sea level.*

But we had a very vague idea as to how far south the avocado might extend as a wild tree. Indeed we did not know it as a wild tree at all, as I have just mentioned; but we assumed it might have been found southward into Central America, and that it might even have extended into northern South America. We knew that Garcilaso de la Vega had preserved the Inca tradition regarding its introduction into Peru from the warm

valleys of Ecuador, about 1475; therefore we assumed that it was not native farther south than Ecuador, at most. And all the evidence pointed toward the belief that the tree was not known to the eastward of Venezuela in pre-Columbian times.

Summarizing the situation, then, in the light of the early chronicles and other evidence, we have reason to believe that avocados were grown at the time of the Conquest, from northern Mexico southward through Central America into northwestern South America, extending southward in the Andean region as far as Peru (where the tree had been introduced, however, shortly before the Conquest) and eastward into the Andean region of Venezuela. It is, therefore, in this area that we must search for the wild ancestor or ancestors of our present cultivated races.

BOTANY OF THE CULTIVATED RACES

A quarter of a century ago, all avocados were considered to be horticultural forms of *Persea gratissima* Gaertn. We all liked this name: Gaertner had given it to the species in 1807, and we had become fairly well used to it. And that flattering term *gratissima*, "most grateful," just suited us enthusiasts who felt that the avocado was God's greatest gift to humanity.

Then someone came along and showed that Miller, in 1768, had used the name *Persea americana* in writing of the avocado, and on the accepted grounds of priority we had to give up *gratissima* and take over *americana*; which however was not so bad as it stamped the fruit as American even if not most grateful.

But the Mexican race of avocados, with anise-scented leaves and thin-skinned fruits, did not quite fit into the scheme of things. In fact, the botanists Schlechtendahl and Chamisso had described it in 1831 as a distinct species, *Persea drymifolia*, and some of us thought this was a pretty good idea. When I published my "Manual of Tropical and Subtropical Fruits" in 1920, I pondered this matter at length, and finally went on record as accepting this specific distinction,—a thing I have lived to regret. My colleague, Sidney F. Blake of the U. S. Department of Agriculture, who made a "Preliminary Revision of the North American and West Indian Avocados" at the same time (published in the Journal of the Washington Academy of Sciences, Vol. 10 No. 1), chose to consider the Mexican race as a botanical variety of *Persea americana*, following the lead of Carl Mez, who had monographed this group of plants in 1889.

At the same time, in working over the considerable number of botanical specimens which we had brought together at the Office of Foreign Plant Introduction in Washington, Blake found that the well-known Trapp avocado of Florida differed from all others represented by the specimens he had at his disposal, in that the floral parts were almost glabrous. In others, they showed varying degrees of pubescence. Since this constituted a good botanical distinction, Blake made a new species of Trapp, calling it *Persea leiogyna*. He and I had a good many arguments over this at the time; I felt that Trapp was nothing more than an extreme form of the ordinary *P. americana*: that he would find, if he waited long enough, other varieties of avocado with glabrous floral parts just as we already had varieties of the other extreme,—i. e., heavily pubescent floral parts. I believe this has since proved to be the case, and I doubt that *P. leiogyna*,

as a botanical species, will survive the test of time. In the present discussion, we shall leave it out of consideration, just as we shall leave *P. drymifolia* to one side. So far as my own conception is concerned, I have reached the opinion that all cultivated avocados are horticultural forms of *P. americana*; and their wild prototypes (of which more later) are geographical forms of the same species.

Before leaving this subject, it may be well to mention one or two other points of botanical interest in connection with a general study of avocados, wild and cultivated. Carl Mez described a form, *P. gratissima schiedeana*, which puzzled us for a long time. I don't imagine he had much botanical material at his disposal, or he would have seen how widely this differs from *P. gratissima* (now *P. americana*). After I had collected material of this tree in southern Mexico and in Guatemala, where it is known as *chinini*, *coyo*, and *chucte*, it did not take long for the botanists to realize that it is a perfectly good species, entitled to stand on its own feet, as was recognized by Nees in 1836 when he described it as *P. sciedeana*. Though strikingly similar to the avocado in its fruit characteristics, this is not a true avocado, and will not enter into consideration in connection with the history of the cultivated races. It is a wild and cultivated tree in Central America as well as in southern Mexico, and occasional varieties are found which are well worthy of propagation; but I am convinced the species has nothing to do with the ancestry of the cultivated avocados. In the treatment I prepared for Bailey's cyclopedia, I listed this plant, which I had not then seen, under the doubtful name of ***Persea frigida***. And in my "Manual of Tropical and Subtropical Fruits," I mentioned *P. pittieri*, the yas of Costa Rica, which has since been shown to be nothing more nor less than *P. sciedeana*.



THE WILD AVOCADO OF TECPAN
*Fruits and foliage from a tree growing in the forest at Chichavac,
near Tecpan, Guatemala. Natural size.*

GEOGRAPHICAL FORMS OF THE WILD AVOCADO

So much for the botany of the avocados: I shall now attempt to show that the cultivated races, Mexican, Guatemalan, and West Indian, (the latter should have been called South American for accuracy's sake), all of which I consider to be forms of a common species, *P. americana* Mill., are in all probability derived from prototypes which still exist in a wild state in tropical America.

Though the avocado is a cultivated fruit tree, and has been under the influence of man for many years, by comparison with the wild forms which I shall shortly describe, it does not appear to have been greatly altered by cultivation, except with regard to the one thing in which man is interested, i. e., the edible portion. Still, if we had to assume that the present cultivated races had all been derived from one common ancestral form, then it would also be necessary to assume a very long period of cultivation in order to

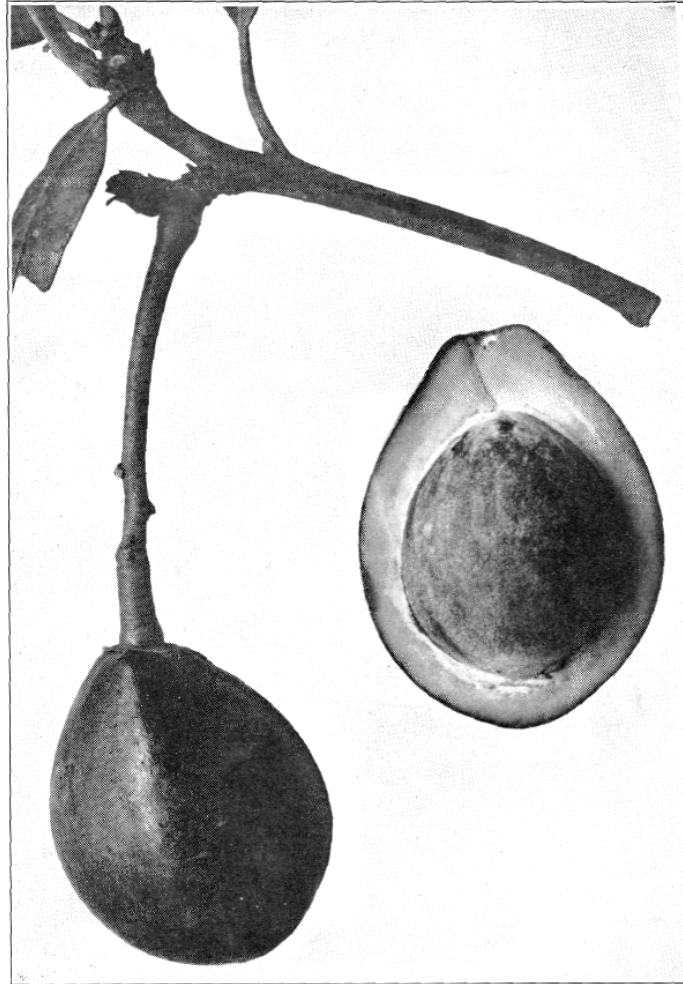
account for the changes which have taken place. In the light of the evidence now at hand, however, nothing more than selection for fruit size and quality, carried out over no very long period (speaking in terms of plant evolution), would be required to give us the varieties we have today.

How long ago did the indigenous inhabitants of the American tropics bring wild avocados into domestication? This is a question we cannot definitely answer; but it is an interesting theme on which to speculate. At least with regard to the Mexican and Guatemalan races, cultivation has produced no very radical changes; more or less conscious selection has increased the size of the fruit, and the proportion of edible pulp to seed. That is about all. I see no reason why it should take more than a thousand years to achieve the end which has been gained, even under the conditions which obviously have existed; for it cannot be considered that "cultivation" as practiced by the Indians of Mexico and Guatemala is the same thing as the intensive treatment which we give today to many of our horticultural crops. We are constantly weeding out the poor, and perpetuating the good. We do this on a big scale. We hasten the process of improvement by plant-breeding methods.

What did the Indians do? It is reasonable to assume that their ancient practices differed little from those of the present day. Their fruit trees were rarely planted in orchard form. They sprung up in dooryards, where a chance seed had been dropped; or, more rarely, they were planted intentionally, in which case it would have been natural for the planter to select a seed from a specimen which, for reasons of abundant pulp, or rich flavor, pleased his fancy.

Nevertheless, if cultivation, of the sort practiced by the indigenous inhabitants of Mexico and Central America, has brought about relatively slight changes in the wild avocados with which they started, I believe we can at least feel that the improvement, from the standpoint of man, has been greater than it has in several other species which have been cultivated side by side with the avocado. Take for example the zapote, *Lucuma mammosa*; it still grows abundantly as a wild tree in northern Guatemala and southern Mexico, and the fruit produced is closely similar in size, quantity of edible pulp, and flavor, to that produced by trees "cultivated" in the gardens of the Indians. The same is true of several species of *Annona*; of the guavas; and so on.

But let us have done with speculation and turn our attention to the wild avocados. We have to deal with (1) the wild avocado of Orizaba in Mexico, which I believe to be the prototype of the Mexican race of cultivated avocados; (2) the wild avocado of Tecpan, Guatemala, which seems almost certainly to be the prototype of the Guatemalan race; (3) the wild avocado of San Isidro, near San Jose, Costa Rica, found also in the lowlands of Honduras and probably elsewhere, a form not so obviously connected with the development of cultivated avocados, but which **may** have been the prototype of the West Indian race; and (4) the wild avocado of Santa Marta, Colombia, regarding the indigenous or primitive character of which I do not feel quite certain.



A PRIMITIVE FORM OF THE MEXICAN AVOCADO

This fruit, shown natural size, grew upon a tree which was found in what appeared to be a wild state, on the slopes of the Volcan de Agua in Guatemala, at an elevation of about 6000 feet. It probably differs in no important respect from many of the wild avocados found near Orizaba, in Mexico.

1. The wild avocado of Orizaba—

The anise-scented, small-fruited, thin-skinned avocados which we group together as the Mexican race are cultivated widely in the Mexican highlands. Since pre-Columbian times, native Mexicans have distinguished them from the thick-skinned avocados (Guatemalan race) by calling the one **ahuacatl**, the other **pahua**.

How widely this tree occurs in a wild state, I am unable to say. In believing it to be indigenous in Mexico, I am relying mainly on the observations of a very competent botanist, Dr. C. A. Purpus of Huatusco, not far from Orizaba, in the state of Vera Cruz. When I was in Mexico in 1918, I saw many avocado trees around the town of Orizaba, and noted that their fruits were unusually small and primitive in character. But I was not able to get far enough from civilization to convince myself that this form is truly indigenous in the region. Under date of 13 January 1927, however, Dr. Purpus, with

whom I had been in correspondence on this subject, wrote me: "Avocados grow wild here, everywhere in the potreros (pastures), the open forests, etc. The fruit of this wild tree is very small, about half as large as a hen's egg, sometimes a little larger; the shape is sometimes roundish, sometimes that of an egg."

On my first trip to Guatemala, in 1916-17, I found a single tree of this race, growing at about 6000 feet elevation on the slopes of the Volcan de Agua. I later found a few trees cultivated in the nearby town of Chimaltenango, but I was never able to find them anywhere in Guatemala, growing abundantly in what I felt certain to be a wild state. From what I have seen myself, and what Dr. Purpus writes, I have no doubt that we can consider the lower slopes of the Volcano Orizaba, in Mexico, the native home of this race of avocados. Its distribution may be, and probably is, considerably more extensive.

I figured this form, and mentioned it briefly, in my article, "Wild Avocados," published in the 1927 Year Book.

Before considering the job complete, I would like to re-visit the Orizaba region and obtain more data regarding the distribution and characteristics of the wild trees. But I do not believe there can be much doubt as to their representing the wild form of the Mexican race. So far as I have seen, they differ from the cultivated varieties only in size of fruit.

2. The wild avocado of Tecpan—

For years I was unable to account for the origin of the Guatemalan race of avocados in any logical manner. No wild form was known which answered the requirements. The tree had to be fairly hardy and free from anise-scent; the fruit had to be thick-skinned. When Oton Jimenez and I reported the wild avocado of San Isidro, Costa Rica (see the 1920-21 Year Book of this Association), we thought we might have hit upon the wild ancestor of the Guatemalan and West Indian races. Of course, the wish was father of the thought. It was pretty hard for us to swallow the hard shell **plus** the anise-scent; for as every one knows, no horticultural race has both of these characteristics at the same time.

My attention was first called to the wild avocado of Tecpan by Axel Pira about 1930. He told me of wild avocado trees which grew on his property, high up in the mountains between the towns of Tecpan and Solola. Little by little I have been able to get further information, mainly through several visits to the region, and through the continued assistance of Mr. Pira.



THE WILD AVOCADO OF SAN ISIDRO

Fruit and foliage, natural size, from a tree growing in an indigenous condition in the region known as La Palma, not far from San Isidro, Costa Rica.

The region where I have personally seen this avocado is one of the most picturesque in a land of picturesque regions. High on the mountainsides, at elevations between 8000 and 9000 feet, the wild avocado grows among pines, oaks, and the beautiful Guatemalan cypress botanically known as *Cupressus benthami*. I have never seen any other avocado, wild or cultivated, at this high elevation. The cultivated forms are occasionally grown at 8000 feet in Guatemala, but I have never seen them at 9000; and at 8000 they sometimes get caught by frost.

The tree reaches large proportions; I have not been able to measure the height, but have seen specimens with trunks at least four feet in diameter at the base. The fruits are nothing but miniature avocados of the Guatemalan race; they are usually oblate in form, not more than two inches thick, with the characteristic woody skin and a relatively large seed. I cannot see where they differ from their cultivated cousins except in the

size of the fruit; and I feel confident that it is from this wild form that cultivated avocados of the Guatemalan race have been developed.

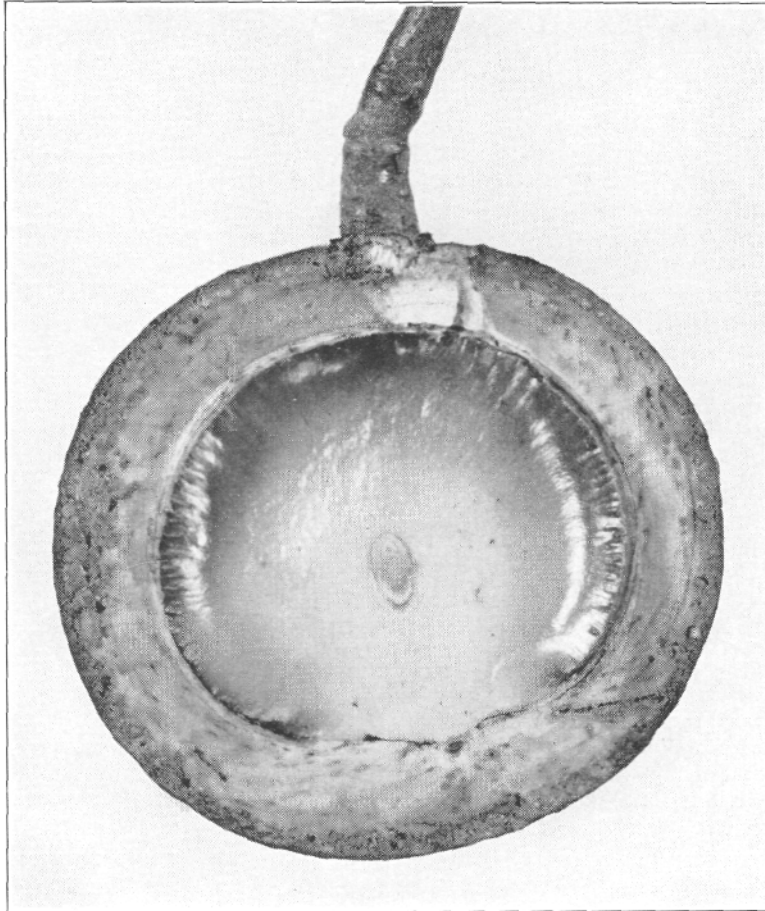
How widely this tree may occur in Guatemala I do not know. So far, I have been able to find it only in the Tecpan region, but it probably exists elsewhere. I doubt very much that it occurs to the south of Guatemala, as there are few regions presenting similar conditions of altitude and climate, until Costa Rica is reached. I have never seen nor heard of it in that country; and Costa Rica has been pretty thoroughly botanized, so that it should have come to light by this time if it is there.

3. The wild avocado of San Isidro—

It is not necessary again to describe this form in detail, since I published a description of it in Inventory No. 63, of the Office of Foreign Plant Introduction, U. S. Department of Agriculture; since it was discussed in my article "Wild Avocados" in the 1927 Year Book. Suffice it to say that this form occurs from Honduras at least as far south as Costa Rica (I have never seen it in Colombia but have heard accounts which lead me to believe that it exists there); in Honduras I have personally seen many specimens in virgin forest, at elevations from a few hundred to about 2000 feet above sea level, while in Costa Rica, Oton Jimenez and I saw it only in a region not far from San Jose, at elevations between 4500 and 5000 feet. The tree has much the same appearance as that of the Guatemalan race, but the leaves and bark are strongly anise-scented. The fruit is oblate, about the size of a tennis ball, and has a very hard, granular shell, enclosing a very large seed and a small quantity of flesh which usually has something of an anise-flavor and which contains granulations which seem to be derived from the inner surface of the shell. It is not much good to eat.

The geographical distribution of this form lends strength to the contention that it may have been the parent of the cultivated West Indian race. But if this is the case, cultivation has in this instance brought about considerably greater changes than in the two previously described forms, the Mexican and the Guatemalan. The anise-like odor, pronounced in the bark, leaves, and fruit, has disappeared entirely, for there is none of it in present-day varieties of the West Indian race, so far as I have ever been able to observe. How long it would take to produce this change I do not know.

But the facts still remain that we have, in this form, an avocado which botanically does not differ from *Persea americana* as generally recognized; and which, in an unquestionably indigenous state, exists in the Caribbean lowlands of Honduras, at moderate elevations on the Caribbean watershed of Costa Rica, and almost certainly elsewhere in the Caribbean region,—the area in which we would naturally look for the origin of the West Indian race of avocados; and that, given an adequate period of time, it seems quite possible for this wild form, brought under the influence of even primitive cultivation, to give rise to such varieties as are today found along the shores of the Caribbean.



THE WILD AVOCADO OF SAN ISIDRO

A specimen cut in half to show the thickness of the shell, and the size of the seed. Natural size.

4. The wild avocado of Santa Marta—

I first visited the region of Santa Marta, Colombia, in 1919, when engaged in hunting for new avocados on behalf of the Office of Foreign Plant Introduction. Before starting on the trip, I had seen in the herbarium at Washington a botanical specimen of *Persea americana* collected in the mountains back of Santa Marta by H. H. Smith.

When I reached that region, therefore, I was anxious to hunt for wild avocados on the slopes of the Sierra Nevada. At an elevation of about 2000 feet, I found avocados forming almost solid stands several acres in extent. The crop had mostly ripened, and many half-rotten fruits were lying on the ground. From these I could see that they were typical "West Indian" avocados in form and character, though smaller than we would usually expect in cultivation. They were light green in color, mostly pyriform in shape, and between 8 and 12 ounces in weight.

I did not have opportunity to explore a very wide area; and the fruit was so much like the

cultivated West Indians that I decided the trees must be escapes. This opinion I retained for several years, until recently, when, in connection with my work for the United Fruit Company, I have had occasion to revisit Santa Marta many times and have become more familiar with the facts, which are these:

Avocados grow in an apparently wild state on the slopes of the Sierra Nevada de Santa Marta between elevations of 1000 and 4000 feet (I am not certain of these limits); in many places they are so abundant as to form almost solid stands over small areas; in character of tree and fruit they are typical West Indian, except that the fruit is commonly smaller than that of most cultivated forms.

The more I have seen of these trees, the more I have come to feel that they **may** represent a truly indigenous form. Opposed to this belief is the relatively large size of the fruit (which suggests that they have been in cultivation, and at present are nothing more than escapes); and the very considerable range in size, form, proportion of edible pulp, and a few other characters, which variation in what we may term horticultural characteristics, also suggests that the trees are escapes. Indians have occupied this region for a long time. They have scattered seeds along the trails through these mountains, just as has been done in other parts of tropical America; and the avocado may have found, in this particular region, natural conditions so favorable that it has been able to grow and reproduce itself freely, until we have the small forests of avocados which today exist.

I hope to make further visits to the region in which these trees grow, in order to convince myself one way or the other. If the trees are truly indigenous here, then we have, undoubtedly, the wild prototype of the West Indian race, and the wild avocado of San Isidro simply takes its place as a geographical form of *P. americana*, one of at least four which are known to occur (others may yet be discovered), but **not** one which has taken part in the development of present-day horticultural varieties of the avocado.