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The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

[June 1970]

Dr D Maggs CSIRO
Division of Horticultural Research
Merbein, Victoria, Australia

My dear Sir:

Unfortunately I have to start off by begging your pardon for the long delay in answering your extremely interesting letter of 19 February, on a subject which is so close to my heart that I should have answered it the day it was received. ~~Ever since that day in November 1911 when I grafted (shield-budded) the first Fuerte avocados trees which were ever propagated I have been a fanatic on the subject of avocados.~~ As you perhaps know, my father had sent Carl Schmidt to Mexico to hunt good avocados for California and I was the propagator in our nursery, the West India Gardens, at Altadena California.

You ask whether I still regard *P. americana* as a single comprehensive species, and how far ^{we can} you consider introgression from the "fringe" species (e.g. *P. schiedeana*) from various ^{localities} as the main cause of the great variation found in *P. americana*.

To answer your question I am going to ~~introduce~~ ^{discuss} indulge ^{briefly} myself in a dissertation on the systematics of the *Perseas*, a subject on which I haven't the slightest right to an opinion, but it happens that in the past few years I have been thinking and talking a lot about wild avocados, due largely to Louis Williams' description of two ~~wild~~ ^{names} forms, which he has called *P. nubigena* and *P. gigantea*, and Lucille Kopp's "Taxonomic Revision of the Genus *Persea*", Vol. 14 No. 1 of the Memorials of the New York Botanical Garden, ~~xxx~~ published 15 March 1966. I suppose you have seen this. If you will want to get it.

wild enough, ~~to me~~. ⁴ Too much variation in ^{size and shape of} ~~fruit~~ ^{never}

Until recent years we thought the avocado was ~~not~~ known farther south than Ecuador, whence Huayna Capac, as reported by Garcilaso de la Vega, carried it to the warm valleys near Cuzco about 1475.

But now the archeologists have found avocado seeds in the ^{graves} ~~sigings~~ along the Peruvian coast, ~~as far south as Nazca~~ (cf.

The Ethnobotany of Pre-Columbian Peru, by Margaret V. Towle, 1961).

That doesn't mean that ^{necessarily} avocados were native in those Peruvian ^{coastal} valleys, ^{I don't believe they were} but it is interesting to know that they were cultivated there way back yonder.

Paul Allen, ^{an excellent botanist} solved the problem of the West Indian race to my satisfaction, by ^{describing an} ~~reporting~~ indigenous trees which he saw on the Pacific side of Costa Rica ~~and publishing~~ (Plate 27 in his Rain Forests of the Golfo Dulce, 1956), ~~a photograph of the fruit.~~

^{Perhaps} I feel pretty sure this geographical variant of *P. americana* extended over into Colombia, ^{whence} where it had been domesticated and carried ^{at an early day} way down into southern Peru, ^{in pre-columbian times.}

So much for the horticultural forms of *P. americana*. Now, how about what you ["] call the ["] fringe species and introgression? In the Veracruz region of Mexico we have *P. schiedeana*, which Carl Mez considered a ^{botanical} variety of *P. americana*, but which, when you see it in the field as we do in Mexico and Guatemala, is a very different thing and which I personally would never hesitate to call a good species, ~~and~~ I have never seen an avocado which seemed to me to have even been on close ^{personal} terms with *P. americana*. In the city of Orizaba, for example, there ^{are} are hundreds of trees of "drymifolia" and of *schiedeana*. I made a careful survey of this region many years ago and never saw anything which didn't look like pure *schiedeana* ~~and~~ ^{or} pure "drymifolia", ^{or what I call the West Indian race of P. americana} ~~and~~ ^{and} not far from Orizaba we have *P. floccosa*, which Louis

but even so, I don't would

3 recognizing *P. floccosa* a good sp

Williams and I had the pleasure of examining in what certainly appeared to be the wild, (many years ago) It certainly is close to *P. americana*, and here we come up against ^{the} our taxonomic problem.

If I were a taxonomist, I would be a lumper. Some taxonomists are splitters. When the taxonomist is a splitter, and only knows his plants *Perseas* from a limited number of herbarium sheets, he ^{is likely to make} makes a lot

of new species. But if he gets out in the field and seeds hundreds of trees of any ^{interesting plant} given form, he finds so much variation from tree to tree that he ^{may become} gives up and becomes a lumper. My good friend Sydney

Blake made a new species, *P. leigyna*, out of the Trapp avocado, from herbarium material I sent him from Miami, Florida. Based on the ^{mainly on} the

^{almost} glabrous floral parts, practically. Later when I had sent him herbarium material of many other horticultural forms of the West Indian race of avocados, he agreed that Trapp is not a species.

There are other *Perseas* around Orizaba, ~~quite a few of them,~~ some of which look like Mexican avocados the size of big olives, but neither Louis Williams nor myself ever thought we could see any sign that they had become mixed up with "*drymifolia*".

The great place for ^{hybrid *Perseas*} ~~ingression,~~ I would say, is Atlixco in Puebla, where Fuerte came from, but there it is only a matter of mixing up the Guatemalan race of *P. americana* with the Mexican, as far as any of us have been able to see. (~~Extruded I don't believe any of my colleagues will pick me up on this~~). And ^{north of} up in Tamalipas there are a lot of horticultural avocados which have every appearance of being crosses between the ^{Guatemalan race} West Indian and the Mexican ~~race~~ or "*drymifolia*". The same I found to be true, many years ago, in the Chota valley of Ecuador. And of course we are having crosses every year between the West Indian and the Guatemalan races in south Florida. At least we assume they are crosses, and in many

There is one wild avocado^{it} which does not fit into our horticultural picture nor can I see that it has entered into the formation of the horticultural varieties, or cultivars as they ^{are called} ~~are called~~ ^{any} ~~them~~ today. I refer to ^a ~~the~~ wild tree ~~which~~ ^{and in Costa Rica} of which I have seen numerous specimens in Honduras. It produces fruits which are the size of tennis balls, which look just like avocados of the Guatemalan race, but which are so strongly anise-scented that not even a self-respecting monkey will eat them. I am sorry Lucille Kopp did not see ~~any~~ herbarium specimens of this wild Persea, which I ^{consider} ~~feel sure~~ is just another geographical form of P. americana. It messes up ^{our} ~~the~~ horticultural key to the races of avocado unpardonably. You know we always consider the anise-odor to be found only in the so-called ^{balanced variety} ~~drymifolia~~ variety, ^{the thin skinned Mexican avocados} as Lucille Kopp classified it. If there were introgression in the horticultural forms, this might well be one; the tree looks like an avocado, the fruit looks like a Guatemalan avocado, but it has that confounded anise odor to the n'th degree, and, furthermore, it grows only at elevations ~~about~~ below about 5000 feet, so far as I have seen.

Lentmyer

So let us ~~"return to our mittens"~~. If I had my way, which I wont, all cultivated avocados would be geographical forms of P. americana, or hybrids between modern ~~horticultural forms~~ cultivars, with no introgression from what you term "fringe species" ~~xxxxxxx~~ ~~xxxxxxxxxxxxxxx~~ P. schiedeana is as different from P. americana as chalk is from cheese. I am a bit ~~shaky~~ about P. floccosa but I will go along with the botanists who call P. floccosa a good species, though Lucille Kopp says : P. floccosa exhibits the typical floral ^{and} inflorescence structure of P. americana, but the flowers are smaller, the young fruits more globose, and the pubescence floccose as indicated by the specific epithet. The texture of the

Antigua, Guatemala, 3 June 1970

Dr. Don Maggs
CSIRO
Merbein, Victoria, Australia.

Dear Doctor Maggs:

This is a very tardy reply to your interesting aerogramme of 19 February.

You ask whether I still regard Persea americana as a single comprehensive species, and how far do I consider introgression from the fringe species, e.g. P. schiedeana from various localities as the main cause of the great variation found in P. americana.

To answer your question I am going to discuss briefly the systematics of the Perseas, a subject on which I haven't the slightest right to an opinion, but it happens that in the past few years I have been thinking and talking a lot about wild avocados and the origin of our cultivated forms, due largely to the appearance of Lucille Kopp's "Taxonomic Revision of the Genus Persea", Vol. 14 No. 1 of the Memoirs of the New York Botanical Garden, published 15 March 1966. I assume you have seen this. If you haven't, by all means get it.

I will say at the start that I still consider P. americana as a single comprehensive species, and I have never, in all my travels, seen anything looked to me like the introgression of a "fringe" species, as you put it. For example P. schiedeana. One or two other workers don't go along with this, altogether; cf. J. Galindo and G. Zentmyer, 1966 Yearbook of the California Avocado Society, where they say on p. 80: "A possible genetical infiltration into the cultivated avocados is suspected, respectively, from P. liebmanni

in the State of Michoacan (Mexico) and P. schiedeana in Tabasco."

You know that quite a few of us avocado fanáticos have been hunting wild avocados for many years. We satisfied ourselves that what we call the Mexican race (the P. armifolia of the early days) is native around the volcano Orizaba in the State of Veracruz, and almost certainly in other parts of Central Mexico.

Then I had the good fortune to find that wild avocado of Tecpan, as I called it, here in the highlands of Guatemala. Some years after I reported this, Louis Williams saw many trees of this wild avocado in the same region. Williams considered it to be a good species and named it P. nubigena. I am satisfied that this wild avocado was the progenitor of our pre-ent-day Guatemalan race. Then we found what I consider to be the same thing on a mountain top near Escuela Agrícola Panamericana in Honduras. Williams described this as P. gigantea. Lucille Kepp has reduced both these to P. americana, botanical var. nubigena. If I were a taxonomist, I wouldn't even go along with that. Just two more geographical variants of P. americana.

For years we have been trying to find the home of what we call the West Indian race of avocados. We felt it ought to be in Costa Rica, Panama or Colombia. There were a lot of "wild" avocados on the slopes of the Sierra Nevada de Santa Marta in Colombia, precisely where the bachiller Fernandez de Enciso published the first account of the avocado (1519) which had not then reached the West Indies. But the trees I saw in this region, in 1919, didn't look "wild" enough to me. Too much variation in the size and shape and color of the fruits.

Then Paul Allen, a very capable botanist, described (Plate 22 in his Rain Forests of the Golfo Dulce, University of Florida Press, 1956) a wild avocado in forests at a low elevation on the Pacific side of Costa Rica. Allen had no doubt that it is P. americana

and he considered it just another geographical form, the farthest South yet reported. It seems to me quite probable that its distribution extended into Colombia, but so far as I know it has not been reported south of Panama by any taxonomist. We do know that avocados were cultivated in Ecuador before the Spanish Conquest, and in a recent, most interesting work by Margaret V. Towle, "The Ethnobotany of Pre-Columbian Peru", 1961, it seems well established that avocados were cultivated in very early times in the valleys of the Peruvian coast as far south as Nazca. But it doesn't seem likely, to me, that they would have been native south of the rain forests on the coast of Ecuador, if even that far.

So much for the horticultural races, or botanical varieties, or geographical variants of *P. americana*. Now, how about the "fringe" species and introgression? In the Veracruz region of Mexico we have, in considerable abundance as a cultivated tree, *P. schiedeana* which Carl Mez considered a botanical variety of *P. americana*. But when you see it in cultivation, or semi-wild, as we do so often in southern Mexico and Guatemala, it is so different from the avocado that it is most certainly a good species. Many years ago I made ~~stated~~ one hundred trees in the city of Orizaba, Mexico. Dooryard trees. There were West Indians of a primitive form, horticulturally, there were plenty of schideanas, and plenty of "strymifolias". I didn't see anything which looked to me like a mixture of any two of these.

Not far from Orizaba we have *Persea floccosa*, which Louis Williams and I had the pleasure of collecting back in the 1940s. We did not see it in cultivation. I do not think that any taxonomist would doubt that it is a good species. I have never seen an avocado which to me looked like it had any *floccosa* blood, but it seems to me that someone has made a report to the contrary. In California

It has been hybridized with P. americana.

Some of the great places for hybrids of the horticultural races are Atlixco, in the State of Puebla, where the Guatemalan and the Mexican races have been grown side by side for a long time, as everyone knows. Farther north in Mexico there are hybrids between the Mexican and West Indian races, or so we believe. And I found what I felt were similar hybrids in the Chota valley of Ecuador. And in the past half century there have been plenty of hybrids between the Guatemalan and West Indian races in Florida. You know all about these.

There is one wild avocado which does not fit into the horticultural picture, but I have no reason to believe that it has entered into the formation of any of our cultivated varieties. This is what I used to call the wild avocado of San Isidro (in Costa Rica) but later I saw plenty of wild trees in Honduras. The anise odor in the bark, leaves and fruits is so strong that I do not believe any self-respecting monkey would eat the latter, though the common name for this form is aguacate de mono or monkey's avocado. I believe it to be just another variant of P. americana. It looks as though we have placed too much importance on the anise-odor in avocados. Is not something of the sort a Lauraceous characteristic?

This is about all I have to say, for though we have been working on avocados, wild and cultivated, for half a century, I suppose botanists half a century from now will really know something.

Sincerely yours,

Wilson Popece