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## TWO RELATIVES OF THE AVOCADO AND THEIR REINTRODUCTION INTO FLORIDA

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*Coconut Grove*

When my friends asked me why I was going to Guatemala last summer, I told them I wanted to get seeds of the Coyo and the Anay, two trees related to the Avocado. It has seemed to me for some years that it was about time the horticulturists of this country paid some attention to the possibilities of combining the relatives of the genus *Persea* with the idea of creating new and perhaps advantageous hybrid forms of the avocado which would be new to horticulture, like the tangelos which are new forms created by Swingle through the combining of distinct species of citrus\*

*(\* I am not unmindful of the fact that to make artificial crosses between different varieties of avocados is a very much more difficult undertaking than that of crossing varieties of citrus and that some new, special techniques will probably have to be devised for breeding work such as I have hinted at. First, however, let us get the species established where crosses might be made.)*

It had always annoyed me whenever I went to see the late George B. Cellon, that although a good sized tree of one of these wild relatives of the avocado, introduced by Wilson Popenoe, was growing in his yard, there seemed to be nobody about who undertook seriously to cross its flowers with those of the avocado. This tree was ***Persea schiediana***, known in Guatemala as Coyo or Chucte or sometimes as Shucte. Popenoe collected some budwood (44999 S. P. I.) in San Cristobal, Vera Paz, in July of 1917 and in Tactic in Alta Vera Paz some seeds (45354) in October of the same year. The bud wood failed to live, but some of the seeds grew and I believe Mr. Cellon's tree was from seed from Tactic.

The account of Popenoe's introductions of these two species of trees is to be found in the Inventories of Plant Introductions of the Office of Foreign Plant Introduction of the U. S. Department of Agriculture. I am not going into the details of these previous introductions now, since so far as I can find, no trace of them remains as a living record of what was a remarkable piece of introduction work. I say no trace. I should remark that Popenoe's published accounts of thcp; n , full and sufficient and should arouse the curiosity of any horticulturist who is interested in the possibilities of avocado plant breeding.

What the outcome of such breeding experiments will be nobody can predict, I suppose,

but I am assuming in this paper that some thing; worth while may result. For Popenoe's judgement as a student of the avocado impresses me, and it is this judgement which urged me to make an attempt to get seeds of the Coyo again. Here is what he says in his account of S. P. I. 45354: "Among the hundreds of Coyo trees which are found throughout the Vera Paz region, an exceedingly small number produce fruit of excellent quality. Up to the present time I have found only two which seem worthy of vegetative propagation. The vast majority of trees produce small, often malformed fruits, with a large seed and fibrous flesh of poor quality and unattractive color. The best varieties, however, such as that found in the property of Padre Rivera, of Tactic, are as large as a good avocado of the West Indian race. The seed is no larger in proportion than the seed of a good budded avocado, and the flesh is creamy white, free from fiber, and of a very rich nutty flavor. If a variety like this can be established in the United States, it seems reasonable to believe that it will become popular. The fruit so strongly resembles an avocado in general appearance that it would not be taken by one unfamiliar with avocados for a distinct species, but the flavor is so distinct that the difference can be recognized at once. The season of ripening is much shorter than with the avocado \* \* \*. When picked and laid away to ripen the Coyo requires only three or four days to soften, while the avocado sometimes takes eight or nine days. Among the Indians of the Vera Paz region the Coyo seems to be preferred to the avocado."

This description might deter some from growing the Coyo, might convince those who draw conclusions from mere verbal descriptions without seeing the actual thing, that it is useless to try it. This note is not for such.

I used to visit Mr. Cellon's tree on his old place <on Seventh Avenue and admire the trim clean trunk and large, soft, pubescent leaves; they were much larger than those of the avocado and the flower clusters were covered with a felt of soft pubescence. Mr. Cellon told me that it fruited for him once but that the fruits were small, slender things without fully developed seeds and in his opinion of no value. He never tried to hybridize it as I recall, and because the seeds would not grow and some preliminary efforts to bud the tree on avocado stocks were not successful, Mr. Cellon finally chopped it down I always regretted the disappearance of the Cellon tree but events around me prevented my doing anything constructive, such as making breeding trials for example, and I have always had it in mind to get some seeds of it for another trial under the changed conditions of a wider interest in the avocado industry.

It was with this background that I determined last summer to visit the regions in Guatemala where the Coyo grows and see if I could get seeds and get more information about the species.

What I secured was not much, hardly enough perhaps to warrant this paper, but I give it with the hope that it may stir up interest in its introduction on a wider scale.

Wilson Popenoe also discovered another wild relative of the avocado when he was exploring in the mountains and lowlands of Guatemala in 1916-17, and although so far as I know not a single tree of it has survived, his carefully worded account of it and the fact that it was determined to be a distinct genus of the avocado family by Dr. Blake, **Hufelandia Anay** Blake, made it also appear a desirable tree to reintroduce. Here is an abstract of Popenoe's first description of the tree and fruit. "43432 S. P. I. No. 34A,

Mazatenango, Guatemala, Sept. 23, 1916. Seeds of an interesting species of *Persea* which occurs in this region as a large forest tree and is called **Anay** by the natives. It so closely resembles an avocado of the Mexican race in the external appearance of the fruit as to lead one to suspect at first that it must be a form of ***Persea americana***, but on a closer examination of the tree and fruit one finds numerous characters which indicate that it must be entirely distinct from *Persea*."

"In clearing the forest for planting coffee, a few large trees are left to provide shade for the coffee plants and it was due to this fact that we found the Anay. Two large trees are standing close to the entrance of the Finca, 'El Compromiso,' about one half mile from Mazatenango. Others are said to occur in the forest and are known to the natives, who eat the fruit in the same way as avocados and consider them a variety of avocado, '**tipo de aguacate**' as they say.

"The Anay is a tall rather slender tree, reaching a great height in the forest. The two which were seen were between 60 and 70 feet in height. The bark is nearly smooth and of a rich red brown color, grayish in places. The young branchlets are light brown, finely pubescent; the leaf blades are broadly elliptic to oblong, lanceolate in outline, 8 to 13 inches long, 3 to 6 inches broad, acute to shortly acuminate, \*\*\*\*\*. The foliage when crushed has no aromatic odor like that of the Mexican race. The fruits ripen in August and September. In form they are slender pyriform, sometimes curved and sometimes pointed at the apex." (For excellent photographs of both the tree trunk and the fruit see "Plant Immigrants" No. 133, May, 1917, Plates 217 and 218, a mimeographed bulletin of the Office of Foreign Seed and Plant Introduction, Bureau of Plant Industry, U. S. Department of Agriculture, which ran from 1908 to 1924 as a monthly but was killed by the Government Printing Office.)

As soon as Mrs. Fairchild and I arrived at the "Casa Popenoe" in the ancient town of Antigua, once the most beautiful city of the western hemisphere, now the most charming ruined town in the world, I began making enquiries as to how we could ferret out these two avocado relatives and perhaps get more seeds of them. Rummaging about in his library, I found a bound volume of Wilson Popenoe's field notes and by chance opened the volume right at his account of the discovery of both the Anay and the Coyo. This find made it easy to look these species up.

With copies of his notes in my little red book, Mrs. Fairchild and I set out one morning for the lowlands of Guatemala and Mazatenango. Antigua lies between two magnificent volcanoes at 4900 feet altitude and warm underclothes are comfortable. September temperatures range from 86 to 59 as compared with 92 to 80 in Coconut Grove, and the cool, almost cold nights make blankets necessary. The average rainfall in Guatemala City is only 47 inches, less than that of South Florida. Mazatenango on the contrary is only 1235 feet above sea level and has a rainfall of about 100 inches and temperatures more like those in South Florida during the summer season.

As our car descended along the trail towards Esquintla where we took the train for Mazatenango, we began almost immediately to discard overcoats and sweaters and then coats until by the time we reached what is known as the "Tierra Caliente" we were dripping with perspiration and so boiling hot that I had to hunt a place—a little hotel of sorts—in which to get out of my flannel underwear into the lightest garb possible in

order not to melt on the train ride to Mazatenango. This ride through the banana plantations and sugar cane and occasional coconut palm plantings, although as the crow flies only about 25 miles from Antigua, was as different as or more so than between North and extreme South Florida. Altitude and its effect on vegetation is something which one living a life on the level "plains" of Florida finds it hard to realize. Old residents of Antigua no more think of planting trees or shrubs from the Tierra Caliente in their gardens, expecting them to live, than a resident of Tallahassee would plant coconuts in his yard and believe they would grow there. And yet there is no question of frost injury to tender plants in Antigua. I think the cool nights are detrimental to strictly tropical low land species in the uplands, and hot muggy nights are suffocating, so to say, to high altitude species when planted in the lowlands. I have had the experience time and again of planting high altitude plants from Colombia or Guatemala in my own garden at Coconut Grove and being encouraged by their excellent growth during the cool season, to have all my hopes dashed as soon as the hot humid nights of summer come on. Shading helped them but do what I could they faded away, growing smaller and smaller as the insects attacked them and they either died or led a miserable existence until the cool days of autumn arrived, when they started in again and made a fair growth, only to repeat the process the following summer. The effects of altitude are felt by plants as they are by humans and their protoplasm may be quite as sensitive as ours to pressures of atmosphere and the other qualities of altitude. This is at least the hypothesis under which I am at present operating.

When we reached Mazatenango the representative of the United Fruit Company met us and in a half hour we stood at the entrance of the Finca "El Compromiso" and looked around for the trees Wilson Popenoe had described as seeing there on September 23, 1916, 29 years before. We were there almost on the anniversary of his visit, for it was September 27th. There the trees stood as though unmindful that a third of a century had passed since that other American horticulturist had come to see them.

I had read in Wilson Popenoe's notes that when he was there in 1916 the fruits were most of them on the ground and anticipated, but not fully, that I should find the same state of affairs when we visited the trees. There was not a fruit to be seen, not one, but in the weeds at the foot of the tree where we searched, young seedlings here and there were coming up. They were vigorous enough but their fleshy cotyledons which were still attached and their slender petioles made them easily distinguishable from the cotyledons of the avocado. They were riddled with all sorts of humus-inhabiting larvae, such as generally reduce the cotyledons of plants when the food materials have been removed by the seedling.

We gathered every likely seedling into our baskets and made sure there were no other trees anywhere about and then approached the residence of the owner of the finca, Señor J. Antonio Ramirez, one of the old residents of the region. He received us cordially and although we began with our poor Spanish he spoke English perfectly. He entertained us on the porch of his large house, excusing the appearance of disorder by saying that he had just returned from Lincoln, Nebraska, where his son is at college and where he had been twice to visit him.

Yes, he liked the Anay; it had a somewhat sweeter taste than the avocado and there were many of his friends who preferred it to the avocados, or as he called them the

aguacates. Since the avocados which he knew were probably all of the lowland, leathery skinned, so-called "West Indian" type, his observation on the flavor of the Anay did not mean muäb. For in these matters of taste unless you have the food you are judging actually in your own mouth, in contact with your own taste buds, you cannot "tell what it tastes like."

Señor Ramirez ordered one of this men to bring the stump of an old tree fern for us to pack our seedling Anays in and we left him with the arrangement made that he would send us next August as many fruits of the Anay as we required. We had expected to find a good hotel in so large a town as Matzatenango but were disappointed, and our United Fruit Company friend insisted we must push on in his automobile to the town of Retalhuleu where a perfectly delightful hotel awaited us with a patio in which 25 species of ornamental trees and shrubs and vines were growing, and where the next day we cleaned and packed in shredded fern roots the seedlings we had gathered, getting them ready for the air express from Guatemala City.

We returned the same way we had come to the Casa Popenoe in Antigua and in a day or two I took the seedlings to the Palace in Guatemala and showed them to Señor Pacheco, then the Secretary of Agriculture, and had them passed for export by plane to Coconut Grove. The next time I saw Señor Pacheco was the day before a revolution in which tanks blew the forts to pieces and ousted the whole government, but the new officials showed him the courtesy of allowing him to remain in the country and in his surprising nursery of orchids and bromeliads.

The changes in fortune brought by a third of a century have landed Wilson Popenoe as President of the Escuela Agrícola Panamericana at Zamorano near Tegucigalpa, Honduras, and as we were invited to the ceremonies of its opening. I took in my arms some of the seedling Anays, gathered from under the very trees where he had discovered them 29 years before, and had the pleasure of presenting them to my old colleague in person and seeing them safely planted in his school slat-house where in the future they may grow and form a part of the school aboretum. Who knows but they may play a role in the development of the avocado orchard which he contemplates building.

The Anay seedlings (**Hufelandia Anay**) which we sent to the U. S. Plant Introduction Garden in Coconut Grove have grown, and although too few of course to insure a fair test, have shown so far an ability to withstand what was a rather rough treatment of transplanting. In August Señor Ramirez will surely send us some seeds.

There now remained the Coyo to look up. We made a visit to the Plant Introduction Garden at Lancetilla near Tela, which belongs in another story, and flew back to join our son Graham, who was detailed from his post in Panama to Guatemala to study a serious eye disease carried by a biting fly. A few days later the three of us took a morning plane for Coban and Tactic where the Coyo trees occur.

Juan Chiquin, the driver of the auto which the charming Hempsteads put at our disposal while we were in their delightful inn, "La Posada" at Coban, knew plants as has no other chauffeur I ever drove with. He grasped instantly that we wanted seeds, and when no fruits could be seen in the trees he began scratching about at the base of the trees. When none could be found under them, he knew other trees miles away where there

must be some, and disappeared across a log that crossed the mountain stream along which we had been hunting. When he returned he had a basket full of Coyo seedlings, unmistakable, with the same soft pubescent leaves as the trees about me.

Like the seedlings of the Anay, these of the Coyo had to be carefully cleaned and washed and swathed in fern fibers before they were put in the air express in Guatemala City a few days later. Some of these have grown and are now being watched by two careful plant propagators in Chapman Field and The Fairchild Tropical Garden slat-houses.

I saw numerous specimens of the Coyo growing around on the hillsides that ringed an area of lowland through which flowed the Chichochochoc river in the Finca Chipoc. Some of these were nearly two feet in diameter and perhaps 40 feet high. They were evidently old trees, with wind beaten foliage, and were standing where their roots must have an abundance of water but in a stiff soil whose acidity was evident, in strong contrast to the calcareous rocky soil which surrounded the only tree of Coyo I had ever seen before, that on Mr. Cellon's place in Miami. Some of these trees must be flooded whenever the river rises and overflows its bank. Near them were numerous trees of the native **Liquidambar styraciflua** which I have always associated with river bottoms in North America, and I am inclined to think the Coyo may grow better on the marl prairies along the lower east coast of South Florida than on the rocky lands. The similarity of the lands where it grows in Guatemala to such as the hard shelled Guatemalan type of avocado selects may indicate, however, that it will prefer the kind of soil and drainage that our Guatemalan winter fruiting avocados elect.

I had a chance in November, a week later after our visit to Coban which lies at 4300 feet altitude, to see a single specimen of Coyo tree in the low country of Guatemala, at San Augustin, at 1080 feet altitude. It was an immense specimen, 4½ feet through and 70 feet tall, and it grew on the alluvial lands bordering a branch of the Rio Motagoa in the Finca San Miguel owned by Señor Joan R. Lopez. How old it was nobody there knew. But although it was reported to bear heavy crops and the fruits were esteemed very highly by the owner and by the people generally, who class it as an avocado or rather an "aguacate", I was much too late to get a fruit.

However, the gentleman who took me with him to San Augustin from his home and Mission School at El Rancho, Mr. Edward Haymaker, one of the best known Americans in all Guatemala, assured me that when the tree fruits he will ship me as many as I want. I cannot let pass the occasion to mention that Mr. and Mrs. Haymaker are two of the most remarkable people I met in Guatemala. They have the complete confidence of the Indians of their region and from many miles around children flock to the Haymaker house which they "own", so to say, during school hours, and where they get that discipline and loving treatment which I knew as a boy in the Middle West and which I have come to think of as a treatment which builds character.

The region around El Rancho is distinctly dry and the landscape reminded me of the deserts of Arizona with tall cacti everywhere and eroded canons filled with spiny vegetation able to endure long periods of drouth. As Mr. Haymaker, a man of 86, walked me over the hills along the narrow paths, we passed a shrub of the lignum vitae tree **Gaiacum guatemalense**. It was only two feet high but the owner of the land on

which it stood assured us that it had not changed in appearance so far as he could judge during the last ten years. Standing not far off was an older tree that was 30 feet high and had a trunk over a foot in diameter; it must be centuries old. I have one of these beautiful blue flowered trees on my own place and it always attracts attention when it flowers. I mention this to show the character of the interesting region around El Rancho. Someday I would like to return there and look for ornamental plants for South Florida. There may be many such. Wilson Popenoe found in this region, the region of Progreso as it is called, that superb flowering tree the "Flor de Mico", **Phyllocarpus septentrionalis**. He introduced the seeds in 1917 and there are many beautiful specimens growing around Coconut Grove where, although it rarely produces its beautiful red flower clusters, those who own it refuse to cut it down because it has the graceful habit of an American elm and has proven itself a very valuable shade tree. In the Soledad Garden in Cuba I have seen it in bloom in February and vote it one of the loveliest of all the flowering trees I have ever seen. Although Popenoe described it as growing along the banks of streams and as probably demanding a good deal of water, here in the Coconut Grove region it thrives well on the porous rocky soils.

I should like to record other of the interesting plants we saw, such as the Skinner's oak, **Quercus skinneri**, with acorns two inches long; the "Injerto" or green sapote, **Calocarpum viride**, an excellent Sapotaceous fruit; the "Pitahaya", **Cereus compressus**, with large, showy fruits that contain a brilliant red and perfectly delicious, melting, sweet flesh; the **Annona cherimola** of which we brought home a collection of seeds from selected fruits; and several interesting palms, sixty selections out of the hundreds of interesting plant species and varieties which we saw.

Guatemala deserves a thorough exploration for the many plant species which would probably grow in Florida.