

BOTANY.—*A preliminary revision of the North American and West Indian avocados (Persea spp.).* S. F. BLAKE, Bureau of Plant Industry.

For several years Wilson Popenoe, of the Office of Seed and Plant Introduction, has been engaged in the collection of the various forms of the avocado, or "alligator pear," which are found in Mexico and Central America. Many new and valuable forms have been introduced into the gardens maintained by the Office, whence they are being distributed among horticulturists, and a considerable amount of herbarium material has been accumulated. This material, which has recently been put into my hands for study, is sufficient, in connection with that already in the U. S. National Herbarium, to permit a fairly satisfactory preliminary treatment of the forms of the avocado which occur in Mexico, Central America, and the West Indies. Mr. Popenoe is about to extend the field of his investigations by a two years' trip in Central and South America, in which it is hoped material will be secured to settle the status of one or two South American forms, at present too poorly represented in our herbaria to be disposed of definitely. In the meantime it is desirable to put on record the information already obtained as to the relationship of the forms north of the Isthmus.

The latest systematic treatment of *Persea americana* and its relatives is that of Mez (1889),<sup>1</sup> in his monograph of the American Lauraceae. Mez recognizes, in the small group made up of the avocados, two species, *Persea gratissima* Gaertn. f. (*Laurus persea* L.) and *P. floccosa* Mez. Of *P. gratissima* two varieties are recognized in addition to the type, *P. gratissima schiedeana* (Nees) Meissn. and *P. g. drymifolia* (Schlecht. & Cham.) Mez. In a later publication Mez<sup>2</sup> has recognized the priority of the name *Persea americana* Mill. (1768) over *P. gratissima* Gaertn. f. (1807), the name by which the common avocado has generally been known in literature.

Mr. Popenoe,<sup>3</sup> as a result of his extensive field acquaintance

<sup>1</sup> Jahrb. Bot. Gart. Berlin 5: 145-148. 1889.

<sup>2</sup> Arb. Bot. Gard. Breslau 1: 113. 1892.

<sup>3</sup> In BAILEY, *Stand. Cycl. Hort.* 5: 2556. 1916.

with the avocado, has recognized three chief forms on the basis of leaf and fruit differences. These he separates by the following key:

- A. Leaves anise-scented: skin of fruit thin and soft. 1. *Mexican type*.
- AA. Leaves not anise-scented: skin of fruit thick.
  - B. Surface of fr. usually smooth: skin leathery, usually not more than  $\frac{1}{16}$  in. thick; seed coats frequently distinct, the outer one adhering to wall of seed cavity; cotyledons often rough. . . . . 2. *West Indian type*.
  - BB. Surface of fr. usually rough or warty: skin brittle, granular,  $\frac{1}{16}$  -  $\frac{3}{16}$  in. thick; seed coats adhering closely to the nearly smooth cotyledons. . . . . 3. *Guatemalan type*.

Mr. Popenoe, moreover, has become convinced that his "Mexican type" represents a distinct species, *Persea drymifolia*, Schlecht. & Cham., and that *Persea schiedeana* Nees is a distinct species. Both of these forms were treated by Mez as varieties of *P. americana*.

In the study of the extensive material which has now been brought together it became clear at once that Mez had erred in reducing *P. schiedeana* to varietal rank, since it possesses definite specific characters, not only in the pubescence of its leaves and its long pedicels, but also in the technical features of its floral parts, which were entirely passed over by Mez. *P. drymifolia* is a more doubtful form, not always distinguishable with certainty in herbarium material, and I prefer, at least for the present, to treat it as a variety of *P. americana*. The novel fact appears, moreover, that the most commonly cultivated avocado of Florida, known as the Trapp, represents a technically very distinct and undescribed species, characterized by its sparsely pubescent perianth and absolutely glabrous pistil and staminodes. Another new species of the avocado group, characterized by its glabrous ovary, narrow panicle, and sessile staminal glands, has been collected by Purpus in Oaxaca and is here described as *P. cinerascens*.

While the relationships of the North American forms can be considered as now established with a fair degree of definiteness, this cannot be said of the South American types. In addition to typical *P. americana* and its variety *drymifolia*, at least two

other forms occur in South America which, through lack of sufficient material, cannot be definitely placed. One is the plant described as *P. gratissima* var. *melanocarpa* by Philippi,<sup>4</sup> a single specimen of which is in the National Herbarium. It is peculiar in its comparatively large bracts and subsimple panicles shorter than the peduncles. The other, collected by Mr. Pittier near Caracas (no. 5913), has a glabrous ovary, pubescent style, and unusually long stipes to the glands of the third series of stamens. Both these forms are best left in abeyance until further material becomes available.

The avocados<sup>5</sup> occurring in North America and the West Indies may be distinguished by the following key:

Perianth densely griseous-puberulous on both sides; staminodes pubescent.

Ovary pubescent; staminal glands stipitate.

Pedicels 1 to 6 mm. long; staminode with triangular head, much broader than its stipe.

Branchlets glabrous to pilosulous, leaves glabrous to pilosulous beneath; filaments 2 to 3 times as long as the anthers; head of staminode much shorter than the stipe.

Leaves not anise-scented; perianth deciduous. . . 1. *P. americana*.

Leaves anise-(or sassafras-)scented; perianth usually persistent. . . . . 1a. *P. americana drymifolia*.

Branchlets fulvous-villous; leaves floccose-tomentose beneath; filaments only one-third longer than the anthers; head of staminode about equaling or exceeding the stipe. . . . .

2. *P. floccosa*.

Pedicels 8 to 15 mm. long; stipe of staminode twice to thrice as long and essentially as broad as the elliptic head; branchlets densely ferruginous-tomentose. . . . . 3. *P. schiedeana*.

Ovary glabrous; staminal glands sessile. . . . . 4. *P. cinerascens*.

Perianth sparsely pilosulous outside, essentially glabrous within; pistil and staminodes glabrous. . . . . 5. *P. leiogyna*.

<sup>4</sup> Anal. Univ. Chil. 91: 501. 1895.

<sup>5</sup> The avocados form a small group of the subgenus *Eupersea* Mez, characterized by their comparatively large flowers (usually 6 to 8 mm. long) with equal or only slightly unequal perianth segments. Of the species here considered, the most important commercially are *P. americana*, *P. americana drymifolia*, and *P. leiogyna*. *P. schiedeana* also has a large and well-flavored fruit, but is of little importance at present outside of its native habitat. *P. cinerascens*, and presumably *P. floccosa*, bear fruits too small to be of any value.

1. *Persea americana* Mill. Gard. Dict. ed. VIII. 1768. COMMON AVOCADO.

*Laurus persea* L. Sp. Pl. 1: 370. 1753.

*Persea gratissima* Gaertn. f. Fruct. 3: 222. pl. 221. 1807.

*Persea gratissima vulgaris* Meissn.; DC. Prodr. 15<sup>1</sup>: 53. 1864.

*Persea gratissima oblonga* Meissn.; DC. Prodr. 15<sup>1</sup>: 53. 1864.

*Persea gratissima macrophylla* Meissn.; DC. Prodr. 15<sup>1</sup>: 53. 1864.

*Persea persea* Cockerell, Bull. Torrey Club 19: 95. 1892.

Tree, up to 20 meters high; branchlets glabrous to finely puberulous or pilosulous, more or less glaucous; leaf blades 9 to 30 cm. long, 3.5 to 20 cm. wide, oval varying to elliptic or obovate-oval, rarely ovate or suborbicular, short-pointed, acute, or acuminate, sometimes obtuse, at base unequal, broadly rounded to cuneate, papyraceous to pergamentaceous, feather-veined (lateral veins 5 to 7 pairs) and finely prominulous-reticulate beneath, above deep green, glabrous or sparsely pubescent along costa, beneath glaucescent, glabrous or pilosulous with more or less spreading hairs along costa and primary veins, rarely over whole surface; petioles glabrous or puberulous, 2 to 6.5 cm. long; panicles densely griseous-puberulous, several or many toward ends of branches, 6 to 22 cm. long (including the 2.5 to 9 cm. long peduncle); pedicels 3 to 6 mm. long; perianth (5) 5.5 to 7 mm. long, densely griseous-tomentulose both sides; segments elliptic or lance-elliptic to oval-ovate, obtuse, the outer 1 to 1.5 mm. shorter than the inner; stamens of series I 4.5 to 5.5 mm. long, the slender filaments densely pilose, 3 to 3.8 mm. long; of series II similar, 4 mm. long; of series III similar, 4.5 to 5.4 mm. long, the filaments (3.2 to 4 mm. long) bearing 0.5 to 0.8 mm. above base two rotund obtuse or rounded glands on pilose stipes of about the same length; staminodes 1.8 to 2.8 mm. long, the densely pilose stipe 1 to 1.8 mm. long, the head triangular, acute, usually apiculate, truncate or sagittate-cordate at base, 0.3 to 1.2 mm. long; ovary densely pilose, style pilose, about twice as long as ovary.

TYPE LOCALITY: West Indies.

SPECIMENS EXAMINED:

VERA CRUZ: San Pablo near Rio Nautla, June, 1841, *Liebmann* 13. Colipa, March, 1841, *Liebmann* 86. Orizaba, June, 1918, *Popenoe* 826 (S. P. I.).

PUEBLA: Atlixco, Dec., 1918, *Popenoe* 864 (S. P. I.).

OAXACA: Cafetal Concordia, near Pochutla, May, 1919, *Popenoe* 825 (S. P. I.).

CHIAPAS: Tapachula, Nov., 1918, *Popenoe* 819, 821 (S. P. I.). Zacualpa, July, 1918, *Popenoe* 828 (S. P. I.).

YUCATAN: Izamal, 1895, *Gaumer*, 402.

GUATEMALA: Near Finca Sepacuité, Alta Verapaz, 1902, *Cook & Griggs* 20, 322, 564. Guatemala City, Feb., 1917, *Popenoe* 758 (S. P. I.). Antigua or vicinity, Feb., 1917, *Popenoe* 765, 766, 767, 769, 771 (S. P. I.). Los Verdes, Dept. Amatitlan, Nov., 1893, *Heyde & Lux* 6229. Pacaya, March, 1890, *J. D. Smith* 1941.

EL SALVADOR: Without definite locality, 1905, *Renson* 219.

COSTA RICA: San Francisco, March, 1897, *Tonduz* 10999. Port

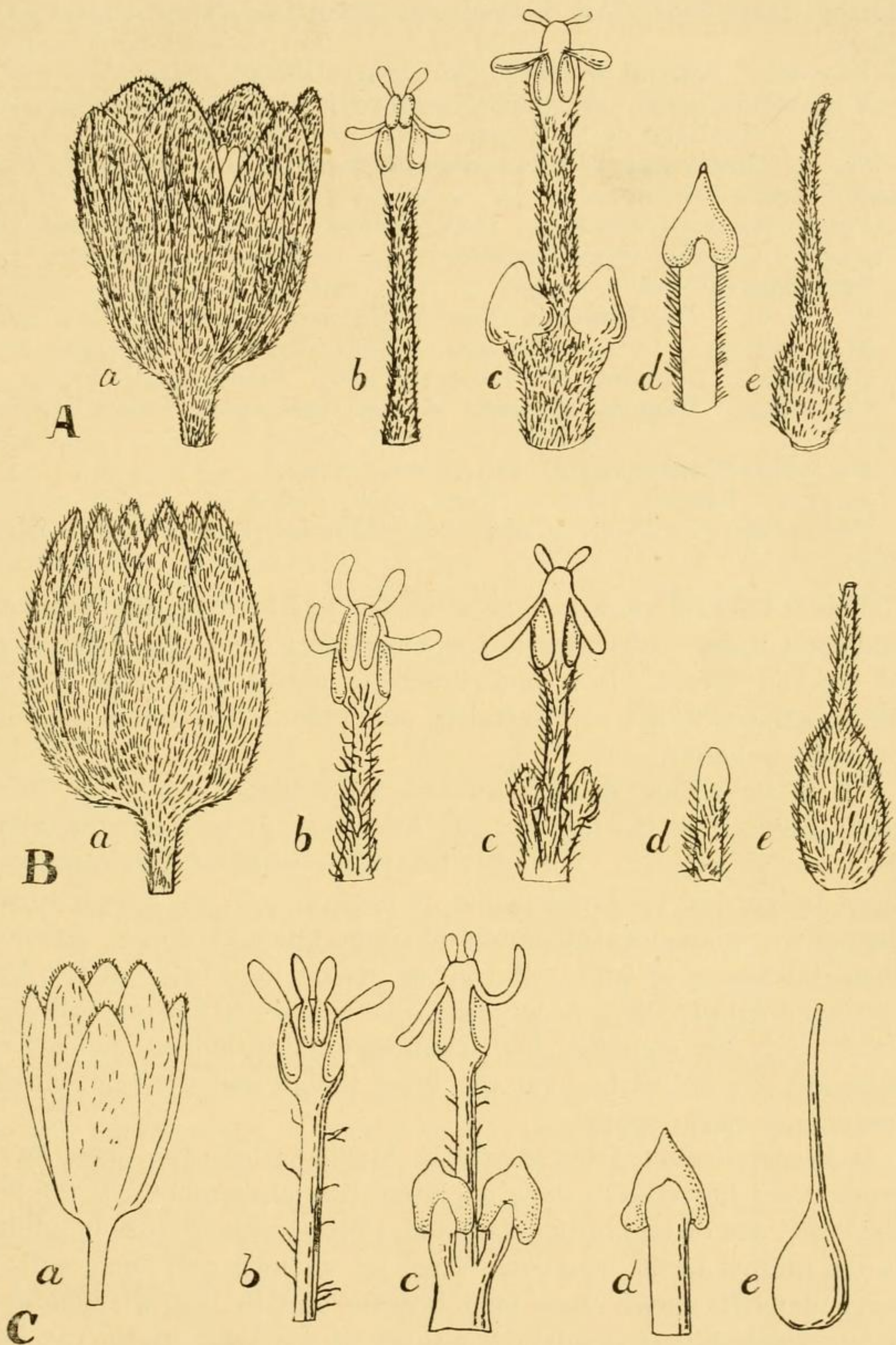


Fig. 1.—A, *Persea americana* Mill. B, *P. schiedeana* Nees (drawn from Purpus 7074). C, *P. leiogyna* Blake (drawn from Popenoe 219). a, perianth,  $\times 5$ ; b, stamen of series I,  $\times 10$ ; c, stamen of series III, viewed from dorsal side,  $\times 10$ ; d, staminode,  $\times 10$ ; e, ovary,  $\times 10$ .

Limon, May, 1903, *Cook & Doyle* 476. San José, April, 1903, *Cook & Doyle* 2.

PANAMA: Around Culebra, Jan., 1911, *Pittier* 2144.

BAHAMA ISLANDS: Nassau, New Providence, 1903, *Curtiss* 116.

CUBA: Santiago de las Vegas, 1905, *Abasco* 4556.

SANTO DOMINGO: Without definite locality, 1871, *Wright, Parry,* and *Brummel*.

PORTO RICO: Cabo-Rojo, 1885, *Sintenis* 759, 759b. Ponce, 1903, *Prey* 69. Caguas, 1899, *Heller* 931.

ST. THOMAS: 1881, *Eggers*.

ST. CROIX: Big Princess, 1896, *Ricksecker* 305.

MARTINIQUE: 1871, *Hahn* 350. Without date, *Duss* 1948.

GRENADA: Belmont, St. Georges, 1905, *Broadway*.

COLOMBIA: Vicinity of Santa Marta, 1898-1901, *Herbert H. Smith* 1760.

BOLIVIA: Cochabamba, 1891, *Bang* 1162.

BRAZIL: Botanic Garden, Pará, 1908, *Baker* 59.

PHILIPPINE ISLANDS: Cultivated, Manila, Luzon, 1919, *Merrill* 6347.

This is the first known of the avocados, and is by far the commonest and most widely cultivated in the American tropics and in the tropics of the Old World. It is undoubtedly a native of tropical America, but specimens which were certainly indigenous where found are nearly or quite unknown.

Of the three races distinguished by Mr. Popenoe, whose key has already been cited, the first or "Mexican type" is here separated as *P. americana drymifolia*. The other two races, called by Mr. Popenoe the West Indian and the Guatemalan, respectively, do not appear to show distinctive characters of botanical importance, however significant their differences in fruit and fruiting season may be from the horticultural point of view. At any rate, I have failed to find any differences whatever in the abundant herbarium material examined, and am consequently compelled to treat the West Indian and Central American forms as a single species.

Specimens collected by Merrill in Manila, where the plant has recently been introduced, show an interesting abnormality in the floral structure, one or two of the staminodes being antheriferous in addition to the normal fertile stamens. They are about 4 mm. long, with the hairy filaments about 3 mm. long, bearing laterally near the middle one or two sessile adnate glands; the anthers are 4-celled, with the two lower cells laterally dehiscent, the upper cells introrse. This occasional conversion of the staminodes into stamens was long ago noted by Meissner.<sup>6</sup>

<sup>6</sup> DC. Prodr. 15<sup>1</sup>: 53. 1864.

1a. *Persea americana drymifolia* (Schlecht. & Cham.) Blake. MEXICAN AVOCADO.

*Persea drymifolia* Schlecht. & Cham. *Linnaea* 6: 365. 1831.

*Persea gratissima drymifolia* Mez, *Jahrb. Bot. Gart. Berlin* 5: 147. 1889.

Leaves anise- or sassafras-scented when crushed, usually smaller than in *P. americana*, elliptic, and acute or acuminate at each end, but sometimes as broadly oval as in *P. americana*, and showing the same variation in pubescence; perianth equaling that of the larger-flowered examples of *P. americana*, its segments usually persistent in young fruit or even to maturity; fruit thin-skinned.

TYPE LOCALITY: Papantla, Vera Cruz, Mexico.

SPECIMENS EXAMINED:

NUEVO LEON: Monterey, March, 1891, *Dodge* 150.

SINALOA: Above Colomas, July, 1897, *Rose* 1813.

SAN LUIS POTOSI: Without definite locality, 1879, *Schaffner* (*Vigener* No. 572).

TEPIC: Between Aguacate and Dolores, 1897, *Rose* 2013.

VERA CRUZ: Fortin, 1883, *Kerber* 306. Patio of Hotel Colon, Puerto Mexico, July, 1918, *Popenoe* 827 (S. P. I.). San Andres Tuxtla, 1918, *Popenoe* 824 (S. P. I.).

STATE OF MEXICO: Coyoacan, Federal District, Jan., 1919, *Popenoe* 854, 855, 856 (S. P. I.).

PUEBLA: Cultivated, Orizaba, 1857, *Mohr*. Atlixco, Dec., 1918, *Popenoe* 857, 859, 860, 861, 862, 863 (S. P. I.).

GUATEMALA: Roadside below Santa Maria de Jesus, Zacatepequez, Oct., 1916, *Popenoe* 675 (S. P. I.), Feb., 1917, *Popenoe* 770 (S. P. I.).

ECUADOR: Quito, 1918, *Rose* & *Rose* 23556. Cultivated, Ambato, 1918, *Rose* & *Rose* 22338.

This, the common Mexican race of avocado, is a form of doubtful rank. In its commonly persistent or subpersistent perianth it departs not only from its close relative *P. americana* but from the character ordinarily given for the genus. This feature is not universal, however, and the form in the absence of fruit can be distinguished only by its anise-scented leaves. I can find no differences whatever in floral structure, and therefore rank it for the present as a variety of *P. americana*. Mr. Popenoe, however, who is familiar with the plant in the field, is of the opinion that it represents a distinct species. Its Mexican name is given in the original description as "aguacate oloroso."

2. *Persea floccosa* Mez, *Jahrb. Bot. Gart. Berlin* 5: 148. 1889.

Tree with fulvous-villous, glabrate branchlets; leaf blades 11 to 17 cm. long, 4.8 to 7.5 cm. wide, ovate, acuminate, at base obtuse or somewhat acutish, densely ferruginous-lanate on both sides when young, in age above subglabrate, densely foveolate-punctate, beneath glaucescent, floccose-tomentose, loosely prominent-reticulate; petioles up



to 4.5 cm. long; panicles pyramidal, shorter than the leaves, ochraceo-villous; pedicels 1 to 3 mm. long; perianth villous, 5 mm. long, the segments equal, narrowly ovate, acute; filaments  $\frac{1}{3}$  longer than the anthers, densely long-pilose, those of series III bearing at base two large sub-globose acute glands; staminodes foliaceous-triangular, not barbellate at apex, the head slightly longer than the densely long-pilose stipe; ovary densely pilose, ellipsoid, about equal to style; fruit unknown.

TYPE LOCALITY: Chinantla, Puebla, Mexico.

This species, based on *Liebmann* 85, does not seem to have been collected again. It is said to bear the name "aguacate cimaron." No material has been seen by the writer, and the above description is translated from Mez's original.

3. *Persea schiedeana* Nees, Syst. Laur. 130. 1836. Coyó.

*Persea gratissima schiedeana* Meissn.; DC. Prodr. 15<sup>1</sup>: 53. 1864.

*Persea pittieri* Mez, Bot. Jahrb. 30: Beibl. 67: 15. 1901.

Tree 15 to 20 meters high, rarely to 50 meters; branchlets stout, densely ferruginous-tomentose, glabrescent; leaf blades 12.5 to 30 cm. long, 7 to 15 cm. wide, obovate or elliptic-obovate to oval-obovate or sometimes oval, at apex abruptly short-pointed, obtuse, broadly rounded, or even subtruncate, at base broadly rounded, cuneate-rounded, or subcordate, feather-veined (lateral veins 11 to 13 pairs) and rather loosely prominulous-reticulate beneath, above deep green, in youth densely ferruginous-tomentose, in age glabrate or merely tomentose along costa and sometimes along chief veins, beneath glaucous, along veins and veinlets or over whole surface densely pilosulous with loose spreading sordid-griseous hairs; petioles stout, densely sordid or ferruginous-tomentose, at length glabrescent, 1.5 to 4.5 cm. long; panicles densely griseous-tomentulose, nearly equaling the unfolding leaves, 10 to 12 cm. long (including the 4.5 to 6.5 cm. long peduncle); pedicels 8 to 15 mm. long; perianth 6 to 8 mm. long, densely griseous-tomentulose both sides; tube obsolete; segments subequal, lance-elliptic, gradually narrowed to an acutish tip, 2.5 to 2.8 mm. wide; stamens of series I 3.2 to 3.5 mm. long, the rather slender densely pilose filaments 2 to 2.2 mm. long, the anther 1.3 mm. long; of series II similar, 4 mm. long, those of series III similar, 3.6 mm. long, the densely pilose filaments bearing essentially at the base two ovate obtuse pilose glands on pilose stipes of about the same length to twice as long; staminodes 1.3 to 1.9 mm. long, pilose, the stipes subulate, twice to thrice as long and essentially as broad as the elliptic obtuse head; ovary densely pilose, twice as large as in *P. americana*; style pilose, two-thirds as long as the ovary.

TYPE LOCALITY: Misantla, Vera Cruz, Mexico.

SPECIMENS EXAMINED:

MEXICO: Zacuapan, Vera Cruz, March, 1914, *Purpus* 7074. Tree in forest, probably indigenous, Dos Ríos, near Santa Lucrecia, Vera



Cruz, April, 1918, *Popenoe* 830 (S. P. I.). Cultivated, San Andrés Tuxtla, Vera Cruz, April, 1918, *Popenoe* 829 (S. P. I.).

GUATEMALA: San Agustín, Nov., 1916, *Popenoe* 741 (S. P. I.). Near Finca Sepacuité, Alta Verapaz, March, 1902, *Cook & Griggs* 21. Sepacuité, May, 1914, *Cook & Doyle* 43. Near Finca Sepacuité, Nov., 1916, *Popenoe* 745 (S. P. I.). Common wild and cultivated, Tactic, Alta Verapaz, March, 1917, *Popenoe* 772, 775 (S. P. I.). Rare, north bank of Motagua, above El Rancho, Nov., 1916, *Popenoe* 739 (S. P. I.).

COSTA RICA: Without definite locality, 1905, *Wercklé*.

PANAMA: Foot of El Salto Ravine, El Boquete, Chiriqui, altitude 1000 to 1300 meters, March, 1911, *Pittier* 3132.

This species, incorrectly treated as a variety of *P. americana* (*P. gratissima*) by Mez, is readily distinguished by its densely ferruginous-tomentose branchlets, long pedicels, equal perianth-segments, narrow staminode tips, and short style.

Mr. Popenoe, in the manuscript notes which he has courteously placed at my disposal, has noted the following names for this species: coyó and coyocté (at Senahu, Sepacuité, Guatemala), kiyó (San Cristóbal, Cobán), kiyau (Cobán), chucte (El Rancho), chaucte (San Agustín), shucte (Zacapa), kotyó (Chamá, Alta Verapaz). In Mexico it is known as chinini. Mr. Pittier describes the tree from which he collected specimens (no. 3132) as about 50 meters high, 1.2 m. in diameter at base, with brownish yellow flowers. The fruits were said to be about 10 cm. in diameter, with a thick mesocarp, and of exquisite flavor. The vernacular name is given as aguacatón.

According to Mr. Popenoe, the flowers are produced from November to March in Guatemala, and the fruit ripens from July to October. The flowers are pale greenish yellow, turning crimson at base in age, or sometimes light rose, the stamens likewise turning crimson with age. The staminal glands are bright orange. The flowers of *P. americana* are described by Mr. Popenoe as pale green, not changing color in age.

The fruit of the coyó (*P. schiedeana*) is said by Mr. Popenoe to be much like that of the common avocado, and equally variable in appearance and quality. The skin is thick but leathery and pliable, and the flesh of a brownish white color and a fine oily texture, almost always penetrated by fibres. The flavor is much like that of the common avocado, but distinguishable, suggesting that of a ripe coconut. The cotyledons when cut are rose-pink in color, while they are whitish in the avocado.

Although the type number of *Persea pittieri* Mez (*Pittier* 1156,

from Valle de Rancho Redondo, near Volcán Irazù, altitude 1500 meters, Costa Rica) has not been available for examination, it is clear from Mez's full description that his plant is only *P. schiedeana*. His error is undoubtedly due to the fact that he had previously treated *P. schiedeana* as only a variety of *P. gratissima*, and consequently did not consider it in this connection.

4. *Persea cinerascens* Blake, sp. nov.

Tree; branchlets of the year densely pilose-tomentose with sordid-rufescent hairs; older branchlets fuscous, more sparingly pilose-tomentose; leaves alternate, crowded on the young branchlets, the blades 10 to 20 cm. long, 5 to 8 cm. wide, elliptic to oval-oblong or obovate, acute

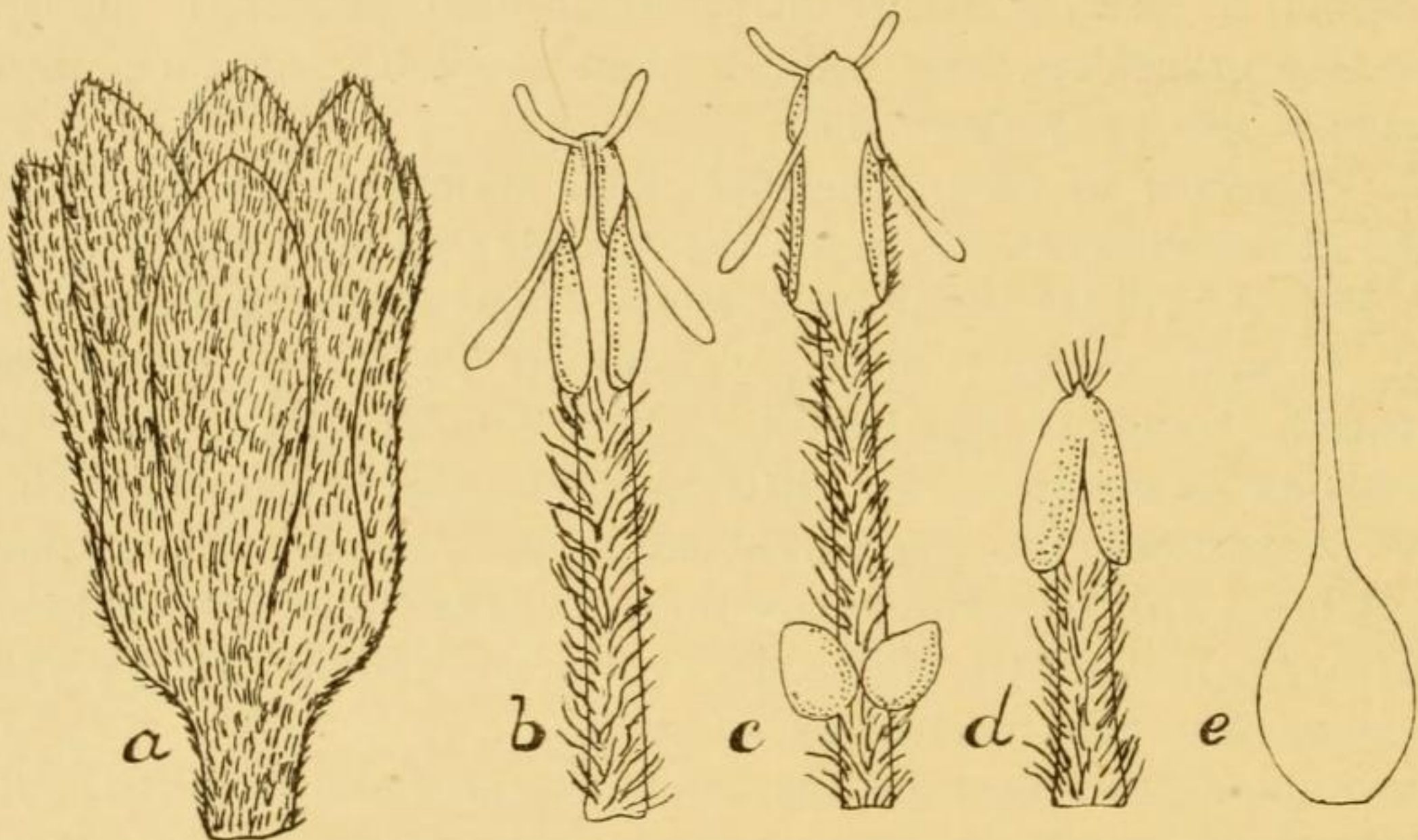


Fig. 2.—*Persea cinerascens* Blake (drawn from Purpus 7671). *a*, perianth,  $\times 5$ ; *b*, stamen of series I,  $\times 10$ ; *c*, stamen of series III, viewed from dorsal side,  $\times 10$ ; *d*, staminode, viewed from ventral side,  $\times 10$ ; *e*, ovary,  $\times 10$ .

or short-pointed but blunt at apex, cuneate at base, chartaceous, entire, above dull green, rather obscurely foveolate, with impressed veins, sordidly pilose-tomentose chiefly on costa and lateral veins, beneath cinerascens, sordidly pilosulous on whole surface but more densely so on the veins with crisped spreading hairs, prominent-reticulate, the 14 to 16 pairs of lateral veins diverging at an angle of  $45^\circ$  to  $60^\circ$ , the secondaries connecting them nearly at right angles; petioles pilose-tomentose with sordid-rufescent hairs, 2 to 3 cm. long; peduncles axillary, 3.5 to 7 cm. long, like the whole inflorescence sordidly pilose-tomentose; panicles 5 to 7 cm. long, 3 to 4 cm. wide, narrowly subpyramidate, the short branches 3- to 6-flowered toward apex; bractlets deciduous; pedicels stout, 1 mm. long; perianth 7 to 8.5 mm. long, densely pilosulous-tomentose both sides with sordid-cinereous hairs, the tube about 1 mm. long, the segments elliptic-oblong, 1.8 to 2 mm.

wide, obtusish, the outer 1 to 1.5 mm. shorter than the inner; stamens of series I 4.8 mm. long, the densely pilose filaments 3 mm. long, the slightly broader anthers 1.8 mm. long; stamens of series II similar, 4.5 mm. long; stamens of series III 5.2 mm. long, the densely pilose filament 3.4 mm. long, bearing 0.7 mm. above base two sessile ovoid pilosulous glands 0.7 mm. long, the anther 1.8 mm. long, the lower cells subextrorsely dehiscent, the upper lateral-introrse; staminodes 3 mm. long, the densely pilose filament 1.7 mm. long, the cordate-sagittate apiculate gland 1.3 mm. long, glabrous on inner face, dorsally pilose and barbate at apex; ovary ellipsoid, glabrous, 1.5 mm. long; style slender, glabrous, 3.5 mm. long; extreme base of calyx segments thickened and persistent in fruit, forming a saucer 1 mm. high, 4.5 mm. wide; berry subglobose, glaucous-blue, about 12 mm. long and thick; seed globular, 8 mm. thick.

Type in the U. S. National Herbarium, No. 884613, collected at Zacuapan, Vera Cruz, Mexico, June, 1916, by C. A. Purpus (No. 7671). Duplicates in the Gray Herbarium. Also collected in fruit at the same locality at a later date by Purpus (No. 8144).

This species is readily distinguished by its glabrous ovary, sessile staminal glands, narrow panicle, and by the pubescence of its leaves. In Mez's treatment of *Persea* it seems to come nearest to *P. liebmanni* Mez, from the description of which it differs in its larger flowers, longer anthers, staminodal glands glabrous inside, and larger berry. It is evidently of no importance as a food plant.

The sheet in the National Herbarium is in bud only, and the complete description of the species has been made possible through the kindness of the Gray Herbarium in loaning two sheets of the same number bearing a few opened flowers, and of Mr. T. S. Brandegee in sending fruiting material of a later collection by Purpus from the same locality.

5. *Persea leiogyna* Blake, sp. nov. TRAPP AVOCADO.

Tree about 10 meters high, with broad low head; branchlets stout, glabrous, glaucous; leaves alternate, the blades 7.5 to 16 cm. long, 4.5 to 8 cm. wide, ovate or elliptic-ovate to oval, acute or short-pointed, the apex usually blunt, at base unequal, rounded to cuneate-rounded, pergamentaceous, pinnate-veined (veins 4 to 9 pairs, prominulous-reticulate beneath), above deep green, glabrous, beneath somewhat glaucous, glabrous or with very sparse short incurved hairs along costa and toward base of primary veins; petioles glabrous, 2 to 3.5 cm. long; panicles axillary, 5.5 to 10 cm. long (including peduncle, this 2 to 4 cm. long), crowded toward tips of branchlets, about twice as long as the petioles, rather sparsely puberulous with loose curved hairs, not at all canescent; pedicels 2 to 4 mm. long; perianth yellowish green, 5.3 to 6 mm. long, short-ciliate above middle and sparsely pilosulous outside with loosely spreading curved hairs, essentially glabrous inside, punctate, the segments elliptic-oblong, obtuse to rounded, the outer

4 to 5 mm. long, 2 mm. wide, the inner slightly longer, 5.3 to 6 mm. long, 2 mm. wide; stamens of series I 3 to 4 mm. long, with slender sparsely ciliate filaments 1.5 to 2.7 mm. long; of series II similar but longer, the filaments 2.2 to 2.9 mm. long, the anther 1.3 mm. long; of series III similar, the filaments 2.5 to 3.2 mm. long, the anthers 1.2 to 1.4 mm. long, the glands borne about one-sixth to one-fifth the length of the filament above its base, ovate or rotund-ovate, obtuse or obliquely emarginate at apex, cordate-sagittate at base, glabrous, borne on distinct but shorter glabrous stipes; staminodes glabrous, 1.8 to 2.5 mm. long, the head triangular, narrowed from the base, apiculate, equaling or shorter than the filament; ovary glabrous, ovoid; style glabrous, slightly longer than ovary; fruit oblate to globose, 7 to 12 cm. long, light yellowish green outside, with smooth thickish skin; seed often loose in the cavity.

Type in the U. S. National Herbarium, No. 1012124, collected in Charles Deering's grove at Buena Vista, Florida, April 7, 1916, by Wilson Popenoe (No. 219). Other specimens examined (cultivated):

FLORIDA: Plant Introduction Garden, Miami, April 5, 1916, *Popenoe* 196, 198 (S. P. I.).

In foliage characters *Persea leiogyna* is so close to many specimens of *P. americana* that the two species can not be distinguished by leaves alone. In its shorter greenish yellow (when dried) sparsely pilosulous perianth, its smaller sparsely ciliate stamens, its glabrous staminodia, and its glabrous ovary, however, *P. leiogyna* is unique in the group of species known under the name of avocado.

*Persea leiogyna* is the commonly cultivated "Trapp avocado" of Florida, from Fort Pierce to Winter Haven, Bradentown, and southward. The "Family avocado," represented by *Popenoe* 196, is identical in botanical characters. The latter is said to be a variety of local origin, rather extensively propagated.

The material of this species which I have examined consists of that above cited, and in addition eight branches from different trees of the "Trapp avocado" collected in the vicinity of Miami in the early spring of 1919 by Mr. Popenoe. All of these agree precisely with the type in the diagnostic characters above mentioned. The species flowers from March to April, and fruits from October to December.

The many thousand trees of the Trapp avocado now in cultivation in Florida and Cuba have all been produced by budding and grafting from the single original tree, grown in Florida from seed believed to have been brought from Cuba, by the late C. L. Trapp, of Cocoanut

Grove, Florida.<sup>7</sup> As might be expected from the method of propagation, they have remained very constant in their characteristics, and specimens from different trees throw no light on the possible origin of the species. It is of the so-called West Indian race, with smooth, leathery, thick-skinned fruit and seed commonly loose in the cavity. Whether it really is a long-distinct wild species, a native of Cuba or more probably brought there from other regions, whose wild original is extinct or awaits rediscovery, or whether it is a comparatively recent mutant under cultivation, or perhaps even a hybrid, are questions which at present can receive no answer. It is possible that the seedlings now being grown in South Florida may throw light on the question when they flower. On the basis of our present information, however, and in view of its striking and constant technical characters, the species must be considered one of the most distinct in the genus.

<sup>7</sup> The name "Trapp avocado" was given by Prof. R. H. Rolfs (Bur. Pl. Indus. Bull. 97: 119. 1907) in honor of "Mrs. Trapp, Cocoanut Grove, Fla., who owns the original tree."