California Avocado Association. Annual Report. 1915. 1: 44-69

VARIETIES OF THE AVOCADO

F. O. Popenoe
President of West India Gardens, Altadena, Cal.

I believe it can safely be said that the most important problem which we avocado growers of California are facing at the present time is the question of varieties. I have just had this brought home to me very forcibly by finding, when I came to prepare a list of all the varieties which had been planted in California, that the number totals well above eighty. How is the prospective planter to know which of these are best suited to his needs? And how are we to reduce this enormous number to the 10 or 15 choice varieties which we will ultimately want to cultivate?

Our experience in California with avocados is as yet limited, but we are getting more data every year, and we begin to feel, in regard to certain varieties, that they can be planted with a sufficient degree of safety to make a practical horticultural enterprise. Every fruit grower knows that there is a constant shifting and changing of varieties, and rarely can we settle down to cultivate any one permanently. We are seeing orchards budded over every year, because the owner was not satisfied with the variety he was growing. It is hopeless, I suppose, for us to expect that we can settle down upon any limited number of avocado varieties for a long time to come, but we can and must cut down the number to as few as possible, and be able to recommend those which will be absolutely the best obtainable. This association can, I believe, be of great assistance to the public in this connection, by disseminating information concerning the most desirable varieties and eliminating the inferior ones.

Just now it seems to be a fad for any one who has a seedling avocado tree which is bearing fruits of even fairly good quality, to give the variety a name and propagate it. That is why we have 86 varieties growing in California today. Of course, it is highly desirable that we test as many varieties as possible, as it is only in this way that we can ever hope to standardize the very best, but let us try to avoid burdening ourselves unnecessarily. Most of all, let us avoid confusing the mind of the prospective planter by forcing him to choose between a horde of unknown sorts, some of which may be absolutely inferior. Let us keep this industry freed from the confusion caused by numberless varieties.

Different Types

I do not believe the people of California have yet reached an understanding concerning the different types of avocados which we are cultivating, and it will be well if we can get these clearly established at once so that we may all use the same terms and language in speaking of the types. At the present time, many nurserymen are classifying avocados in their catalogues as "thin-skinned" and "thick-skinned" or "hard-shelled." This is scarcely sufficient for accuracy, and I would like to point out the characteristics of

the types cultivated in California, as I have seen them and as they are beginning to be generally recognized by pomologists.

Considering all the avocados which are cultivated in the United States, we find them naturally falling into the following three groups:

1. The WEST INDIAN or SOUTH AMERICAN type. This appears to be the most tropical in character of all the types we have tested in California, and I only know of one instance in which it has fruited in this state. C. P. Taft of Orange has grown a number of seedlings from Cuba, two of which have borne fruit. Trees of the South American type are more susceptible to frost than those of the Guatemalan type, and vastly more so than the thin-skinned, small fruited Mexican type. In character of foliage it is often difficult to distinguish this type from the Guatemalan, but as a rule the leaves are somewhat smaller here in California, are crowded more closely together on the branches, and the wood is of lighter color. The foliage, too, is usually of a lighter shade of green. The fruits of this type vary in form as do those of the others, being pear-shaped, oval or round. In color they are usually yellowish green or maroon. The skin is leathery, and separates readily from the flesh, but it is not so thick nor so woody as in the Guatemalan type. The flesh is often rather watery in seedlings, and not so richly flavored as in the Guatemalan type, but in some of the best varieties the quality is good. There is one defect which is not usually found in the Guatemalan type, i.e., the seed is large and often loose in the cavity. It appears at the present time as though this type would not become of any importance in California. It is the principal one cultivated in Florida, the well-known varieties, Trapp and Pollock being representatives of it. It is the one cultivated in Cuba and other West Indian Islands, and along the coast of Central and South America.

2. The GUATEMALAN type. Commercially this is doubtless the most valuable type cultivated in California, and it is the one which is being at present most extensively planted. It is peculiar in that it carries its fruits through the winter and into the following summer, thus requiring 12 to 16 months to ripen them. While the Mexican type blooms in winter and ripens its fruits the following summer, and the West Indian type blooms in spring and ripens its fruits in summer, the Guatemalan type blooms in late spring and carries its fruits over the following winter and sometimes as late as September and October of the following year. The varieties of this type at present cultivated in California ripen from February to September. For fall and early winter other types must be grown, unless we obtain, later on, varieties of the Guatemalan type which will extend the season.

The California representatives of this type have originated in Guatemala and in Southern Mexico, principally in the vicinity of Atlixco, state of Puebla, Mexico, at an altitude of nearly 6000 feet. A large proportion of the varieties which have originated here in California came from seeds imported from Atlixco by John Murrieta of Los Angeles about 1900. Mr. Murrieta's work has probably had a more profound influence on California avocado culture than that of any one else up to the present time.

Because of the Mexican origin of several of our Guatemalan varieties, some have thought this name inappropriate. Inasmuch as these thick-skinned Mexican varieties belong to the Guatemalan type, however, they should certainly be called by this name,

as it serves to show their relationship to other varieties of the same type.

The characteristics which distinguish this type from the others are several and as a rule quite dependable, though it is sometimes difficult to distinguish one of the thinner skinned Guatemalan fruits with an almost smooth surface from a fruit of the West Indian type. When the texture of the skin does not serve to identify the fruit to a certainty, the Guatemalan can usually be distinguished by the color of the fruit and by the character of the seed and its coats.

The tree is easily distinguished from that of the Mexican type by the entire lack of anise-like fragrance in the leaves. The type seems to be about midway in hardiness between the West Indian and the Mexican. There is a slight difference in hardiness among the different Guatemalan varieties.

The fruits of this type have a thick skin, frequently woody and brittle. The surface is usually more or less rough, sometimes covered with wart-like protuberances around the base, but in a few cases nearly smooth. The flesh is usually free from fiber, and of good flavor. It is scarcely as rich and oily as the average fruit of the Mexican type, but is very pleasant and of satisfactory quality from every point of view. The seed is usually not large in proportion to the size of the fruit, and is almost never loose in the cavity. The keeping and shipping qualities are remarkably good, and I believe this type to be the true commercial fruit.

3. The MEXICAN type. This is the hardiest type in cultivation and at present the only one we have which ripens during late fall and early winter. It was introduced to California from Mexico, where it appears to be by far the commonest and most abundant type. Some varieties are of unusually rich flavor and excellent quality; in others there is an objectionable amount of fiber in the flesh. The oil content runs as high as 33%, and averages considerably higher than in any other type.

The tree is usually vigorous of growth, very hardy, withstanding in some instances temperatures as low as 18 or 20 degrees without injury. As the fruits are usually under one-half pound in weight, the tree is able to carry an immense number of them, 4000 sometimes being produced in a single crop. The fruits are usually oval or pear-shaped, ranging from 3 to 10 ounces in weight, and green or dark purple in color. The skin is about as thick as that of an apple. The seed is sometimes loose in the cavity, with loose seed coats.

The plant is characterized by an anise-like odor, which is some-times found even in the ripe fruit.

If picked at the proper time, fruits of this type can be shipped reasonable distances without difficulty, but they do not hold up so well in market as do the thick skinned sorts. They are excellent fruits for home use, and as they ripen at a season when no other type is in market, they must also receive attention from a commercial standpoint, in a limited way.

The tree comes into bearing earlier than that of the other types, sometimes at two or three years from seed, and in the case of budded trees, usually within two years. The Guatemalan on the other hand, does not bear as a rule until about five to seven years old when grown from seed, and at about three or four years from the time of budding.

Specific Varieties

Of the Mexican type the best which are now being propagated would seem to be the Ganter and Harman, green in color, and the Chappelow, Northrop and Carton, all purple. These are about all equally vigorous in growth; they have the same tendency to bear early and prolifically, and are in a general way of the same quality. The Harman and Ganter are the largest, and I would pick them as the favorites but for the fact that many of the fruits develop upon ripening a soft or decayed spot at the lower end, which is a severe handicap when offered on the market. It is possible that we may find some method of remedying this defect. If so, these two varieties would stand out as the best produced in California up to the present time.

Of the Guatemalan type, the consensus of present opinion favors the Taft as the best variety of local origin. This is an excellent fruit, and one which we all feel safe in planting. While it may maintain its lead it is being closely pushed by the Sharpless and Blakeman, two unusually fine fruits. Colorado, one of the best fruits produced by Mr. Murrieta, is another excellent variety, and Meserve, which originated at Long Beach, is also being quite extensively propagated. All of these have good commercial characteristics and are well worth planting. Other Guatemalan varieties which have been receiving a great deal of attention are Challenge, which has produced some enormous crops and is a fruit of perfect form, but with a large seed and not of the highest oil content; Walker, the most prolific of all Guatemalan varieties grown in California, but rather small and with a large seed; Lyon, a prolific and very precocious variety, but not a very strong grower, and seeming to be rather susceptible to frost; and Solano, one of the largest fruits grown in California and very handsome, but not rich in oil.

In another category must be placed Dickey, Royal and Murrieta. These are all splendid fruits, but it has been found that the young budded trees are exceedingly difficult to rear. After the buds have taken, and perhaps made a growth of two or three feet, many of the plants turn yellow and die. We have not as yet discovered the cause of this trouble. It seems to be a constitutional weakness, and it may be very difficult to remedy. When top-worked on old stumps these varieties usually grow well and do not show the tendency to die which the young budded trees do.

All of these varieties, and others, will be found described in the accompanying list. This list is intended to include practically all the varieties which have been propagated in California since the inception of the industry some five or six years ago. In compiling it, an effort has been made to have the spelling of the varietal names accurate and to bring the nomenclature into accord with the rules of the American Pomological Society, the standard in such matters. The descriptions are designed to convey, in as few words as possible, an accurate idea of the important characteristics of the fruit, as well as the habit of growth, productiveness and hardiness of the tree. Synonyms, where there are any, are given immediately after the variety name, following which is the name of the town or district where the variety originated, and the year when it was first propagated by budding or grafting. These dates may not be absolutely correct in every instance, but they will serve to show-approximately when the variety came into existence as a

horticultural form. This list was submitted for criticism to Edwin G. Hart, C. P. Taft, W. A. Spinks and D. W. Coolidge, directors of this association, and to T. U. Barber of Hollywood.

KEY TO THE TYPES

Mexican Type

A. Leaves usually anise-scented; skin of fruit rarely thicker than that of an apple.

Guatemalan Type

AA. Leaves not anise-scented; skin of fruit thick.

B. Surface of fruit slightly roughened to warty, dark green or dark purple in color; skin $^{1}/_{16}$ to ⅛-inch thick, often coarsely granular and woody; seed coats thin, both adhering closely to the seed ; cotyledons nearly smooth.

West India Type

BB. Surface of fruit smooth or nearly so, light green, yellowish, or maroon in color; skin rarely as much as $^{1}/_{16}$ inch thick, pliable and leathery; seed coats thicker, rarely closely attached to the seed, frequently distinct with the outer one adhering to the wall of the seed cavity, the inner one loosely surrounding the seed; cotyledons usually rough.

INDEX

All the varieties included in the list are here given in alphabetical order, without reference to type, the numbers referring to the positions they hold in the list. Synonyms are printed in italics, followed by the number of the variety under which they will be found.

MEXICAN TYPE

a. Varieties of California Origin

1. AZUSA. Azusa, 1914. An elongated, pear-shaped fruit, not distinctly necked, measuring about 4½ inches in length and weighing 6 to 8 ozs. It is glossy purplish-black in color, with cream-yellow flesh of rich nutty flavor, containing by analysis 21% of fat. The tree is a vigorous grower, hardy and productive. It blooms in January and ripens its fruit in November and December.
2. BLAKE. Pasadena, 1910. Slender pyriform, with a rather long neck, sometimes curved. Length, about 4 inches, weight, about 6 ozs. The skin is smooth, light green, with numerous yellowish dots. Flesh creamy yellow, smooth, of very rich flavor. Seed conical, rather small, often loose in the cavity. An analysis has shown that this

variety contains 25% of fat. The tree is very hardy, moderately vigorous in growth, productive, the season October.

3. CARTON. San Fernando, 1913. Slender pyriform, rarely distinctly necked, about 4 inches in length and 6 to 8 ozs. in weight. Skin smooth, purplish black in color, very glossy. The flesh is creamy yellow in color, of smooth, buttery texture, and rich flavor. Analysis has shown it to contain 19% of fat. The seed is rather large, sometimes loose in the cavity. The tree is hardy, a vigorous grower, flowering from January to March and ripening its fruit in October and November.
4. CHAPPELOW. Monrovia, about 1902. A slender pyriform fruit, distinctly necked, about 4 inches in length and 5 to 8 ozs. in weight. The surface is smooth, glossy, deep purplish black in color with reddish dots and scars. Flesh pale greenish yellow, buttery, free from fiber, and of very rich flavor, containing 29% of fat according to one analysis. Seed rather small, about 1 oz. in weight, tight in the cavity. The tree is vigorous, hardy, blooming from November to March and ripening its fruit from August to November. The average crop of the parent tree during the last11 years is said to have been 518 fruits, which entitles it to be considered fairly productive.
5. FOWLER. Pasadena, 1910. Form oblong-oval to obovate, about 4 inches in length and 4 to 8 ozs. in weight. The surface is smooth, glossy, light green overspread with russet on one side. Flesh yellow, buttery, sometimes slightly fibrous, of very rich, nutty flavor, containing 21% of fat, according to one analysis. Seed rather large, oblong-conical, tight in the cavity. The tree is a vigorous grower, hardy, but not very productive. It ripens its fruit from August to October.
6. CANTER. Whittier, 1908. An oval to obovate fruit, 3 to4 inches long, weighing 4 to 9 ozs. The surface is smooth, only slightly glossy, and green, with numerous yellowish dots. The flesh is cream-colored, sometimes slightly fibrous, of rich, nutty flavor, containing 25% of fat by one analysis. The seed is small to medium-sized, loose in the large cavity. The tree is a very vigorous grower, hardy, precocious, very prolific, flowering in January and ripening its fruit from October to December. While still on the tree, the fruit shows a tendency to decay at the apex.
7. HARDY (Syn. *Taft Hardy,* not to be confused with *Taft.)*Orange, 1913. A small, obovate fruit, about 2½ inches in length and 3 to 5 ozs. in weight. The surface is smooth, green in color. Seed rather large. Flavor rich. The tree is precocious, hardy, and a prolific fruiter, but of insufficient value to merit propagation. Though it originated in the orchard of C. P. Taft it has been neither named nor propagated by him, and he considers it of no value.
8. HARMAN. Sherman, 1910. Form obliquely obovate, length 3 to 4½ inches, weight 5 to 10 ozs. The surface is smooth, glossy, greenish purple in color, with large yellowish dots. Flesh cream-yellow, of fine, buttery texture, free from fiber, and of very rich flavor. Analysis has shown it to contain 18% of fat. The seed is large, loose in a large cavity. The plant is unusually vigorous in growth, making an erect, strong tree; it is a prolific bearer, and blooms from November to March, ripening its fruit from October to December. When fully ripe, the fruit shows a strong tendency to burst or decay at the apex.

9. HATHAWAY. Hollywood, 1913. An oval to obovate fruit, 3 to 4 inches long, weighing 5 to 8 ozs. The skin is light green, the flesh pale cream-colored, somewhat fibrous, of rich flavor. The tree is vigorous, prolific, flowering in January and ripening its fruit in September and October. Hardy.
10. HOLLENBECK. Los Angeles, 1912 or 1913. Form oval or obovate, about 3 inches in length and 4 to 8 ozs. in weight. Surface smooth, green, washed with russet or maroon. Flesh yellow, slightly fibrous, of rich flavor. Seed rather large. Tree vigorous, hardy, not very productive, ripening its fruit about October.
11. HORN. Sherman, 1910. An inferior fruit, no longer being propagated.
12. KNOWLES. Santa Barbara, 1915. A small, pyriform fruit, scarcely necked, weighing 5 or 6 ozs. The skin is very smooth, glossy, purplish black in color. The flesh is yellow, somewhat fibrous, oily, of rich flavor, containing, by one analysis, 33% of fat. The seed is medium-sized, rarely loose in the cavity. The tree is vigorous, hardy, and at about eight years of age produced 1000 fruits in one crop. It ripens from December to February, unusually late for this type.
13. MATTERN. Los Angeles, 1912. A small pyriform, purplish bronze fruit, weighing only 3 or 4 ozs. It is of good quality and rich flavor, containing by one analysis 25% of fat, but too small to be worthy of general planting.
14. MONROVIA. Monrovia, 1912. Pyriform, about 4 to 8 ozs. in weight. Surface glossy, smooth, dark purple in color. Flesh free from fiber and of rich flavor. The tree is hardy, a strong, thrifty grower, but inclined to be irregular in bearing and not very prolific. It ripens its fruit in the fall.
15. NORTHROP. (Syn. *Eells}.* Santa Ana, 1911. In form this fruit varies from obovate to pyriform, sometimes distinctly necked. It measures about 4 inches in length, and weighs from 4 to7 ozs. The surface is smooth, glossy, purplish black, the flesh cream-yellow in color, fine, smooth, almost free from fiber, and of rich flavor, analyzing 25% of fat. The seed is medium-sized, tight in the cavity. The tree is very hardy, of vigorous growth, and has the habit of producing two crops annually, the main crop ripening in October and November, the second crop, which is much smaller, in April and May.
16. PICO. Hollywood, 1910. A small, obovate fruit, not over 3 inches long, and weighing 3 to 5 ozs. It is deep glossy purple in color, with cream-yellow, smooth flesh of rich flavor. The seed is rather large, tight in the cavity. It is hardy, a prolific bearer, ripening from September to November. Its small size makes it of comparatively little importance.
17. RAINEY. Santa Barbara, 1912. A rather slender pyriform fruit, with a pronounced neck, measuring about 4 inches in length and weighing 4 to 6 ozs. The flesh is pale yellow, slightly fibrous, but of fairly rich and pleasant flavor. The seed is medium-sized, completely filling the cavity. Tree vigorous, hardy, and fairly productive.
18. RODOLF. Monrovia, 1913. A slender pyriform or oblong pyriform fruit, with a long neck. Color, size and other characteristics of fruit similar to those of Chappelow, of which the variety is a seedling. The tree is hardy, prolific, commencing to ripen its fruit in August and continuing through the fall months. It is considered to be more

productive than its parent.

19. SKINNER. Los Angeles, 1913. Described as similar to the Northrop, but not quite so large nor so richly flavored. Said to be very hardy.
20. TOPA TOPA. Nordhoff, 1913. An elongated fruit, almost oblong-pyriform, about 4 inches in length, weighing 6 to 10 oz. The skin is smooth, deep glossy purple in color. Flesh cream-yellow, very slightly fibrous, of pleasant flavor, containing by one analysis 15% of fat. The seed is long and slender, completely filling the cavity. The tree is vigorous, hardy, fairly productive, blooming in January and ripening its fruit in September and October.
21. WHITE. Santa Barbara, 1910. Oblong-pyriform, not distinctly necked, and somewhat oblique at base and apex. Length about 4½ inches, weight 6 to 8 ozs. The surface is smooth, glossy, dark purple, sometimes tinged with green. Flesh cream-colored, slightly fibrous, flavor pleasant but not particularly rich, showing, by one analysis, about 15% of fat. Seed large, conical, completely filling the cavity. The tree is hardy and a vigorous grower, coming into bearing early and producing good crops. It ripens its main crop from September to December, showing a strong tendency to mature a few fruits at other times of the year.

b. Varieties of Foreign Origin

22. CANYADA. Canyada, Queretaro, Mexico, 1911. (West India Gardens No. 9). An oval to pyriform fruit, of large size for this type, the skin rather thick, the surface nearly black in color. Flesh yellow, of smooth texture and rich flavor. Seed medium-sized, tight in the cavity. The trees are erect, stocky, of rapid growth but the branches are inclined to be slender and straggling. Hardy, and said to fruit prolifically, ripening in July and August at Canyada
23. PLATA. Santa Maria del Rio, San Luis Potosi, Mexico, 1911. (West India Gardens No. 2). A small fruit, about 3½ inches long, green in color and of good quality. It produces its fruits abundantly in clusters, the main crop in August and another crop in February. Tree a strong grower, erect in habit, hardy.
24. QUERETARO. Canyada, Queretaro, Mexico, 1911. (West India Gardens No. 11). An oval fruit, 5 inches in length, somewhat rough and black in color. The skin is rather thick and tough, separating readily from the yellow, richly flavored flesh. Seed medium small, completely filling the cavity. The tree is a strong grower, hardy, and characterized by an unusually heavy tomentum on the lower surface of the leaves. It is said to be prolific, the fruit ripening from August to October at Canyada.
25. SAN SEBASTIAN. Queretaro, Qto., Mexico, 1911. (West India Gardens No. 7). An oval fruit, 6 inches in length and weighing 12 to 16 ounces. The skin is rather thick, black in color, separating from the yellow flesh of rich flavor. Seed medium sized, tight in the cavity. The tree is erect, stocky, of rapid growth and has proved to be unusually hardy. It is said to be prolific, the fruit ripening in March at Queretaro.
26. VAL DE FLOR. Oaxaca, Mexico, 1912. A slender pyriform fruit, with a very long neck, about 5 inches in length and 6 to 8 ounces in weight. The surface is deep

purple in color, the skin thick for this type. Flesh free from fiber and of rich flavor. Seed small. Tree vigorous, very hardy and prolific, the parent tree producing 2000 fruits in a single crop. It is said to fruit twice a year, the principal crop ripening October to December.

GUATEMALAN TYPE

a. Varieties of California Origin

27. BEAUTY. Orange, 1911. An obovate fruit, about 4½ inches long and 1 pound in weight. The surface is slightly roughened and of a dull, dark green color, the skin thick and granular. The flesh is cream colored, nearly free from fiber and of fairly rich flavor. Seed obliquely spherical, medium sized, completely filling the cavity. The tree is remarkable for the deep wine color of the new foliage. Productiveness, fair; season, May to September.

28. BLAKEMAN. (Syn. *Habersham,* provisionally known as *Dickey No.* 2). Hollywood, 1912. Form broadly oblique, 4 inches in length and about 1 pound in weight, sometimes up to 20 ounces. Surface is nearly smooth, rarely roughened, dark green in color, the skin thick and tough, separating readily from the deep cream-yellow flesh, of fine, smooth texture and rich, agreeable flavor. An analysis has shown the fat content to be 16 per cent. Seed broadly conical, small to medium sized, completely filling the cavity. The tree is fairly hardy, a strong grower and promises to be prolific. Season, May to July.

29. BRODIA. Orange, 1914. Pyriform, somewhat oblique, about 4½ inches long, slightly over 1 pound in weight. The surface is somewhat roughened, deep green in color, the skin very thick. The flesh is very slightly fibrous, of fairly good flavor. Fat content, by one analysis, nearly 11 per cent. Seed medium sized, conical to spherical, tight in the cavity. A prolific bearer, but the tree is tender.

30. CHALLENGE. Hollywood, 1912. Form obliquely spherical, measuring about 4 inches in length and weighing 14 to 18ounces. The surface is rough, dark purple in color, the skin thick and granular. The flesh is cream-colored, smooth, the flavor not so rich as in the very best varieties. One analysis has shown it to contain 9 per cent of fat. The seed is very large, spherical, completely filling the large cavity. The tree is a moderately strong grower with slender wood, difficult to bud. It is prolific and ripens its fruits from February to May.

31. CHAMPION. Orange, 1911. Form oblong-oval, somewhat oblique, length about 4½ inches; weight 14 to 20 ounces or more. Surface smooth, green, the skin thick. Flesh cream-colored, nearly free from fiber, of fairly rich flavor. Seed medium sized, completely filling the cavity. Tree a good grower, considered rather tender. It is productive and ripens its fruits from June to the end of September.

32. COLORADO. (Syn. *Murrieta Purple}.* Los Angeles, 1912. Form obovate, length 5 inches, weight 14 to 18 ounces. The surface is slightly roughened or reticulate, dark purple in color with numerous brown dots, the skin medium thick, hard and granular. Flesh rich yellow, free from fiber, smooth, buttery, of very rich, nutty flavor. The seed is oblong-conical, medium sized, tight in the cavity. The tree is rather weak in growth

and difficult to propagate. It is moderately productive and ripens its fruits during April and May.

33. DICKEY. Hollywood, 1912. A slender pyriform fruit, broad and rounded at the base, somewhat oblique at the apex. Length nearly 6 inches, weight 14 to 20 ounces. The surface is slightly roughened, bright to deep green in color, the skin moderately thick, tough. The flesh is of rich cream-yellow color, smooth and free from fiber, and of very rich and pleasant flavor. The seed is roundish-conical, small, completely filling the seed cavity. The tree is a strong grower, but difficult to propagate. It bears good crops of fruits which ripen in May, June and July.
34. DICKINSON. Los Angeles, 1912. Form oval to obovate, 3½ inches long, weighing 7 to 12 ounces. The surface is very rough and verrucose, dark purple with large maroon-colored dots. Skin unusually thick and woody. Flesh pale greenish yellow, free from fiber, of pleasant, fairly rich flavor. Seed roundish oblate, medium sized, tight in the cavity. The tree is a good grower, very precocious and a prolific bearer, but is considered more tender than some of the other varieties of this type. The fruit ripens in April and May.
35. FERRY. Hollywood, 1912. An obovate to nearly pyriform fruit, 3¾ inches long, weighing 5 to 8 ounces. The surface is rough, light green in color, the skin thick, hard and granular. Flesh greenish yellow, slightly fibrous, the flavor not very rich. Seed oblong-conical, small, completely filling the cavity. The tree is very productive and ripens its fruits in April and May.
36. LAMBERT. Hollywood, 1915. Form obliquely obovate, almost round, 4¼ inches long, 14 to 20 ounces in weight. The surface is rough, green in color with a. brownish tinge, the skin medium thick. Flesh very slightly fibrous, the seed rather large, completely filling the cavity. Productiveness not yet determined. Season May and June.
37. LYON. Hollywood, 1911. Form broadly pyriform, indistinctly necked, oblique at apex. Length 5½ inches, weight 14 to 18ounces. Surface somewhat rough, rich green in color, the skin moderately thick and tough. Flesh deep cream-colored, smooth, free from fiber, and of rich, pleasant flavor. The fat content, according to one analysis, is 16 per cent. Seed broadly conical, medium small to medium in size, completely filling the cavity. The tree is rather difficult to propagate, and not a strong grower. It is very precocious, coming into bearing at 2 years from the bud, and is a heavy bearer. The season is April to June.
38. MESERVE. Long Beach, 1912. In form this fruit is broadly oval to spherical, measuring about 4 inches in length and weighing 14 to 16 ounces. The surface is undulating to roughened, dark green in color, the skin thick and tough. The flesh is creamy yellow in color, with slight fiber discoloration, of very rich and nutty flavor. The seed is oblate, medium sized, completely filling the cavity. The tree is a good grower, with rather slender wood. Its productiveness is somewhat in doubt, but is probably good. The season is April to June.
39. MILLER. Hollywood, 1910. Oval to obovate in form, about 4½ inches in length and 8 to 14 ounces in weight. Surface rough, deep, dull purple in color, the skin thick and

woody. Flesh deep yellow in color, free from fiber, and of rich and pleasant flavor. An analysis has shown it to contain 23 per cent of fat, the highest percentage yet found in a variety of the Guatemalan type. Seed medium large, broadly conical, completely filling the cavity. Tree a vigorous grower, productiveness not determined; the parent tree sets good crops of fruit, but drops them before they develop to any size; it is old, and has been moved in recent years, which may account for this. The fruits ripen in May and June, but hang on until late summer.

40. MONROE. Santa Ana, 1914. Form obconical to broad pyriform, length about 6 inches, weight 22 to 24 ounces. Surface nearly smooth, green in color, skin thick and tough. Flesh cream-colored, free from fiber, of rich, agreeable flavor. Seed medium sized, tight in the cavity. Tree a good grower, blooming in February and March and ripening its fruit from May to July. Productiveness not yet determined, as the parent tree is just coming into bearing.

41. MURRIETA. *(Syn. Murrieta Green).* Los Angeles, 1912.Form broadly obovate to spherical, slightly oblique, measuring 3¾ inches in length and weighing 16 to 20 ounces. The surface is undulating to slightly roughened or pitted, dark green in color, the skin medium thick and tough. The flesh is creamy yellow in color, of smooth, fine texture, free from fiber, and of rich, nutty flavor. The seed is large, spherical, completely filling the cavity. The tree is not a very strong grower and is difficult to propagate. It is moderately prolific, and the latest to ripen of the Guatemalan varieties yet fruited in California, maturing in September and October.

42. PRESIDENTE (Formerly called *El Presidente).* Los Angeles, 1912. An oblong-pyriform fruit, about 5 inches long and 14 to 18 ounces in weight. The surface is undulating, dull green with numerous large yellow dots, the skin moderately thick, rather tender. The flesh is yellow, smooth and of fine texture, the flavor very rich and pleasant, fiber almost none. The seed is medium sized, completely filling the cavity. The tree is moderately vigorous, productive, ripening its fruit in June.

43. RHOAD. Orange, 1912. Slender to broad pyriform, 4¼ inches long, about 12 ounces in weight. The surface is roughly undulating, light or yellowish green in color, the skin thick, firm. Flesh cream colored, firm, very slightly fibrous, the flavor not very rich. One analysis has shown it to contain about 10 per cent off at. The seed is large, roundish conical, tight in the cavity. The tree is a strong grower, fairly hardy and productive, ripening its crop from April to June.

44. ROYAL. Hollywood, 1913. Broadly pyriform, length 5½ inches, weight 14 to 20 ounces. The surface is rough, dark purple in color, with large maroon dots, the skin thick and woody. The flesh is cream colored, free from fiber, of fairly rich flavor, containing by one analysis 14 per cent of fat. The seed is small, completely filling the cavity. The tree is difficult to propagate and rather lacking in vigor. It is moderately productive, the parent tree producing 600 fruits in one crop. Its season is February to May.

45. RITA. Orange, 1912. Broadly pyriform, about 4½ inches in length and 8 to 14 ounces in weight. The skin is rough, thick and tough, yellow-green in color. Flesh light yellow, smooth, of pleasant and fairly rich flavor. An analysis has shown it to contain 14 per cent of fat. The seed is medium sized, tight in the cavity. Tree a

vigorous grower and good bearer. Season, May to July.

46. SEÑOR. Orange, 1912. A broadly pyriform fruit, about 5 inches in length and 14 to 24 ounces in weight. The surface is smooth, green, the skin thick and tough. Flesh light yellow, free from fiber, flavor fairly rich. One analysis has shown it to contain17 per cent of fat. The seed is rather large, tight in the cavity. The tree is vigorous, but rather straggling in habit, moderately productive, ripening its fruit from May to July. Crop for 1916 very heavy.

47. SHARPLESS. Santa Ana, 1913. An elongated pyriform fruit, broad at the basal end, measuring about 6½ inches in length and weighing 1 to 1½ pounds. The surface is slightly pitted or roughened, greenish-purple to deep purple in color, the skin thick and hard. Flesh cream-colored, smooth, free from fiber, of unusually pleasant, rich flavor. It has been, shown by one analysis to contain nearly 16 per cent of fat. The seed is small, completely filling the cavity. Tree a strong grower, having a tendency to become tall and slender. Productiveness very good, season May to August.

48. SOLANO. Hollywood, 1912. Form broadly obovate to oval, measuring 5¾ inches in length and weighing 1 to 1½ pounds. The surface is nearly smooth, somewhat glossy, bright green in color; the skin moderately thick, firm. Flesh yellowish-cream colored, firm, fine grained, the flavor pleasant but not rich. One analysis has shown it to contain about 4 per cent of fat, but it seems probable that the percentage would be considerably higher if the fruit was grown under proper conditions. Seed small, oval, tight in the cavity. The tree is a fairly vigorous grower. It fruits prolifically, the season being March to May.

49. SPINKS. Monrovia, 1915. Form nearly spherical, length about 5 inches, weight averaging 27 ounces, sometimes attaining to 30 or 35 ounces. Surface roughened, purplish-black in color, the skin thick and hard. Flesh cream colored, smooth, of rich flavor. The seed is 3 ounces in weight, completely filling the cavity. Tree precocious and a prolific fruiter. Season February to August.

50. SURPRISE. Hollywood, 1915: Oblong pyriform, about 5½ inches in length and 1 to 1¼ pounds in weight. The surface is very slightly roughened, bright green in color. Skin thick and tough. Flesh deep cream colored, free from fiber and of rich, delicious flavor. Seed small, tight in the cavity. Productiveness not yet determined. Season probably April and May.

51. TAFT. Orange, 1912. A pyriform fruit, broad and slightly necked, measuring about 5 inches in length and weighing from 14 to 25 ounces. The surface is slightly roughened, particularly around the base, deep green in color, the skin thick and firm. The flesh is light yellow, smooth, with no trace of fiber, of unusually pleasant rich flavor. One analysis shows 18½ per cent of fat. The seed is medium sized, completely filling the cavity. The tree is exceptionally handsome and vigorous, readily propagated, probably the hardiest variety of this type originated in California. It is of good productiveness and ripens its fruit from May to October. The parent tree has set a heavy crop this year.

52. ULTIMATE. Orange, 1912. A pyriform fruit, about 4 inches long and 12 ounces in weight. The surface is nearly smooth, bright green in color, the skin medium thick.

The flesh is cream colored, slightly fibrous, of rich flavor. Seed spherical, medium sized, completely filling the cavity. The tree is moderately productive, vigorous, ripening its fruits from May to September.

53. WALKER (Syn. *Walker's Prolific).* Hollywood, 1910. Form obovate to broadly pyriform, very shortly necked, measuring about 4 inches in length and weighing 5 to 8 ounces. The surface is rough, especially toward the base, deep green in color, the skin thick, woody. Flesh light cream colored, nearly free from fiber, the flavor rich, but a trifle strong. One analysis has shown it to contain nearly 19 per cent of fat. The seed is very large, tight in the cavity. The tree is a vigorous grower, reasonably easy to propagate, somewhat diffuse in habit, precocious in fruiting and a very prolific bearer. It ripens from May to August, the fruit sometimes hanging on until October.

54. WAGNER (Syn. *Hollywood Wagner}.* Hollywood, 1914. Form broadly, obovate, about 3½ inches in length and 8 to 12 ounces in weight. The surface is rough, deep green in color, the skin thick and tough. Flesh cream colored, smooth, of fairly rich flavor. The seed is large, completely filling the cavity. Tree fairly vigorous, precocious and very productive, ripening its fruit from May to August.

b. Varieties of Foreign Origin.

55. ALTO (West India Gardens No. 28). Atlixco, Puebla, Mexico, 1911. Roundish obovate to pyriform, measuring 6 inches in length and weighing 1¼ pounds. The surface is slightly undulating to rough, deep green in color, the skin thick and hard. Flesh deep cream yellow in color, smooth and buttery, free from fiber, of rich nutty flavor. Seed conical, small, tight in the cavity. Tree said to be productive. Ripens in November and December at Atlixco.

56. AMECA (Syn. *Furnival No.* 1). Ameca Valley, Jalisco, Mexico, 1912. Described as a large fruit, about 2 pounds in weight, and purplish-black in color. The skin is thick, the flesh abundant and of very rich flavor. Seed medium large, tight in the cavity. It may not be a true Guatemalan variety.

57. ATLIXCO. (West India Gardens No. 29). Atlixco, Puebla, Mexico, 1911. Form oblong to obliquely pyriform, measuring 5 inches, in length and weighing 1 pound. Surface slightly rough, greenish purple in color, the skin thick and tough, not brittle. Flesh light cream colored, smooth, fine in texture, free from fiber, of rich flavor. Seed medium to large, oblong-conical, completely filling the cavity. Tree erect, with drooping branches. Season said to be December at Atlixco.

58. CANTO (West India Gardens No. 25). Atlixco, Puebla, Mexico, 1911. .Broadly pyriform, not distinctly necked, measuring5 inches in length and weighing 1 pound. Surface slightly roughened, yellowish green, skin thick and hard. Flesh cream colored, smooth and buttery, free from fiber, of mild, very pleasant flavor. Seed very small, conical, tight in the cavity. The tree is said to be productive and ripens its fruit in January at Atlixco.

59. COLIMA (Syn. *Johnston No.* 5). Near Colima, Mexico, 1912. Described as a large, hard-skinned fruit of excellent quality. It is a vigorous grower, with unusually large foliage. It may not belong in the Guatemalan type.

60. COLON (West India Gardens No. 24). Atlixco, Puebla, Mexico, 1911. A slender pyriform fruit, 5 inches in length and about 12 ounces in weight. The surface is undulating, scarcely roughened, dark green in color, the skin medium thick, hard and tough. Flesh deep cream color, smooth, free from fiber, of rich, pleasant flavor. Seed small, completely filling the seed cavity. The tree is said to be productive, and ripens its fruit in January at Atlixco.
61. FUERTE (Syn. *El Fuerte,* West India Gardens No. 15) Atlixco, Puebla, Mexico, 1911. Form broadly oval, length 4inches, weight about 14 ounces. Surface roughened, green in color, the skin thick. Flesh yellow, smooth and buttery, of rich flavor. The seed is small, tight in the cavity. The tree propagates readily and has proved to be an unusually strong, erect grower. Its season at Atlixco is said to be October and November.
62. GORDO (West India Gardens No. 14). Atlixco, Puebla, Mexico, 1911. Form nearly round, length about 4 inches. Surface rough, deep purple in color, skin thick and tough. Flesh cream colored, of rich flavor. Tree said to be productive.
63. GRANDE (Syn. *El Grande,* West India Gardens No. 39). Atlixco, Puebla, México, 1911. Obovate to pyriform, not distinctly necked, measuring 6 inches in length and weighing about 2 pounds. The surface is rough, dark green in color, the skin thick and tough. Flesh deep cream colored, very smooth, free from fiber, of rich, delicious flavor. Seed round-conic, medium sized, completely filling the cavity. The tree is moderately vigorous, but somewhat difficult to propagate. It comes-into bloom very young .Its season at Atlixco is said to be December.
64. JOHNSTON (Syn. *Johnston No.* 6). Near Colima, Mexico, 1912. A large, thick-skinned fruit, described as of very good quality. It is characterized by unusual vigor of growth and exceedingly large foliage. May not belong to the Guatemalan type, but is placed here provisionally.
65. KNIGHT'S NO. 1 (provisional name under which the variety is being grown by E. E. Knight, the introducer). Depto. Of Jalapa, Guatemala, 1914. Form round, length 3½ inches, weight 1 pound. Surface rough, green in color, the skin thick, woody. Flesh very firm, free from fiber, yellow in color, of very rich, nutty flavor. Seed medium sized, tight in the cavity. Tree of strong, vigorous growth, said to be hardy and a prolific bearer. Season October to March in Guatemala.
66. KNIGHT'S NO. 27 (provisional name under which the variety is being grown by E. E. Knight, the introducer). Depto. Of Antigua, Guatemala, 1914. Form round, length 4 inches, weight 1½ pounds. The surface is rough, green, the skin thick and woody. Flesh firm, yellow in color, free from fiber and of very rich, nutty flavor. Seed medium sized, completely filling the cavity. The tree is a strong grower, hardy and prolific in fruiting. Its season in Guatemala is October to March.
67. LINDA (Knight's No. 29). Depto. of Antigua, Guatemala, 1914. Form round, length 4⅝ inches, weight 2 pounds. Surface rough, deep purple in color, the skin thick and woody. Flesh firm, yellowish in color, free from fiber, of rich, nutty flavor. Seed medium sized, completely filling the cavity. Tree vigorous and hardy, productiveness good. Season October to March in Guatemala.

68. MERITO (West India Gardens No. 18) Atlixco, Puebla, Mexico, 1911. Fruit long, pyriform, about 1 pound in weight, somewhat rough, purple in color with a medium seed. Season December and January at Atlixco; May and June in California.

69. MILES (West India Gardens No. 35). Atlixco, Puebla, Mexico, 1911. Fruit slender pyriform, about 1 pound in weight, deep purplish black in color. Season December at Atlixco.

70. MODESTO. Atlixco, Puebla, Mexico, 1912. Fruit large, deep purple in color, of good flavor, with a small seed. Tree is reported to be unusually productive, ripening its fruits in December at Atlixco.

71. MONTEZUMA (West India Gardens No. 33). Atlixco, Puebla, Mexico, 1911. Form obovate, sometimes broad pyriform, measuring 4½ inches in length, and weighing 14 to 16 ounces. The surface is nearly smooth, deep green in color, the skin thick and hard. Flesh deep cream color, smooth, free from fiber, of mild, pleasant flavor. Seed small to medium sized, oblate-conical, tight in the cavity. The tree is moderately vigorous in growth, but difficult to propagate. It is reported to be unusually prolific, the parent tree bearing 3000 fruits in a single crop. The season at Atlixco is December.

72. NUTMEG. Honolulu, Hawaii, 1912. Form broadly oval to nearly round, about 4 inches in length and 16 ounces in weight. Surface rough, deep purple in color, the skin thick and woody. The flesh is said to be smooth, free from fiber and of rich, pleasant flavor. Seed rather large, roundish, tight in the cavity. Tree precocious and a prolific bearer.

73. OBISPO (West India Gardens No. 41). Atlixco, Puebla, Mexico, 1911. Roundish oval to broadly pyriform, 4½ inches long, weighing 14 to 16 ounces. Surface slightly undulating, deep green in color, the skin thick, hard. Flesh deep cream colored to yellow, smooth, free from fiber, mild and pleasant in flavor. Seed oblate-conic, medium sized, tight in the cavity. Tree said to be moderately productive, ripening its fruits in December at Atlixco.

74. ORO (Syn. El *Oro,* West India Gardens No. 32). Atlixco, Puebla, Mexico, 1911. An oblong pyriform, rather slender fruit, 6½ inches long, weighing 18 ounces. Surface undulating to slightly roughened, glossy green, the skin very thick, hard. Flesh deep cream colored, smooth, of rich, pleasant flavor. Seed very small, conical, tight in the cavity. Tree erect, of vigorous growth, fairly easy to propagate. It ripens its fruits in December at Atlixco.

75. PERFECTO (Syn. *El Perfecto,* West India Gardens Nos.19 and 22). Atlixco, Puebla, México, 1911. Form broadly oblong-pyriform, *7* inches long, weighing 24 to 30 ounces. The surface is undulating to slightly rough, dark green in color, the skin thick, tough and hard. Flesh cream colored, of very smooth, buttery texture, entirely free from fiber, the flavor rich and delicious. Seed small, conical, tight in the 'cavity. The tree is only moderately vigorous in growth, and not as prolific as some of the smaller varieties, the parent tree bearing about 200 fruits in a crop. The season at Atlixco is said to be January.

76. .POPOCATEPETL. Atlixco, Puebla, Mexico, 1912. Form oval to broad pyriform,

weight about 20 ounces. Skin thick, deep purple in color. Flavor very rich. Tree said to be abundantly productive with off years

77. PUEBLA (West India Gardens No. 13). Atlixco, Puebla, Mexico, 1911. Broad pyriform, not distinctly necked, 4 inches in length, about 10 to 12 ounces in weight. The surface is nearly smooth, the skin thick and tough. Flesh yellow, smooth, of rich flavor. Seed small, tight in the cavity. The tree is a very rapid grower, erect, with drooping branches. It promises to be precocious and a prolific fruiter. Propagates very readily. Season September and October at Atlixco.

78. QUEEN (Knight's No. 28). Depto. of Antigua, Guatemala, 1914. Form oblong-pyriform, 5 inches in length, weight 1½ pounds. Skin rough, deep purple in color, thick and woody. The flesh is firm, yellowish in color, free from fiber and of very rich, nutty flavor. Seed very small, completely filling the cavity. Tree vigorous, spreading in habit, very productive. The season in Guatemala is October to March.

79. REDONDO (West India Gardens No. 16). Atlixco, Puebla, Mexico, 1911. Form spherical, length 3¼ inches, weight 12 ounces. Surface somewhat roughened, dark green in color, the skin very thick and hard. Flesh cream colored, smooth and buttery, free from fiber, of rich nutty flavor. Seed small, roundish conical, completely filling the cavity. A strong, upright growing tree, easily propagated. Said to be very productive. The season is December at Atlixco.

80. SINALOA (West India Gardens No. 37). Atlixco, Puebla, Mexico, 1911. Oval to pyriform, 7 inches long, weighing1½ to 2 pounds. The surface is rough, green in color, the skin thick and tough. Flesh deep cream colored, smooth, free from fiber, rich and pleasing in flavor. Seed roundish conical, tight in the cavity. The tree is moderately vigorous, and propagates fairly well. It is productive and ripens its fruits in December at Atlixco.

81. SCHMIDT (West India Gardens No. 40). Atlixco, Puebla, Mexico, 1911. A pyriform fruit, 5½ inches long, weighing16 to 24 ounces. The surface is rough, deep green in color, the skin thick. Flesh cream colored, smooth and buttery in texture, of rich and pleasant flavor. Seed medium sized, round-conic, completely filling the cavity. Its season at Atlixco is December.

82. VERDE (Syn. *California Trapp,* West India Gardens, No. 17). Atlixco, Puebla, Mexico, 1911. Form roundish, slightly oblique, 5¼ inches long, weighing 22 ounces. The surface is nearly smooth, green in color, the skin very tough and hard. Flesh cream colored, smooth, practically free from fiber, of rich, nutty flavor. Seed medium sized, oblate, tight in the cavity. The tree is a moderately strong grower, erect in habit, rather difficult to propagate. The season of ripening at Atlixco is December and January.

83. VOLCAN (Syn. *Ixtaccituatl,* and erroneously *Itzia).* Atlixco, Puebla, Mexico, 1912. Oval to pyriform, large purplish black in color with a thick hard skin. The quality is said to be excellent, the seed small and tight in the cavity. Season December and January at Atlixco.

WEST INDIAN TYPE

a. Varieties of Florida Origin

84. FAMILY. Miami, Florida, 1904. Form obovate to slender pyriform with a pronounced neck, about 5½ inches in length and weighing 10 to 14 ounces. The surface is undulating or nearly smooth, maroon colored, the skin moderately thick, leathery. Flesh greenish cream-colored, sometimes slightly fibrous, of mild, pleasant flavor, but .a trifle watery and lacking in richness. Seed large, roundish conical, tight in the cavity. The tree is a vigorous grower, tender, very productive. The fruit commences to ripen early in the season (July at Miami) and continues until rather late, about the end of September, making the season longer than with most other varieties.

85. POLLOCK. Miami, Florida, 1901. Form broadly pyriform, not distinctly necked, measuring 6 to 8 inches in length and weighing 1½ to 3 pounds. Surface smooth, light green in color, the skin moderately thick, leathery. Flesh rich yellow in color, smooth, buttery, free from every trace of fiber, of unusually rich and pleasant flavor. Seed broadly conical, not large in comparison with the size of the fruit, almost filling the cavity, sometimes loose, with loose seed coats. The tree is a vigorous grower, tender, not as prolific as some of the smaller fruited varieties and showing a tendency to fruit in alternate years. Its season at Miami is August and September.

86. TRAPP. . Miami, Florida, 1901. Form roundish oblate, measuring about 5 inches in length and weighing 14 to 20 ounces. The surface is smooth, yellowish green in color, the skin moderately thick, leathery. Flesh greenish yellow to yellow, smooth, free from fiber, and of fairly rich, pleasant flavor. Seed oblate, large with loose seed coats and often loose in the large seed cavity. The tree is tender, rather lacking in vigor, but is precocious and a prolific bearer. The season in South Florida is October to December, with a few fruits hanging on until the end of February.

Several other varieties of Florida origin have been planted experimentally in California, but as they are ones which are of no commercial importance in Florida and very few trees have survived the winters of California, it is not thought necessary to describe them here. Cardinal, Cyrus, Quality, Sterling and Wester may be mentioned as among this number.

Following his paper, Mr. Popenoe said: "This meeting is the inception, really, of the avocado industry in California, a very important event in every way, and this matter of varieties is one which is also very important. Let us be careful. Let those of us who are propagating and growing trees conform to the facts and not state opinions influenced by a desire to dispose of trees we may have for sale. Let us hew to the line and let the planter, especially the coming commercial planter, probe the question to the core. He can do that safely and the time is coming for him to do it."