

# THE GENUS PTELEA IN THE WESTERN AND SOUTHWESTERN UNITED STATES AND MEXICO.

---

By EDWARD L. GREENE.

---

## INTRODUCTION.

This genus, in so far as known exclusively North American, and in my view of it somewhat anomalous and of not very certain affinity, has been long in need of taxonomic investigation. In the days of George Bentham and Asa Gray it was received as consisting of about five species; one of them supposed to range all the way from New England and Canada to the sources of the Mississippi, thence southward over the whole country even to the shores of the Gulf of Mexico. A second *Ptelea* was recognized as local in Florida, while to all those empires of territory lying westward between the Mississippi River and the Pacific Ocean and including the whole of Mexico were credited three species—all recognized as typically Mexican, but believed to include all the *Ptelea* of Texas, of California, and of all the vast regions lying between those States. It is, indeed, less than ten years since it was given out that we have in all North America north of Mexico only two species and two varieties of *Ptelea*.<sup>a</sup>

But in this first decade of the twentieth century everyone will recognize that such a range as has been accorded to Bentham's middle Mexican *P. angustifolia* is impossible—at least, to any mind having an understanding of all those extremes of diversity as to soil, climate, altitude, and other potently influential conditions which exist between southern Mexico and such regions as Texas and Oklahoma on the one hand and Arizona and northern California on the other.

It was long since due that the investigation of this genus as existing in the West and Southwest should be taken in hand. The center of distribution for *Ptelea* lies somewhere in that direction. The uncounted canyons cutting into the great Mexican plateau, so rich in species of many another genus, abound in *Pteleas*, and so do Mexican mountains everywhere. The like is as true of perhaps a hundred

---

<sup>a</sup>Synoptical Flora of North America, volume 1, part 1, pp. 372, 373. 1897.

isolated mountain ranges of less extent rising up out of the midst of west Texan, New Mexican, and Arizonian deserts, which might be even more prolific of *Ptelea* species. The Grand Canyon of the Colorado and its tributary gorges seem to abound in them, all hitherto undescribed; and the same is true in respect to other extensive districts, all quite different one from another, in Utah, New Mexico, Colorado, and California.

The distributions of Mexican plant specimens, so copiously made by Mr. Pringle and by Dr. E. Palmer during forty years past, include no small number of *Pteleas*, all of which, until within the last year, have been sent forth without any critical examination at all under the one convenient name of *P. angustifolia*, while of that species itself neither of the noted explorers and collectors named appears ever to have obtained a specimen.

At different times within the last twenty-five years the present writer has gathered in several parts of New Mexico, Arizona, and California members of this genus which he was never able to identify, and which are herein first described.

At the National Herbarium there is special wealth of material in this as in many another genus, which has been procured, as it were, by special agents who have gone into many a remote and obscure corner of the West and brought back plant specimens of great value. By wise prevision of the curators in botany, Mr. Coville and Dr. Rose, the collecting of plants—at least one set—has been for years enjoined upon field parties going from the Department of Agriculture, the Geological Survey, the Bureau of Fisheries, etc., to the interior of the remoter territories; and as a result of such work our plant collection is rich beyond comparison in plants collected by this means, which are to be found in no other herbarium, whether of our own country or any other.

To the great wealth of specimens thus gathered here, I have been able to add, by courteous loan, the *Ptelea* specimens from the herbarium of Capt. John Donnell Smith, of Baltimore, those belonging to the Parry Herbarium from the Iowa State College, and those of the California Academy at San Francisco, in which also occur the types of several new species. All of these last, received much more than a year since, now by virtue of my prolonged retention of them have escaped the sad fate that befell almost the whole of that priceless herbarium in the recent earthquake and fire.

In the earliest hours devoted to close inspection and comparison, it became manifest that the real characters for species in *Ptelea* had never yet been indicated or apprehended. In other genera of woody growths, the oaks, for example, he who would distinguish and arrange the species could do nothing were he to leave unnoticed and unnoted the color and other characteristics of their trunks, their branches, and

their twigs of one year's growth; and of actually supreme taxonomic importance in the case of the oaks are the color, texture, duration, marginal indentation, and pubescence of the leaves. Not even the characteristics of the acorns are found to be of equal weight with the mere hue and texture of foliage in the classification of the oaks. And all this I find true in regard to *Ptelea*, and even more; for the characteristics of twigs of one season's growth in this genus, their colors, kinds, and degrees of pubescence, evenness and unevenness of surface, etc., are many times more diverse than they are in any oaks; and both those sets of characters—those furnished by the twigs and those presented by color and texture of foliage—either set indispensable to any natural arrangement of *Ptelea* species, are here for the first time brought to notice. The chaos that has reigned hitherto in respect to *Ptelea* of the farther West and Southwest has held sway because it has not been seen that, in the species of one region, the twigs are chestnut-brown and velvety in one set, chestnut-brown and smooth and shining in another set; while in another and remoter district all the species have cinnamon-red warty twigs; and in a third group the twigs in all the species are either yellowish or straw-colored or nearly white and in almost all smooth and shining. I say with confidence that these marked diversities which even the dead and dry herbarium specimens exhibit can not have been looked at; for no botanist would pretend that one species of shrub or tree could so vary in respect to the bark of its twigs and branches.

The fruits in this genus are also found to present a considerable array of characters available for specific diagnosis, and also even for the grouping of the species; and some new descriptive terms have seemed to be called for in connection with them. The body of the samara, while in the broad, thin-leaved species it is thin and rather flat as well as small in proportion to the wing, is by comparison large and double-convex as well as more narrowly winged in the species that have a thick and subcoriaceous foliage. This seed-bearing body is in some marked by rather closely parallel transverse ridges, with lines of gland dots running between them, or else the ridges are irregularly broken and run into a reticulation, with one or more dots in the middle of each mesh. In either instance the ridges may, at the edge of the body or a little beyond it, unite to form a wall more or less definitely surrounding the body—which wall I denominate the circumvallation—or they may pass directly into the reticulation of the wing itself, leaving the body without circumvallation.

In the Californian group of species the ridges of the body of the fruit are mostly faint or obsolete, in which case the gland dots are multiplied and very conspicuous, in the Lower Californian nearly or quite wingless species rising into a prominent tuberculation. Again, and with respect to its proximity to either the base or the summit of

its winged margin, the seed-bearing body is central in some and variously eccentric in perhaps the greater number. This body of the fruit, in its germinal stage in the flower—that is, as an ovary—is raised on a gynophore or stipe, which stipe, lengthening afterwards with the growth of the wing in which it is merged, yet appears on the surface of the wing below the body, just as the lengthened style is manifest as a line running along the surface of the wing above the body. I have expressed the centricity of the body by the phrase, “style and stipe equal,” its eccentricity in the direction of the base by “style longer than the stipe,” its nearer approach to summit—a rare condition—by “style shorter than the stipe.”

Each one of the three natural groups of *Ptelea* here outlined has its own geographical limits, and nothing in this study has more deeply interested the investigator than the geographic distribution of the groups.

The principal one of the three—that is, the group richest in species and of most extended and varied range, the group with chestnut-brown twigs and prevailingly glaucescent or bluish-green foliage—is dispersed throughout at least middle and northern Mexico, as well as adjacent southern Arizona, New Mexico, and Texas, thence northward along the Mississippi to the Great Lakes, and everywhere eastward to the Atlantic.

A second group, that with twigs almost white and foliage yellow green, forms a belt which runs eastward from northwestern Arizona along the Grand Canyon of the Colorado, there and in southern Utah forming a curious sort of boundary to the distribution of *Ptelea* northward in that part of the country, the belt reaching its eastern limit in the canyon of the Arkansas in southern Colorado, from which point, and still as a narrow belt, it runs down the Rio Grande to the neighborhood of El Paso, Texas; the belt in this part of its course not limiting but intersecting the great main division of the genus.

The third group, that with cinnamon-colored twigs, a quite peculiar hue and venation of foliage, and narrow-winged or even wingless samaras, extends in also a narrow belt, running northward and southward west of the crest of the Sierra Nevada, between northern California and at least the middle of the Lower California peninsula.

Of the fifty-nine species here defined, not quite all are new, two or three of them having been indicated somewhat recently by Dr. Small and Mr. Heller, these belonging to the Texan district.

Among the new ones are several of very recent detection in Mexico, having come to hand only after this paper was nearing completion. One of these was distributed by Mr. Pringle under the name Dr. Rose had assigned it. The others Dr. Rose had himself collected and determined to be new. He has chosen that these should all be incorporated into this monograph, rather than give them separate place among his own miscellanies of Mexican botany.

## SYNOPSIS OF THE SPECIES.

TWIGS when not velvety-hoary either chestnut-colored or darker, never whitish or straw-colored.

UPPER FACE of foliage more or less definitely bluish-green or glaucescent, never clear bright green.

Leaves in maturity thin, or thinnish, never hard and subcoriaceous; samaras in all these very large, thin and plane, the wing ample, the body small in proportion.

Leaflets dark, scarcely bluish-green, not glaucous, only lighter beneath, glabrous, odd one obovate to long-ovate, 9 cm. long; samaras suborbicular, 2 cm. long, nearly as wide.

Leaflets definitely blue-green on both faces, nearly glabrous, odd one ovate, 5 cm. long; samaras suborbicular, retuse at base, obcordate at summit.

Leaflets dull with pubescence above, even more so beneath, odd one broadly obovate, 4 cm. long; samaras suborbicular, 1.5 cm. long, sharply wrinkled and with longitudinal sharp ridge.

Leaflets dull and pubescent, odd one elliptic-obovate, 6.5 cm. long; samaras round-oval, 2.5 cm. long, sharply wrinkled, but with no median ridge.

Leaflets pale, gray-green with pubescence, odd one obovate-elliptic, 5 cm. long, of firmer texture; large samaras broadly somewhat obovate, obtuse, 3 cm. long, obtusely wrinkled and much dotted.

Leaflets less pubescent, bluish-green only when young, very firm when mature, odd one broadly obovate, 7 cm. long, cuspidate-pointed; samaras suborbicular, 3 cm. long, subcordate.

Leaflets very pale, beneath whitish with bloom, large, odd one oval to obovate, 7 cm. long, acutish; samaras small for the foliage, 2 cm. long, obtuse at base, at apex emarginate.

Leaflets very pale, whitish beneath with bloom, almost so above, small, firm, odd one broadly rhombic-lanceolate, 4.5 cm. long; samaras large for the foliage, rounded, but truncate at both ends.

Leaflets pale, whitish beneath with bloom and white down, odd one ovate, 5 cm. long, obtuse, crenate; samaras orbicular, 1.5 cm. long and wide.

Leaflets glaucous on both faces, tomentulose beneath, odd one ovate-elliptic, 5 cm. long, subentire; samaras broader than long, with cordate lobes at each end, the breadth 2 cm.

1. *P. aquilina*.

2. *P. isophylla*.

3. *P. prominula*.

4. *P. wrightiana*.

5. *P. antonina*.

6. *P. rhombifolia*.

7. *P. formosa*.

8. *P. villosula*.

9. *P. tortuosa*.

10. *P. subintegra*.

Leaves in maturity of harder, firmer texture, approaching the coriaceous.

Samaras large, the wing as broad as the body or broader.

Leaflets glabrous, glaucous on both faces, odd one narrowly cuneate-obovate, 4.5 cm. long, subentire; samaras orbicular, 2 cm. long and broad.

11. *P. coahuilensis*.

Leaflets with traces of pubescence, dark blue-green above, pale beneath, odd one 3 to 4 cm. long, round-obovate, very obtuse; samaras round-oval, 1 to 3 cm. long.

12. *P. obtusata*.

Leaflets very small, of like pale blue-green and scantily hairy on both faces, odd one barely 1.5 cm. long, oblong-obovate, obtuse; samaras larger than the foliage, suborbicular, the larger 2 cm. long.

13. *P. pumila*.

Leaflets not pale except beneath, hardly even subcoriaceous, odd one ovate or rhombic-ovate, 4 to 5 cm. long, acute, crenulate; samaras subquadrate-obovate, 2 cm. long, lobed at base and summit.

14. *P. scutellata*.

Leaflets colored as in the last, lanceolate, 6 cm. long; samaras broadly ovate-cordate, 2 cm. long, cuspidate at apex.

15. *P. cuspidata*.

Leaflets of dark only faintly bluish green above, pale beneath, odd one broadly lanceolate, 6 cm. long, acute; samaras suborbicular, 2 cm. long and wide, the broad wing not flat but full and crisped.

16. *P. undulata*.

Leaves glabrous, blue-green above, whitish beneath, odd one 5 cm. long, ovate-elliptic, acute; samaras subquadrate-oval, the longest 2 cm. long, subtruncate at both ends.

17. *P. cognata*.

Samaras smaller as a whole, the body and wing of equal breadth.

Leaves bluish-green and much punctate above, glaucescent beneath, odd one ovate or obovate, 6 cm. long, crenate; samaras orbicular, 1.5 cm. long and wide.

18. *P. crenata*.

Leaves dull blue-green above, glaucous and puberulent beneath, odd one lance-obovate to lance-rhombic, 4 to 5 cm. long, acute, crenate; samaras 1.2 to 1.4 cm. long, round-obovate, acutish at base.

19. *P. jucunda*.

Leaflets glaucescent and along the veins slightly villous as to both faces, odd one broadly obovate and acute, 4 cm. long; small, obovate, 1 to 1.5 cm. long.

20. *P. sancta*.

Leaflets deep blue green above, glaucous beneath, nearly glabrous, odd one ovate or

- obovate, 2-3 cm. long, acute, subentire; samaras very small, suborbicular, 1 cm. long.
- Samaras not so small (except in No. 22), but body in all large in proportion, and broader than the average breadth of the wing.
- Leaflets strongly glaucous on both faces, small petiolulate, lanceolate, crenulate, 4 cm. long; samaras orbicular, 1.5 cm. broad, emarginate.
- Leaflets light scarcely bluish green above and punctate, pale and villous beneath, odd one cuneate-obovate, 4 cm. long, obtuse; samaras round-obovate, 1.5 cm. long, emarginate.
- Leaflets dark blue-green, glaucous beneath, glabrous, odd one 7 cm. long, ovate-rhomboid, acute, doubly serrate-dentate; samaras round-obovate, 2 cm. long.
- Leaflets as in 24 in all but the outline, being narrow, lanceolate, 7 cm. long; samaras oval, often 3-winged, remarkably smooth.
- Leaflets of a deep scarcely bluish green above, very pale beneath with bloom and a fine pubescence, odd one rhombic-lanceolate, 6 cm. long; samaras broadly ovate or oval, acutish, at base truncate.
- UPPER FACE of foliage light-colored, never deep bluish green, in a few species glaucescent, in most of a clear bright green; samaras in all with broad wing.
- Leaves in maturity hard and subcoriaceous.
- Leaflets strongly gland-dotted, odd one 6 cm. long, ovate-elliptic, acute at base, blunt at apex; samaras round-obovate, 1.5 cm. long, retuse.
- Leaflets less notably dotted, odd one 7 cm. long, narrow-obovate, acutish; samaras nearly orbicular, 1.7 cm. long.
- Leaflets nearly dotless, light green and polished above, 5 cm. long, obovate, obtuse; samaras 2 cm. broad, not as long.
- Leaflets fine-dotted, deep green and polished, odd one cuneate-obovate, 5 cm. long, crenate, obtuse or retuse.
- Leaflets lance-elliptic, 5 cm. long, subequal, long-pointed, subentire; samaras orbicular, 2 cm. broad, much dotted.
- Leaflets dull with a short soft pubescence, odd one 5 cm. long, elliptic-lanceolate, very acute; samaras suborbicular, 1.7 cm. long, not as broad, not much dotted.
- Leaves in maturity only firmly membranaceous, at earlier stage very thin.
- Leaflets rich deep green above, pale-tomentulose beneath, odd one 6 cm. long, broad-lanceolate, acute; samaras round-oval, 2 cm. long.
- Leaflets bright light green above, pale beneath, odd one lance-rhomboid, 6 cm. long, acutish;
21. *P. parvula.*
22. *P. glauca.*
23. *P. monticola.*
24. *P. betulifolia.*
25. *P. attrita.*
26. *P. similis.*
27. *P. polyadenia.*
28. *P. aboriginum.*
29. *P. lucida.*
30. *P. toxicodendron.*
31. *P. persicifolia.*
32. *P. subvestita.*
33. *P. padifolia.*

- samaras broad-orbicular, 2 cm. wide, not as long, retuse at both ends. 34. *P. neo-mexicana*.
- Leaflets subequal, paler beneath with fine hairs; odd one lance-elliptic, 7 cm. long, very acute, entire; samaras only 1.5 cm. broad, the length less, retuse at apex. 35. *P. acutifolia*.
- Leaflets of a bright almost shining green, only lighter beneath, odd one 9 cm. long, broadly elliptic, cuspidately acute; samaras 3 cm. long, a trifle wider, orbicular, subcordate, and obcordate. 36. *P. megacarpa*.
- Leaflets light clear green above, paler and yellowish beneath, odd one 5 cm. long, lanceolate, hardly acute; samaras orbicular, 5 cm. across, truncate at base, at apex emarginate. 37. *P. laetissima*.
- TWIGS almost always glabrous, never chestnut-brown, in a few cinnamon-reddish, in most straw-colored or whitish and shining. Foliage never dark, both faces usually yellow-green (almost the hue of orange or lemon leaves).
- Leaves in maturity subcoriaceous or almost coriaceous.
- Leaflets strongly dotted, slightly pubescent, odd one ovate, 5 cm. long, blunt at apex, and emarginate; samaras orbicular, 1.5 cm. across. 38. *P. verrucosa*.
- Leaflets much less dotted, glabrous, odd one obovate, 5 cm. long, acutish; samaras suborbicular, 1.7 cm. across. 39. *P. ambigens*.
- Leaflets glabrous, coarsely dotted above, pale beneath, odd one rhombic-lanceolate, 4.5 cm. long, acute, subentire; samaras subcordate-ovate, 1.5 cm. long. 40. *P. nitens*.
- Leaflets glabrous, size and form as in the last, but pale with bloom and almost dotless; samaras orbicular, nearly 2 cm. across. 41. *P. pallida*.
- Leaflets hardly subcoriaceous, almost dotless, odd one obovate, 6 cm. long, obtuse, crenate; samaras large, 2 cm. broad, not as long, cordate and obcordate. 42. *P. straminea*.
- Leaflets small, yellow-green on both faces and glabrous, punctate, odd one ovate-lanceolate, 3.5 cm. long; samaras all triquetrous. 43. *P. nitida*.
- Leaflets glabrous, much punctate, size and form as in the last, but beneath silvery-lustrous; samaras triquetrous. 44. *P. argentea*.
- Leaflets dull yellow-green on both faces and much punctate, odd one lanceolate, 4 cm. long, obtuse; samaras large, broadly oval, 2 cm. long. 45. *P. neglecta*.
- Leaflets small, narrow-lanceolate, acute, hardly 4 cm. long, wholly yellow-green; samaras large for the leaves, triquetrous. 46. *P. triptera*.
- Leaflets larger, narrow-lanceolate, odd one 6 cm. long; samaras large, flat, suborbicular, 2 cm. wide, rounded at both ends. 47. *P. lutescens*.
- Leaflets truly lanceolate, much dotted, odd one 7 cm. long; samaras 2.2 cm. wide, cordate and obcordate. 48. *P. elegans*.
- Leaflets rhombic-lanceolate, only 3.5 cm. long; samaras orbicular, 1.6 cm. across, retuse at base, at apex cuspidate-acute. 49. *P. confinis*.



Leaves in maturity thinner, hardly firmer than membranaceous, long and very narrow.

Leaflets narrow-lanceolate, odd one 8 cm. long; samaras subreniform-orbicular, nearly 2 cm. wide.

50. *P. saligna*.

TWIGS never whitish, usually cinnamon-colored or darker at the end of the first season; leaves of a peculiar rather deep but dull green, much the same on both faces, never bluish-green or glaucous, the venation in all singularly divaricate and the veinlets colorless and obscure; samaras in most with a narrow wing and broader body, in a few wingless, thick and nut-like.

SAMARAS conspicuously but rather narrowly winged.—All Californian.

Leaflets oblong-lanceolate, lightly crenulate, 5 cm. long; smaller samaras orbicular, longer round-obovate, 2 cm. long, body very little broader than the wing.

51. *P. brevistylis*.

Leaflets of rather vivid green, oval, ample, subequal, the odd one 7 cm. long, 4 broad; samaras subreniform-orbicular, 1.7 cm. broad, 1.4 cm. long, body notably wider than wing.

52. *P. ovalifolia*.

Leaflets thin, rather light green, odd one 5 cm. long, obovate-oblong; samaras round-obovate, subulate-pointed.

53. *P. cinnamomea*.

Leaflets cuneate-obovate, odd one 4 to 7 cm. long, crenulate; samaras orbicular, 1.5 cm. across, body twice as wide as wing.

54. *P. crenulata*.

Leaflets elliptic-lanceolate, 6 cm. long, subserrulate; samaras orbicular or a trifle longer, abruptly acute, 1.5 cm. long; body much wider than wing.

55. *P. bullata*.

Leaflets oblong-lanceolate, obtuse, 5.5 cm. long, crenulate; samaras orbicular, perfectly so, 1.5 cm. wide, body twice the width of the wing.

56. *P. cycloloma*.

SAMARAS thick, nut-like, being wingless, or one species with trace of wing.—All Lower Californian.

Leaflets very small, narrowly obovate-oblong; samaras oval, 2 cm. long, encircled by a very narrow and only keel-like wing.

57. *P. nucifera*.

Leaflets not so small; samaras oval, 2 cm. long, neither winged nor keeled.

58. *P. obscura*.

Leaflets very small; samaras round-ovate, only 1 cm. long, wingless.

59. *P. aptera*.

## DESCRIPTIONS OF THE SPECIES.

### 1. *Ptelea aquilina*, sp. nov.

Twigs of the season dark red-brown, glabrous, lightly rugulose and glandular; leaves thin, of a rich deep green above, paler but not glaucescent beneath, glabrous on both faces; odd leaflet ovate-elliptic, 6 to 9 cm. long, obtusely short-pointed, rather remotely subserrate-crenate, the pair one-third smaller, more oval, slightly inequilateral; samara not large for the foliage, little more or less than 2 cm. long, broadly round-obovate, abruptly acutish, the base now and then retuse; body broadly oval, of less than the width of the wing, indistinctly circumvallate, very definitely transverse-rugose, notably glandular; style and stipe prominent, the latter longer.

Said to be common along the White River near Eagle Rock, in extreme southwestern Missouri, where it was collected June 21, 1897, by B. F. Bush, his no. 171 as in National Herbarium. One would expect it in adjacent Arkansas.

**2. *Ptelea isophylla*, sp. nov.**

Twigs of the season light chestnut-color, glabrous, sharply rugose, obscurely glandular, the older dark brown, smooth: leaves thin, of a light dull glaucescent-green on both faces and both with traces of pubescence, only the upper minutely and inconspicuously gland-dotted; odd leaflet ovate to rhombic-ovate, 4 to 6 cm. long, abruptly obtuse-pointed, subentire, the pair seldom smaller, sometimes even larger, relatively broader, scarcely inequilateral: samara very large for the foliage, 2 to 2.5 cm. long, nearly as wide, suborbicular but with obcordate summit and subcordate base; body round-oval, of less than the width of the wing, circumvallate, the transverse rugosity close but low and not very distinct, the whole only obscurely gland-dotted; stipe nearly twice as long as the style, both slender.

Known to me only as collected by Mr. B. F. Bush, June 8, 1898, from woods in the vicinity of Swan, Missouri. The type sheet in the National Herbarium has Mr. Bush's no. 211. The species is next of kin to my *P. mesochora* of the upper Mississippi region.<sup>a</sup>

**3. *Ptelea prominula*, sp. nov.**

Perhaps a low or small shrub, the twigs small, with short internodes and pubescent: leaves small, dull-green, pubescent beneath, less so above; odd leaflet broadly obovate, 4 to 4.5 cm. long, 2 to 2.5 cm. wide above the middle, all subentire, very shortly cuspidate at apex, the pair of laterals not much smaller, round-ovate: samaras suborbicular, small, 1.5 to 1.7 cm. long, very nearly as broad, subcordate at base, retuse at apex, the body of about the width of the wing, faintly dotted but strongly and prominently transverse-rugose and circumvallate, the reticulation of the wing unusually elevated and prominent, as also the subequal style and stipe, even these connected by a sharp ridge pervading whole length of the body of the fruit.

Known to me in but a single twig in mature fruit, purporting to have been collected on a creek bank near Austin, Texas, May 9, 1872, by Elihu Hall, the label bearing his distribution number, 74; but on the same sheet in the National Herbarium, and under the same label, occur two other twigs, both of *P. rhombifolia*, and with fruit very young, not half grown.

The wing of *P. prominula* is wavy rather than plane, and the elevated character of the wrinkles and reticulations is peculiar.

**4. *Ptelea wrightiana*, sp. nov.**

Twigs of the season short, slender, pubescent, and rugulose: leaves not small, very thin, dull bluish-green, finely but scantily pubescent on both faces; middle leaflet elliptic-obovate, 5 to 8 cm. long, the pair obliquely ovate, only half as large, all merely acutish, subentire: samaras very large, round-oval, 2.5 cm. long, 2.2 wide, obtuse at both ends; body round-oval, of much less than the width of the wing, not obviously either punctate or circumvallate, but the transverse wrinkles sharply prominent, as also the reticulation of the wing; style and stipe equal, both very long, rather prominent.

Turkey Creek, western Texas, June, 1849, Charles Wright, no. 82 as in the National Herbarium. Referred to in Gray, *Plantæ Wrightianæ*.<sup>b</sup>

I also refer here provisionally a sheet of specimens collected by Jermy in western Texas, near San Antonio. It has similar fruits, the foliage differing in that it is of firmer texture, and the outline of leaflets narrow, being elliptic-lanceolate. The label bears no date.

<sup>a</sup>Torrey *5*: 100. 1905.

<sup>b</sup>Part 1, p. 31.

5. *Ptelea antonina*, sp. nov.

Twigs of the season not perceptibly rugose or tuberculate, being hoary with a dense hirtellous-tomentose indument, the older dark dull-brown, smooth and glabrate: foliage at all stages of a definitely blue-green shade, also villous-pubescent beneath, deeper in color and thinly pubescent above, the texture thinnish even in maturity; middle leaflet obovate to obovate-elliptic, 4 to 6 cm. long, acute at base, obtusely cuspidate pointed at apex, faintly crenate or subentire, the pair smaller by one-fourth to one-third, obliquely and even broadly ovate rather than ovate, pointed like the odd one, all sessile: samaras of the largest, even extremely large in proportion to the foliage, 2.5 to 3 cm. long, 2.1 cm. wide above the middle, broadly somewhat obovate, obtuse at the broad apex, mucronulate by the short style, at base narrow, retuse; body oval, of somewhat less than the width of the wing, circumvallate, closely and rather sharply transverse-rugose, only minutely and somewhat obscurely though not sparingly glandular-punctate; style and stipe long and subequal, but neither prominent.

Near San Antonio, Texas, the type specimens in the National Herbarium, collected June 11, 1891, by Mr. L. H. Dewey. In 1894 A. A. Heller collected the same also at San Antonio, but in flower and half-grown leaf only. He distributed it under the same number, 1582, as that which accompanies his *P. rhombifolia*, though the two species are not so very closely related, the foliage of *P. rhombifolia* being not only almost twice as large, but of almost subcoriaceous texture.

6. *Ptelea rhombifolia* Heller, Bull. Torr. Club 26: 313. 1899, in small part only.

Twigs of the season light brown, minutely and densely pubescent, but the indument parted into interrupted lines as following the summits of the pronounced rugosities: leaves large, rather firm in maturity, of a deep green, above sparingly clothed with short depressed hairs, beneath villous-tomentulose; odd leaflet broadly obovate, rarely with some hint of the rhomboid in outline, 6 to 8.5 cm. long, 4 to 4.5 wide above the middle, acute at base, briefly and bluntly cuspidate at apex, laterals smaller by one-fourth or one-third, obliquely ovate, cuspidate: samaras very large, suborbicular, 2.5 to 3.2 cm. long, the breadth but little less, slightly subcordate at the broad base, the rounded or subtruncate apex rarely mucronately or cuspidately acutish; body large, but of less than the width of the broad wing, round-obovate, indistinctly circumvallate, closely but not prominently transverse-rugose, faintly dotted; stipe longer than the style and both long.

Southwestern Texas, where it seems to be common, especially about San Antonio. It was gathered there in immature specimens by Heller in April, 1894; the fruit wrongly characterized by him because not half grown in his specimens. Better material is in the National Herbarium from Dr. E. Palmer, 1879; Munson and Hopkins, near Kerrville, July, 1889; William R. Maxon, at Victoria, April 28, 1905. Mr. Heller's distribution number, 1582, covers this, and also the very different *P. antonina*, above described as new.

7. *Ptelea formosa*, sp. nov.

Shrub perhaps large; twigs of the season large, copiously leafy with large foliage, the bark reddish-brown, seeming glabrous but under a lens minutely hirtellous-puberulent, only minutely and obscurely rugulose and glandular, the older glabrous, smooth, cinereous-gray: leaves large, thin, pale on both faces, above glabrous except on the veins, beneath very glaucous and with scattered villous hairs not only on the veins but elsewhere; leaflets subequal, the terminal one as often smaller as larger than the other two, obovate to oval, 6 to 8 cm. long, only abruptly narrowed at base, all abruptly and cuspidately acute, the margins more or less distinctly subserrate-toothed: samaras not large for the foliage, the largest 2 cm. long, little more than

1.5 cm. wide, varying from orbicular toward ovate, only obtuse at base, the apex emarginate; body oval, both large and thick in proportion to the wing, the width of the two about equal, neither circumvallate nor the ridges running crosswise, but mostly broken into reticulation, gland-dots mostly few and rather obscure; style also quite obscure, longer than the stipe, this more obvious.

Sierra Blanca, New Mexico, August 17, 1897, at 2,120 meters, collected by E. O. Wooton and by him distributed under no. 657, at least as in my herbarium, where the only specimens known to me are preserved. It is manifestly allied rather closely to *P. villosula* of the Organ Mountains, but has a very different thin, large, and handsome foliage, the leaflets recalling the leaves of the choke cherry, but thinner and paler on both faces. I suppose by the foliage that its habitat must be in deep shaded canyons, where the air is moist from the spray of streams.

#### 8. *Ptelea villosula*, sp. nov.

Twigs of the season slender, chestnut-color, almost or quite glabrous, short-rugulose and tuberculate, those a year old not very different: leaves quite firm, membranaceous but not subcoriaceous, glaucescent above and nearly glabrous, beneath whitened by bloom and a white villous short pubescence; odd leaflet broadly rhombic-lanceolate or ovate-lanceolate, tapering to both ends but acute at neither, crenulate, the length 4 to 5 cm., the pair smaller by one-third to one-half, and varying inly inequilateral: samaras large in proportion to the foliage, 1.2 to 1.8 cm. long, almost as broad, usually subquadrate-orbicular, being broadly truncate at both ends; body neither large nor thick as compared with the wing, oval, coarsely and more or less transversely rugose, with or without a trace of circumvallation, the gland-dots few, coarse; style and stipe equal, short, neither one conspicuous.

Known only from the isolated Organ Mountains of southern New Mexico, as collected July 11, 1897, by E. O. Wooton, who distributed excellent fruiting specimens under no. 134, as in my herbarium (type) and the National Herbarium.

From the small size and rather firm texture of the foliage I infer this to be an inhabitant of no closed and shady canyon, but of the open slopes or summits of the mountains; but the collectors never vouchsafe the least information upon these important matters.

#### 9. *Ptelea tortuosa*, sp. nov.

Twigs and branches short, rigid, tortuous, those of the season smoothish, puberulent, the older dull dark brown, glabrate: mature foliage quite firm but not subcoriaceous, pale-green, glabrate and punctate above, glaucous and whitish-tomentulose beneath; odd leaflet 3.5 to 6 cm. long, ovate above a short tapering base, hardly acute at apex, lightly and unevenly crenate; the pair variously smaller, obliquely oval, obtuse at both ends, more distinctly crenate, all sessile: samara suborbicular but broader than long, the width 1.5 cm., broad and subtruncate at both ends; body round-oval, nearly central, not circumvallate, about as wide as the wing, ridges low, more or less transverse and unbroken, gland-dots obvious only under a lens.

Northern Arizona, in the San Francisco Mountain Forest Reserve, J. B. Leiberg, August 10, 1901, no. 5822 as in the National Herbarium.

The type specimens have the appearance of a low shrub of poor and arid soil. But from the same neighborhood there are before me two sheets, one by Mr. Heller, the other from Dr. McDougal, both young and immature fruit, which have the appearance of a different species; and in the first draft of this paper I had named and described them as such. The leaves are broader, larger, thinner, less pubescent beneath, etc., but they may possibly represent *P. tortuosa* as grown in a shady canyon, under the influence of an atmosphere less arid. Future research must lead to the settlement of such questions. The pubescence of the lower face of the leaves in all these has the peculiarity of seeming to be stellate or dendroid; but I think this comes about by a crossing of the hairs in tufts, rather than by an actual branching.

**10. *Ptelea subintegra*, sp. nov.**

Twigs of the season pubescent, hardly rugulose, the older and glabrate branches very dark brown and nearly smooth: foliage extremely pale on both faces, glaucous and with sparse pubescence above, almost white beneath with both bloom and villous-tomentulose indument, texture no thicker than membranaceous; middle leaflet ovate-elliptic, 4 to 5 cm. long, the pair nearly as large, obliquely ovate, all sessile, subentire, scarcely acute: samaras of middle size, much broader than long, the breadth 2 cm., the length 1.5 cm., cordate at base, obcordate at summit; body round-obovate, of much less than the width of the wing, not circumvallate, the transverse ridges few, broad and low, dots few but obvious; style and stipe equal and short.

A fine species known only from somewhere in the vicinity of Durango, Mexico, where it was gathered by Dr. E. Palmer in 1896, the label of the type specimen in the National Herbarium bearing the collector's number 846.

**11. *Ptelea coahuilensis*, sp. nov.**

Twigs of the season glabrous, chestnut-color, densely glandular-verrucose, the older less prominently so, but color the same: leaves small, subcoriaceous, glabrous, glaucous on both faces, most so beneath, and there with but the faintest trace of punctuation; odd leaflet 4 to 5 cm. long, narrowly cuneate-obovate and obtuse to rhomboid and acutish, subentire to quite crenulate, the pair one-half to two-thirds as large, otherwise similar, few being notably inequilateral: samaras large, orbicular, 2 cm. in length and breadth, seldom emarginate at either end; body oval or suborbicular; of much less than the width of the wing, the transverse ridges broad, low and obscure; style longer than the stipe.

Specimens seen only from the State of Coahuila, Mexico, the typical being Pringle's number 1937, collected in July, 1888, as found in the National Herbarium. The sheets of the same collection in the Herbarium of John Donnell Smith are exactly like it. Palmer's 391 in the National Herbarium, from San Lorenzo Canyon near Saltillo I take to be in part the same, though with broader and crenate foliage, and with several of the large samaras three-winged. But there is a very different species mixed with this under that number, 391 of Dr. E. Palmer.

**12. *Ptelea obtusata*, sp. nov.**

Twigs and branches stouter and rigid, as well as densely leafy and fructiferous, during the first season glandular, warty, and pubescent: leaves almost coriaceous, dark blue-green above, glaucescent beneath, with traces of short scattered hairs on both faces, and punctuation almost obsolete; odd leaflet 3 to 4 cm. long, very broad above an abruptly attenuate base, the outline from round-obovate very obtuse, to rhomboid-ovate, a finely crenulate margin at length revolute, the leaflet thus seeming entire, the pair similar but of all sizes: samaras large, round-oval, 1.2 to 1.5 cm. long, the breadth notably less, obtuse at both ends; body large in proportion and much elongated, long-oval, of almost or quite the width of the wing, broadly low-rugose transversely and somewhat circumvallate, dots most obscure; style and stipe equal, and both short.

Known to me only as collected somewhere in Coahuila, Mexico, in 1880, by Dr. E. Palmer, his no. 146 as in the National Herbarium.

**13. *Ptelea pumila*, sp. nov.**

Evidently dwarf, the very short twigs of the season tuberculate, puberulent, leafy with small leaves, the flowers few, some solitary: leaves greatly reduced, pale and alike glaucous on both faces, also with traces of minute hairiness; odd leaflet oblong-obovate, very obtuse, barely 1.5 cm. long, the pair half as large, oval, all subentire: samaras larger than the leaves, mostly orbicular and nearly 2 cm. long

and broad, subcordate at base, the obtuse summit conspicuously mucronate by the long protruding style-tip; body of less than the width of the wing, the coarse, low wrinkles somewhat radiating from its center.

State of Coahuila, Mexico, known in a single specimen (National Herbarium), obtained by Dr. E. Palmer, in 1904, mixed with his no. 391, which is otherwise referred to *P. coahuilensis*.

**14. *Ptelea scutellata*, sp. nov.**

Twigs of the season rugulose, puberulent, the older glabrate, nearly smooth: leaves subcoriaceous, deep blue-green above and glabrous, beneath glaucescent and obscurely puberulent; middle leaflet 4 to 5 cm. long, ovate to rhombic-ovate and elliptic-lanceolate, acute, crenulate, laterals remarkably small, seldom more than half as large, only slightly inequilateral and always narrow: samaras subquadrate-obovate to suborbicular, the more elongated 2 cm. long, the narrow base subcordate, the broad apex obcordate, or at least retuse; body round-oval, not as wide as the average width of the wing, rugose-reticulate and impressed-punctate, not circumvallate; stipe prominent, style of equal length but obscure.

Santa Eulalia Mountains, Chihuahua, Mexico, C. G. Pringle, October 2, 1886, his no. 940, as in National Herbarium. The specimens are in ripe fruit of a former season, or else of the spring preceding, while at the October date of collecting full clusters of flowers were in process of expansion.

In the Herbarium of John Donnell Smith is a specimen from the same mountains, collected by E. Wilkinson, in 1885, in the month of March, which is laden with mature foliage and fruit as from the autumnal flowering.

**15. *Ptelea cuspidata*, sp. nov.**

Twigs of the season chestnut color, puberulent, the older glabrate, all rugulose: leaves subcoriaceous, glabrous, bluish-green above, glaucous beneath, moderately punctate; odd leaflet lanceolate, 5 to 7 cm. long, acute or obtusish, evenly crenulate, the pair of the same shape and from almost as large to barely one-third smaller, all sessile: samaras broadly ovate-cordate to suborbicular, 2 to 2.3 cm. long, the width the same, the base cordate or subcordate, the apex broadly and bluntly cuspidate, also mucronulate by the short free portion of the style; body oval, much narrower than the average width of the wing, coarsely and not prominently transverse-rugose and rather closely punctate; stipe very short, style three times as long.

Santa Eulalia Mountains, Chihuahua, March 1, 1885, E. Wilkinson, in mature foliage and fruit as from an autumnal flowering. Allied to *P. scutellata*, like it in color and texture of foliage; both leaflets and fruits of different character. The only specimens seen are in the National Herbarium, sheet 130319.

**16. *Ptelea undulata*, sp. nov.**

Shrub 4 m. high, with glabrous twigs almost verrucose-glandular and rugulose: leaves subcoriaceous, nearly or quite glabrous, dull dark blue-green above, glaucescent beneath, densely punctulate on both faces; middle leaflet elliptic or even somewhat rhombi-lanceolate, acute, 6 cm. long, obscurely and unevenly crenulate, the laterals similar and not much smaller: samaras suborbicular, 2 cm. long and broad, not flat, the broad wing being full and somewhat ruffled; body oval, circumvallate, the strong rugosity mostly broken into a reticulation inclosing many and prominent gland-dots; stipe very short, style long, neither prominent.

Probably of the Burro Mountains, southern New Mexico; Rusby's 111 as in the National Herbarium, gathered July 17, 1880.

**17. *Ptelea cognata*, sp. nov.**

Twigs of the season chestnut-color; glabrous and polished, warty-rugose, the short ridges surmounted by a large gland: leaves on unusually long and slender petioles,

subcoriaceous, of a deep, slightly bluish-green above, very glaucous beneath, glabrous on both faces; middle leaflet ovate-elliptic, acute, subserrate-crenate or subentire, 3.5 to 6 cm. long, the laterals similar, often quite as large, oblique-ovate or else almost equal-sided and ovate; samaras orbicular to subquadrate-oval, the largest nearly 2 cm. long and elongated, the smaller about 1.5 cm. and orbicular; body large, oval, deeply and coarsely pitted, rather than transverse-rugose, gland dots few but not obscure; stipe very short, style quite long.

Fort Huachuca, Arizona, September, 1891, T. E. Wilcox; type in National Herbarium. Species allied to the foregoing, as indicated by the coriaceous blue-green foliage, but specifically well marked by its total lack of pubescence, long slender petioles, and unusually warty twigs.

**18. *Ptelea crenata*, sp. nov.**

Twigs bright chestnut-color and glabrous, more glandular-tuberculate than rugose; leaves bluish-green and strongly punctate above, glaucescent beneath, with traces of pubescence on both faces and in texture fairly subcoriaceous; odd leaflet ovate, not inclining to rhomboid, 4.5 to 6 cm. long, rather obtuse at apex, at base acute but sessile, the pair oval, but obliquely so, much or little small, all distinctly crenate; samaras small for the foliage, nearly orbicular, 1.5 cm. wide, not quite as long, the apex being retuse, the base truncate; body orbicular, its width rather greater than that of the wing, not circumvallate, the ridges low and irregular but coarse, dots obscure and few; style and stipe both short, subequal.

In some part of northern Arizona south of Flagstaff, J. W. Tomney, September, 1894. Allied to the last two, but not to be confused with either. Type in the herbarium of the California Academy of Sciences.

**19. *Ptelea jucunda*, sp. nov.**

Twigs of the season chestnut-brown, tuberculate, minutely and only sparsely pubescent, the older glabrate, dark, polished; leaves subcoriaceous, dull blue-green above, merely glaucescent beneath, everywhere sparsely and obscurely pubescent; middle leaflet lance-obovate or in some cuneate from the middle, 4 to 5 cm. long, obtusish to very acute, subentive or crenate, the pair not much smaller, obliquely ovate or oval, all sessile; samaras round-obovate, rather small, 1.2 to 1.4 cm. long, acutish at the narrowed base, commonly emarginate at summit; body round-oval, of the width of the wing, coarsely and irregularly rugose, lightly circumvallate, notably punctate; style and stipe equal.

San Luis Mountains, on the Mexican boundary line, Arizona, June 25, 1892, E. A. Mearns, no. 383, as in the National Herbarium. A handsome species with glossy chestnut-colored twigs and branches, rich green perhaps persistent foliage, and smallish but elegant samaras.

**20. *Ptelea sancta*, sp. nov.**

Mature twigs of the season chestnut-color, short, rugulose, glabrous or with minute scattered hairs, the older like them but glabrous; leaves small, glaucescent on both faces and small-dotted, midvein and veinlets slender and whitish, a scanty minute histellous hairiness along them, the leaf margins unevenly crenate; odd leaflet broadly obovate above and abrupt cuneate base, varying to rhomboid-ovate, obtuse or acutish, 3.5 to 4.5 cm. long, 2 to 2.5 wide above the middle, the pair smaller by less than one-third, very inequilateral; samaras of the smallest, round-obovate or subpyriform in outline, 1 to 1.5 cm. long; body large in proportion to the twig, oval or obovoid, with broad and low not very definitely transverse rugosity; style and stipe subequal, both short.

San José Mountains, Sonora, Mexico, August 3, 1893, Dr. E. A. Mearns, U. S. Army; species well marked and not otherwise known. Type in the National Herbarium.

**21. *Ptelea parvula*, sp. nov.**

Apparently a low gnarled shrub, the older branches short, stout, knotted, ash-gray, glabrate, the very short twigs of the season reddish and tomentulose: leaves subcoriaceous, small, dull pale-green above and with some pubescence along the veins, whitish beneath with bloom and also a thin white tomentulose pubescence; odd leaflet ovate or obovate, only 2 to 5 cm. long, the pair not much smaller, all acute, subentire: samara very small, suborbicular, about 1 cm. long, the width a mere trifle less, the whole very thick and firm; body oval, not prominently elevated above the surface of the wing, and like it coarsely reticulate rather than definitely rugose, the dots obscure.

Summit of the Sierra Blanca, southern New Mexico, August 1, 1897, E. O. Wooton, his number 658 as in my set of his plants; but with no note of size or special location other than that of the altitude of 6,300 feet, which is about that of the summit.

**22. *Ptelea glauca*, sp. nov.**

Shrub 3 meters high, all twigs and younger branches glabrous, nearly smooth, chestnut-color: leaves numerous, small, quite firm but hardly subcoriaceous, very glaucous on both faces, very sparingly pubescent beneath, leaflets almost equal, all conspicuously petiolate, about 4 cm. long, lanceolate, obtuse or acute, crenulate: samaras orbicular, the largest 1.5 cm. broad and long, emarginate; body round-oval, broader than the width of the wing, strongly and usually transversely rugose, lightly circumvallate; style and stipe equal, both very short.

Elegant and very peculiar species known only as obtained somewhere in southwestern Chihuahua in 1885, by Dr. E. Palmer; his distribution number 152 as in the National Herbarium.

**23. *Ptelea monticola*, sp. nov.**

Twigs of the season dull-brown, velvety-puberulent, the older glabrate and darker: leaves subcoriaceous, light green and strongly punctate above, beneath glaucescent and slightly villous as well as plainly punctate; odd leaflet broadly cuneate-obovate, 3.5 to 5 cm. long, obtuse or retuse, the pair not much smaller, very obliquely ovate, all lightly crenate, but the crenatures at length becoming obscure by revolution of the whole margin: samaras not large, round-obovate, 1.5 cm. long, of about the same breadth above the middle, the base abruptly acutish, the apex slightly emarginate or scarcely more than truncate; body large, thick, broader than the widest part of the wing, round-obovate, strongly rugose, lightly circumvallate, obscurely dotted.

Summit of the Guadalupe Mountains, western Texas, August, 1881, Dr. V. Havard; a single but full sheet of specimens in the National Herbarium. The species is probably local, for the Guadalupe Mountains are completely isolated, yet our shrub bears marks of affinity for *P. polyadenia*, the habitat of which is the banks of the Canadian River, 300 miles to the northward. Its foliage, however, is very different, and the samaras differ both in outline and markings.

**24. *Ptelea betulifolia*, sp. nov.**

Twigs of the season chestnut-color, roughened with short narrow gland-tipped ridges, glabrous and almost shining, even those of the second season as bright in color and white-dotted: mature leaves firm, hardly subcoriaceous, bright green and almost glabrous above, as nearly glabrous beneath but pale and glaucescent; odd leaflet 4 to 10 cm. long, usually ovate-rhomboid or almost rhombic, acute at both ends, but at base tapering to a short but definite petiolule, the pair smaller by one-third, obliquely rhomboid-oval, being notably inequilateral, all distinctly and doubly serrate-toothed: samaras round-obovate, 1.6 to 1.8 cm. long, usually abruptly narrowed at base and cuspidately acute at apex, or at least mucronate by the short style; body



round-oval, more or less circumvallate and coarsely low-rugose, the ridges more or less confluent into a pitted reticulation and sparsely and faintly dotted, the whole large in proportion to the wing; style and stipe about equal, both prominent.

In various mountain ranges along the Mexican border in southern Arizona; the best type from Fort Bowie, May, 1894, collected by A. K. Fisher. Vigorous branches with the largest of foliage and immature fruit are from Fort Huachuca, by Dr. E. Palmer, 1898, no. 428; both these as in the National Herbarium. A sheet taken by Dr. Mearns, in August, 1893, from near Monument no. 88 of the Mexican boundary line, on San José Mountain, presents some differences, and possibly may represent yet another species; as also many specimens collected in the Santa Rita Mountains by Mr. Pringle in 1881; though I tentatively refer all these to one.

**25. *Ptelea attrita*, sp. nov.**

Character of twigs, color and texture of foliage, etc., quite as in *P. betulifolia*, but leaflets all narrow and lanceolate, distinctly crenate rather than serrate, more or less pubescent on both faces; odd leaflet 5 to 7 cm. long, the laterals closely similar, a trifle smaller, scarcely inequilateral; samaras oval, many triquetrous; body oval, large and thick, of more than the width of the wing, not circumvallate, faintly and sparsely punctate, both its rugosity and the reticulation of the wing low and indistinct (as if worn down by friction); style and stipe both short, neither one prominent.

Camp Bowie, Arizona, J. T. Rothrock (in Wheeler's Exploration), 1874, distributed under number 499, at least as in the National Herbarium. Manifestly a near relative of *P. betulifolia*; possibly to be proven confluent with it. If so, certainly a marked variety.

**26. *Ptelea similis*, sp. nov.**

Twigs and branches chestnut-color, shining, white-dotted, pubescent the first season only, tortuous-angled rather than rugose: leaves subcoriaceous, very rich bright green above, the veins whitish-hirtellous, beneath very pale, with both a dense bloom and a short villous pubescence; odd leaflet cuneate-obovate to broadly and sharply rhomboid and rhombic-lanceolate, 4.5 to 7 cm. long, petiolulate, the pair often similar, smaller by but one-fourth or one-third, all entire or subserrulate; samaras broadly ovate, 2 cm. long, with base broad and subtruncate, apex abruptly acute and also mucronulate; body large, ovate, much broader than the wing, transverse-rugose, but the ridges broad and low, forming a circumvallation of the very edge of the body rather than beyond and around its base, gland-dots obscure; stipe very short, style thrice as long and prominent, the wing being broad all around the summit, and nearly obsolete at the very base.

Extreme eastern Arizona, 35 miles north of Clifton, at an altitude of 1,660 meters, in the canyon of Blue River, collected by Dr. Walter Hough, July 5, 1905, the specimen in the National Herbarium. Species intimately related to the two last preceding, if foliage is to be the more important index to affinity. Fruit of about the same size, but otherwise notably different from that of either; the only samara in the genus which, in so far as I have seen, may be described as ovate.

**27. *Ptelea polyadenia*, sp. nov.**

Twigs of the season invested with a velvety ferruginous tomentum concealing all unevenness, those of the second year glabrate, dull, dark brown, low-rugose: leaves subcoriaceous, 6 cm. long, the upper face light green and polished, but with also a sparse short pubescence, and closely dotted with dark glands; odd leaflet ovate-elliptic, more acute at base than at apex where it is bluntly short-pointed, laterals less than one-third smaller, obliquely oval, being rather notably inequilateral, all definitely, though lightly, crenate; samaras round-obovate, 1.5 cm. long, retuse or emarginate, thickish and hard as well as slightly concavo-convex in maturity; body round-oval,

thick, of less than the average width of the wing, not circumvallate, distinctly and closely transverse-rugose and strongly dotted; style and stipe nearly equal, both short.

The type of this uncommonly well-marked species is on National Herbarium sheet no. 15267, purporting to have been obtained by Dr. Bigelow on Whipple's Expedition, on the Canadian River, somewhere between Fort Smith and the Rio Grande.

There are two other sheets from the same general region, collected more recently, that may or may not belong here—one by Dr. E. Palmer, from between Fort Cobb and Fort Arbuckle, in 1868, and one by M. A. Carleton, from Cheyenne County, Oklahoma, June, 1891. Both these are in early and immature state, though the fruits, if not mature, are nevertheless full grown and similar to those of the type, while, if the foliage is less remarkably gland-dotted, that may well be owing to their immaturity.

**28. *Ptelea aboriginum*, sp. nov**

Twigs of the season appearing more or less rugose, but the unevenness obscured by a short dense spreading pubescence, the older glabrate, smoothish, dark grayish-brown: leaves subcoriaceous, of a rather lively green above, pale beneath, both faces with obscure and scattered hints of pubescence and conspicuously punctate; odd leaflet obovate-elliptic to rhomboid-elliptic or rhomboid-lanceolate, about 5 to 7 cm. long, acute at apex, crenate or subentire, the pair quite similar, but smaller by one-third or one-half, seldom obviously inequilateral: samara 1.5 to 2 cm. long, almost as broad, little deviating from the orbicular, truncate or emarginate at base, at apex usually obtuse, sometimes retuse; body thick, round-oval, large, its width notably exceeding that of the wing, lightly circumvallate, the transverse rugosity low, somewhat reticulately broken, the gland dots large and obvious; stipe broad, cuneate-linear, a little longer than the slender style.

Rocky hills, Signal Mountain, Indian Territory, August 4, 1891, C. S. Sheldon, no. 247, as in the National Herbarium.

**29. *Ptelea lucida*, sp. nov.**

Twigs dark red-brown, low-rugose, obscurely if at all glandular, glabrous or with scattered small hairs: leaves not large, subcoriaceous, glabrous except a few scattered hairs along the margin and the midvein beneath, bright green and shining above, lighter and without luster beneath, in no part pale or glaucescent; odd leaflet cuneate-obovate, very obtuse, 4 to 5 cm. long, 2 to 2.5 cm. wide above the middle, all obscurely crenulate, though seeming quite entire, a very narrow margin being revolute, the pair like the odd one in outline though smaller and inequilateral: samaras large for the foliage, suborbicular, 2 cm. wide, the length somewhat less, both ends being retuse, the body round-oval, of less than the width of the wing, lightly circumvallate, the rugosity obscure and inclined to be radiate.

Rocky bluffs of Comanche Peak, Texas, J. Reverchon, June, 1882, no. 1229, as in the herbarium of John Donnell Smith.

In the National Herbarium, occupying sheet no. 125, are two immature twigs from Gillespie County, Texas, collected by G. Jermy, that seem to be *P. lucida*. A third, on sheet 358374 from Kerr County, in the same State, by W. L. Bray, is obviously to be referred here, although fruit in this is only half grown. The leaves in these early specimens are of course thin, not subcoriaceous as in the mature type specimen collected by Reverchon.

**30. *Ptelea toxicodendron* Small, Bull. Torr. Club 28 : 294. 1901.**

Mature twigs dull rather dark brown, glabrous, remarkably smooth; foliage of a vivid almost shining green above, less vivid but not pale beneath, in age doubtless subcoriaceous; odd leaflet obovate, 4.5 to 6 cm. long, abruptly acute at base, at apex obtuse or even emarginate, plainly crenate, the larger doubly so, the pair commonly smaller by one-half or one-third, nearly ovate and but slightly inequilateral, all sessile: samaras unknown.

Kerrville, Texas, May 3, 1894, A. A. Heller, in flower and perhaps nearly full-grown foliage; distributed under no. 1690. In the mere outline of them the leaflets recall those of *P. betulifolia* of Arizona, but the two are otherwise very unlike.

**31. *Ptelea persicifolia*, sp. nov.**

Twigs of the season light chestnut-color but dull and puberulent, finely rugulose; foliage of a light green, almost subcoriaceous, lighter beneath, and with scanty pubescence of rather long hairs; odd leaflet somewhat broadly and elliptically lanceolate, 5 to 7 cm. long, abruptly acuminate, the pair similar and not much smaller, all sessile, subentire; samaras nearly orbicular, obtuse at both ends, 2 cm. broad, not quite as long; body round-oval, of less than the width of the wing, sinuously circumvallate, definitely transverse-rugose and strongly dotted; style twice as long as the stipe.

Huntsville, Oklahoma, June 5, 1896, Laura A. Blankinship. Species in several respects peculiar, not easy to place. Type in the National Herbarium.

**32. *Ptelea subvestita*, sp. nov.**

Mature twigs of the season quite velvety, the indument concealing the evidently lightly rugose and red-brown bark, the petioles also softly villous, and the lower face of the leaves, these subcoriaceous, glaucescent even above, and with mere traces of a scattered pubescence beyond the veins and veinlets, the latter more distinctly pubescent; odd leaflet rhombic-lanceolate to elliptic-lanceolate, acute at both ends, 4 to 6 cm. long, lightly and often obscurely crenate, the pair inequilateral and obliquely oval, smaller by about one-third; samaras suborbicular, 2 cm. long, more or less; body oval, about as wide as the wing, indistinctly circumvallate, coarsely low-rugose, the ridges not definitely transverse, scantily and obscurely punctate; style and stipe both prominent, subequal.

Dry hills about Silver City and Fort Bayard, southern New Mexico, the type specimens collected by myself in mature fruit, July 20, 1880, and preserved in the Herbarium of the California Academy. Late in November of 1905 the same was collected at Fort Bayard by Mr. J. C. Blumer, the twigs laden with mature fruit of the largest dimensions, the foliage having mostly fallen at that date; but the identity of these specimens with mine, as to the species, is certain, both from the twigs and from such foliage as was preserved.

**33. *Ptelea padifolia*, sp. nov.**

Growing twigs delicately but densely puberulent under a not sparse indument of hirsute hairs which is deciduous, those of the second season wholly divested of the hirsute hairs, only puberulent, even obscurely so, the red-brown bark appearing glabrous, scarcely at all rugulose or glandular; leaves of a vivid green above, nearly glabrous, some short hirtellous hairs along the midvein, and a few more short and appressed scattered over the surface, the lower face pale and almost hoary with a minute villous tomentum; odd leaflet from narrowly crenate-obovate to almost rhomboid-lanceolate, 5 to 7 cm. long, cuspidately acute, the pair smaller by from one-fourth to one-third, mostly oblique-oval and pointless, all neatly and evenly crenulate; samaras not quite mature but full-grown round-oval, nearly 2 cm. long, 1.8 cm. wide; body broad-oval, not as wide as the wing; style and stipe equal.

Western Texas, in the canyon of the Rio Limpia, April 26, 1902, S. M. Tracy and F. S. Earle, no. 272, as in my herbarium (type) and the National Herbarium.

Most unlike all other species of Texas regions westward in its thin deep-green foliage; this by its slender whitish veins, evenly crenulate margins, and even by the outline of the terminal leaflets, readily recalls that of some of the so-called wild cherries.

**34. *Ptelea neo-mexicana*, sp. nov.**

Shrub 2 to 3 meters high; twigs of the season olive-green, glandular-tuberculate, scarcely rugulose, minutely and sparsely villous-hirtellous, the petioles, pedicels, and lower face of leaves more pronouncedly so: foliage thin, of a very bright and lively green above with a trace of pubescence on the veins, beneath pale though hardly glaucescent, but with scattered soft hairs; odd leaflet lance-rhomboid, 5.5 to 7.5 cm. long, equally acute at each end, the laterals sometimes as large, oftener smaller by one-fourth, obliquely ovate, very inequilateral, acute, all evenly and obviously crenate, not notably punctate on either face: samaras large, thin, and flat, suborbicular, 2 cm. wide, the length less by 1 mm. or more, both ends a little retuse; body round-oval or almost orbicular, of about the width of the wing, circumvallate, the rugosity pronounced and elevated, more or less broken into transversely elongated reticulations, the gland-dots obscure; style and stipe not very unequal, the latter a trifle shorter.

In the Black Range, southern New Mexico, at about 2,270 meters, O. B. Metcalfe, October 11, 1904, his no. 1479, as in the National Herbarium. Fendler's no. 95 may perhaps be the same, but the fruit in his specimens is only half grown, yet the foliage, so much younger than in Metcalfe's, is nevertheless of a firmer texture, which is prejudicial against its being the same.

**35. *Ptelea acutifolia* Greene & Rose, sp. nov.**

Twigs of the season dull chestnut-color, rather sharply and angulately rugose and puberulent, the older glabrate, darker, obtusely and tortuously striate: leaves firm but not subcoriaceous, deep green above, paler beneath and villous-strigulose, definitely crenulate, all on elongated petioles mostly 6 to 8 cm. long; odd leaflet lance-elliptic, very acute at both ends, 5.5 to 8 cm. long, the pair usually but little smaller and of the same outline, being scarcely inequilateral: samaras small for the foliage, transversely subquadrate-orbicular to quite orbicular, the largest and most quadrate 2 cm. wide, 1.5 cm. long, such subtruncate at both ends; body very round-ovoid, hardly as broad as the wing, lightly circumvallate, not at all sharply transverse-rugose, moderately punctate; style and stipe nearly equal.

State of Jalisco, Mexico, on the road between Huejuquilla and Mesquitec, August 25, 1897, Dr. J. N. Rose, no. 2580, as in the National Herbarium. Species not otherwise known, and remarkable for the great length of the petioles, the leaflets not acuminate, though very acute.

**36. *Ptelea megacarpa* Rose, sp. nov.**

Twigs tortuously striate rather than rugulose, and with glands between the lines; bark chestnut-colored when mature, glabrous: leaves large, of thin texture, vivid dark-green on both faces, scarcely lighter beneath and not in the least glaucescent, glabrous; leaflets ovate-elliptic, the pair almost or quite as large as the odd one, oblique rather than notably inequilateral, all cuspidately acuminate, entire, the odd one 7 to 12 cm. long; samaras very large, thin and flat, the circumscription exactly orbicular, abruptly subcordate at base and equally obcordate-notched at apex, both the length and breadth about 3.5 cm.; body small in proportion to the wing, circumvallate, transverse-rugose, almost dotless, as also the wing; style of thrice the length of the stipe.

Dr. Rose establishes this handsome species on Mr. Pringle's no. 8868 (type in the National Herbarium), from the State of Hidalgo, Mexico; and it has been so distributed.

Mr. Pringle reports it to attain the dimensions of a small tree at about 1,600 meters altitude below Trinidad Iron Works, where it was obtained by him June 2, 1904. Flowers were collected May 10, but, unhappily, none but the pistillate; so that the character of the filaments can not be given.

**37. *Ptelea laetissima* Greene & Rose, sp. nov.**

Twigs of the season dull red-brown, lightly rugulose, puberulent, the older dull brown, glabrate, smoothish: leaves small, of a light very bright green above, light dull green beneath, with faint trace of minute scattered hairiness on both faces, but to the unaided eye glabrous; odd leaflet lanceolate, acutish at both ends, about 5 cm. long, the pair similar and hardly inequilateral, only about half as large, all sessile, obsolete crenulate: samaras large for the foliage, greenish in maturity, orbicular, about 1.8 cm. long and broad, truncate at base, emarginate at apex; body oval, of less than the width of the wing, prominently rugose, but the wrinkles not very continuously transverse, punctuation not strong; style and stipe nearly equal, both slender yet prominent.

Near Tehuacan, State of Puebla, Mexico, September, 1905, collected by Messrs. Rose, Painter, and Rose (no. 9927), type in the National Herbarium. The specimens being at that date in fruit nearly matured, and with foliage bright and untarnished as if that of early summer at the North, are evidence that the species comes into leaf and flower only late in summer after the beginning of the rainy season.

We have in the United States no *Ptelea* to equal this in the beauty of its light green almost brilliant foliage, a strong tinge of which is held by even the mature fruit.

**38. *Ptelea verrucosa*, sp. nov.**

Twigs of the season greenish at maturity, verrucose-roughened with crowded short rugosities each crowned with a conspicuous gland, the intervening small furrows with a few hairs, the older twigs smoother, straw-colored, glabrate but still low-tuberculate: foliage vivid green above, paler beneath, stiffly subcoriaceous, strongly punctate on both faces and with evident traces of pubescence; odd leaflet ovate above an abruptly cuneate base, 4 to 6 cm. long, cuspidately pointed but the very apex emarginate, the whole margin very lightly though not finely crenate: samara small for the foliage, exactly orbicular, 1.3 to 1.5 cm. long, quite as broad; body round-ovate, broader than the wing, lightly circumvallate, coarsely reticulate and pitted, the glands many and evident; style prominent, more than twice as long as the very short stipe.

Well marked species known in but a single but very satisfactory specimen in the collection of the old Mexican Boundary Survey, mounted on National Herbarium sheet no. 624, along with fragments of three other species. No special locality is indicated for any of the specimens.

**39. *Ptelea ambigens*, sp. nov.**

Shrub, probably low, all the twigs and branches short, stoutish, flexuous, very leafy, scarcely tuberculate and but lightly rugose in any stage, in all pale straw-color, glabrous: leaves quite firmly subcoriaceous, glabrous pale and glaucescent beneath, only very obscurely punctate; middle leaflet obovate, 4 to 5 cm. long, abruptly cuneate at base, acute at apex, the pair obliquely oval, smaller by one-half or one-third, all more or less distinctly crenate: samaras suborbicular, mostly a trifle broader than long, the width in the larger 2 cm. the length 1.8 cm., some smaller even a trifle longer than broad and inclining to obovate; body oval, of less than the width of the wing, with but faint traces of transverse ridges, no circumvallation, but copiously dotted: style shorter than the stipe.

The only specimen, but that a very good one, is from some unmentioned station in southern Utah, and was collected by Dr. E. Palmer as long ago as 1877. The species is peculiar as exhibiting along with the whitish and shining twigs of this group a foliage not so distinctly yellow-green, the lower face being quite glaucescent, as in none of its near allies.

**40. *Ptelea nitens*, sp. nov.**

Shrub low, compact, densely leafy and floriferous; twigs of the season light yellowish brown, roughened by short ridges each bearing a low tubercular gland, delicately puberulent or glabrous, the older only very light brown, smooth, glabrate, almost shining: leaves subcoriaceous, light green, coarsely gland-dotted and glabrous above, paler beneath and less glandular, obscurely pubescent along the midvein; odd leaflet 4 to 5 cm. long, rhombic-lanceolate, very acute or shortly acuminate, faintly crenate, the pair slightly inequilateral, nearly as large: samaras suborbicular inclining to ovoid, 1.5 to 1.8 cm. long, subcordate, the apex obtuse or retuse, the whole of firm hard texture and somewhat polished, body oval and very long in proportion, circumvallate, strongly wrinkled but irregularly rather than transversely, the glands few and not prominent; style greatly elongated, stipe very short, almost obsolete.

Canyon of the Arkansas River above Canon City, Colorado, July, 1892, Miss Eastwood, the type in the Herbarium of the California Academy, in copious fruit. The species was collected by myself in the same canyon in 1896, but in leaf only, no fruit seen. A specimen in young fruit, taken in June, 1892, by Mr. J. H. Cowen at Florence, well down the Arkansas Valley toward the plains, may also belong here; but the bark in this is straw-colored and the immature foliage abruptly rather long-acuminate.

**41. *Ptelea pallida*, sp. nov.**

Twigs of the season of a light yellowish-brown, puberulent, elongated-rugose, hardly glandular, those of a former season glabrate, light ash-gray, low-rugose: leaves not large, rigidly subcoriaceous, dull pale green above, beneath still paler and glaucouscent, both faces glabrous except as to mere traces of short pubescence on the veins and margin; odd leaflet elliptic-lanceolate, 3.5 to 5.5 cm. long, lateral pair one-half to three-fourths as large, obliquely oblong-lanceolate, all minutely crenate-serrulate, the petioles 3.5 to 4.5 cm. long and remarkably slender: samaras large for the foliage, 1.5 to 2 cm. long, almost exactly orbicular, very obtuse or almost truncate at each end; body oval, of less than the width of the wing, not distinctly circumvallate, the ridges low, seldom definitely transverse, usually of a sinuous irregularity and with few large gland-dots interspersed; wing smoothish, the reticulation low; style long, stipe half as long, both prominent.

Arid rocky hills above Peach Springs, northern Arizona, collected by the writer July 3, 1889; type in the National Herbarium. The species is peculiar, not easily associated with any group.

**42. *Ptelea straminea*, sp. nov.**

Fruiting twigs short, stout, almost divaricate or a little recurved, straw-colored and deeply so, almost yellowish, delicately puberulent, faintly rugulose, almost glandless, the dots few, low, obscure, the bark of older twigs whitish, glabrate, smooth and polished: leaves not thick, hardly subcoriaceous, of almost the same bright light green on both faces, everywhere glabrous, only faintly and sparsely punctate; odd leaflet obovate, 4 to 6.5 cm. long, acute at base, obtuse at apex, definitely and not finely crenate, the laterals often quite similar scarcely smaller, sometimes smaller by one-third and acute but seldom at all inequilateral: samaras large, of suborbicular outline but broader than long, the width fully 2 cm., strongly both cordate and obcordate, the whole being thus somewhat 2-lobed; body orbicular and central, of much less than the width of the wing, only faintly low-rugose, very notably and densely glandular.

Rocky slopes of the Virgin Mountains in extreme northwestern Arizona, C. A. Purpus, 1898; his no. 6165 as in the National Herbarium. In the foliage and fruit there are suggestions of affinity between this and the Californian members of the

genus; nevertheless the whitish and shining twigs attest its being really of the present singular group of northern Arizona, though differing considerably from most others as to its broad obovate leaflets of rather thinnish texture.

**43. *Ptelea nitida*, sp. nov.**

Shrub perhaps low, the branching at least compact, the fructification copious, in short and very few-flowered panicles; all twigs and branches whitish, very smooth and somewhat shining: leaves small, of the same light green on both faces, glabrous, strongly punctate; middle leaflet ovate-lanceolate, 3 to 4 cm. long, acutish at each end, obscurely crenulate, the laterals oval to lanceolate and from nearly or quite as large to smaller by about one-third, all sessile: samaras large for the leaves, all triquetrous, the faces round-obcordate, 1.5 cm. in length and breadth, retuse at base but obcordate at the broad summit; body oval, of less than the width of the wing, very faintly circumvallate, but also the rugosity equally low and obscure, as is also the reticulation of the wing, the fruit as a whole remarkably smooth and polished, the scattered punctuation hardly more obvious.

Species known to me only as in the Herbarium of the California Academy from somewhere in the Grand Canyon of the Colorado in Arizona, collected by E. O. Wooton, July 8, 1892.

**44. *Ptelea argentea*, sp. nov.**

Twigs whitish and polished, much smoother than in any others of the group, neither ridges nor glands obvious to the unaided eye: leaves hard and quite coriaceous, of a bright but not shining green above, very pale and with a silvery gloss beneath, yet everywhere perfectly glabrous, odd leaflet lanceolate or even slightly rhombic-lanceolate, acute, 3 to 4.5 cm. long, laterals smaller by about one-fourth, lanceolate, all sessile, obscurely subserrulate: samaras large for the foliage, usually triquetrous, those 2-winged and plane-suborbicular but broader than long, the breadth 1.5 cm.; body in all elongated-obovate, marked throughout its length with obscure low but quite transverse ridges and with low circumvallation, the dots many, yet inconspicuous; style slender, not long, yet longer than the short cuneiform stipe.

This species, remarkable for its leathery foliage, silvery-lustrous beneath, is known to me only as collected by Dr. F. H. Knowlton, somewhere in the Grand Canyon of the Colorado, September 10, 1889, the specimens filling two sheets in the National Herbarium (one the type). Notwithstanding the luster on the lower face of the leaflets, I am unable to detect any indument there, either topidote or otherwise.

**45. *Ptelea neglecta*, sp. nov.**

Mature twigs of the season light chestnut-color, short-rugulose, glandular-tuberculate, glabrous, those a year old whitish, smoother and shining. leaves equally light-green on both faces, subcoriaceous, glabrous, conspicuously and darkly gland-dotted, odd leaflet lanceolate, 3.5 to 5 cm. long, obtuse, the pair commonly little smaller, equal-sided, all obscurely or not at all crenate, sessile: samara very large for the foliage, 2 to 2.2 cm. long, broadly oval or obovate, retuse at both ends, body rather narrowly oval and long, of the width of the wing, not rugose but very strongly gland-dotted, the dots, however, in some disposed in rather definitely transverse lines, style and stipe subequal, both short.

Near Kanab, southern Utah, A. Wetherill, 1897; the only specimens in the Herbarium of the California Academy, consisting of two sorry fragments, but well in fruit, and evincing a marked species.

**46. *Ptelea triptera*, sp. nov.**

Shrub apparently low, the whitish or straw-colored branches more glandular-tuberculate than rugose: leaves small, in maturity subcoriaceous, yellow-green

and glabrous throughout; leaflets all lanceolate, sessile, slightly acuminate, the odd one 3 to 4.5 cm. long, the laterals notably smaller, all obscurely subserrate or dentate: samaras large for the foliage, almost invariably triquetrous, the face broadly round-cordate, the apex being narrower, yet rather broad and emarginate; body round-oval, not transverse-rugose but deeply pitted-reticulate, a conspicuous gland in each pit, the whole body slightly circumvallate, of less than the width of the wing, the fruit as a whole 1.5 cm. long and quite as broad near the base.

Grand Canyon of the Colorado, Arizona, excellent specimen in the National Herbarium, collected by J. W. Toumey, July 11, 1892.

**47. *Ptelea lutescens*, sp. nov.**

Bark of all twigs and branches whitish and shining as well as strongly rugulose and faintly and sparingly glandular-tuberculate: foliage light green, a little pale beneath, of barely subcoriaceous texture, densely and minutely dotted on both faces; odd leaflet lanceolate above a rather long cuneate base, 4 to 6 cm. long, laterals from nearly as large to smaller by one-half, obliquely lanceolate, all lightly subserrate-toothed and quite sessile: samaras large, suborbicular, 2 cm. wide and not quite as long, subtruncate across the broad summit, the base often slightly retuse; body oval, of little more than half the width of the wing, faintly transverse-rugose and circumvallate, not strongly gland-dotted; style and stipe about equal.

Species of northwestern Arizona, inhabiting canyons tributary to the Grand Canyon of the Colorado, the best specimen from Red Canyon Trail, collected June 10, 1901, by Lester F. Ward (type in the National Herbarium). Younger material, with fruit not mature, from Bright Angel Trail, by Dr. C. Hart Merriam, May 10, 1903. These last imperfect specimens have smaller relatively broader leaflets, and may possibly represent another species.

**48. *Ptelea elegans*, sp. nov.**

Twigs much smoother than in the last, and straw-colored rather than whitish, the rugosity less prominent: leaves thinner, twice as large, the middle leaflet lanceolate, acuminate, all these sessile, obscurely subserrate-toothed: samaras fully 2 cm. wide and of the same length except as notched broadly and deeply at both ends between rounded cordate lobes; body obovoid, distinctly yet delicately transverse-rugose not circumvallate, small dotted; style short, stipe none.

Grand Canyon of the Colorado, Arizona, June 14, 1891, D. T. McDougal, the shrub said to grow "in rich soil and in water." The only specimens seen are in the National Herbarium.

**49. *Ptelea confinis*, sp. nov.**

Immature twigs of the season, short, crooked, whitish, rugulose and polished, but also sparingly pubescent; those a year or two old dull brownish, glabrate, less rugulose, notably glandular-tuberculate: leaves small, of a light somewhat yellowish green above, paler and glaucescent beneath; odd leaflet 3 to 4 cm. long, rhombic-lanceolate or merely ovate-lanceolate, the laterals almost as large, obliquely lanceolate, all acutish, sessile, finely and evenly or very obscurely serrulate: samaras large for the foliage, suborbicular, 1.5 cm. long and of the same breadth, retuse at base, minutely cuspidate-acute at apex; body oval, of less than the width of the wing, conspicuously transverse-rugose and dotted; style and stipe both short.

El Paso, Texas, April, 1881, G. R. Vasey; specimens with fruit unripe, but apparently almost or quite full grown.

The plant is interesting as belonging to that group of white-barked species inhabiting the region of the Grand Canyon of the Colorado in northwestern Arizona and adjacent Utah.

The material examined is on four sheets in the National Herbarium, among which I would name that on sheet 15254 as the type.



**50. *Ptelea saligna*, sp. nov.**

Twigs and branches all with whitish shining bark faintly rugose, not obviously glandular, glabrous: foliage thinnish, clear light green above, paler beneath, pustulate-punctate but glands colorless and obscure, both faces glabrous; odd leaflet narrowly lanceolate or even lance-linear, slightly acuminate but the very apex obtuse, 5 to 9 cm. long including a distinct and not very short petiolule, the pair one-third smaller, short-petiolulate, in general narrower in proportion but equal-sided, all lightly crenate: samaras large, subreniform-orbicular, being always broader than long, the breadth 1.5 to 2 cm., base subcordate, apex not so, but now and then mucronate-acutish; body oval, smallish, of little more than half the width of the wing, very lightly transverse-rugose and faintly dotted, not circumvallate, the faint ridges becoming more prominent as graduating into the somewhat retrorse venation of the wing; style and stipe equal, or the former longer.

Nagle's Ranch, Arizona, altitude 2,240 meters, M. E. Jones, September 15, 1894, no. 6048, as in the National Herbarium (type) and the Herbarium of the California Academy. Most peculiar species, having long narrow leaflets imitating the leaves of *Salix nigra* in color, form, and texture. The locality is in northern Arizona, north of the Grand Canyon.

**51. *Ptelea brevistylis*, sp. nov.**

Twigs and branches for two seasons dark reddish brown, sparsely puberulent, not rugulose, but roughened with a rather close tuberculation: leaflets of a dull light green, ovate- to oblong- lanceolate, 5 cm. long, in age glabrate, doubtless pubescent when young, the margins lightly crenulate: samaras large and with broad thinnish wing, the outline usually round-obovate, but in some nearly orbicular, the length of the largest 2 cm., the breadth toward the summit 1.8 cm.; body of the fruit large, round-obovate, very obscurely and irregularly rugose, somewhat pubescent, strongly gland-dotted, very eccentric, its summit nearly or quite styleless and the wing thin, deeply emarginate, or obovate, the almost sessile stigma in the notch, the base of the wing merely subcordate and the stipe long.

Of this shrub, singular among Californian species of *Ptelea* by its large fruit with broad wing, which is subcordate at base and nearly obovate at summit, only a single specimen has been seen, and that imperfect as to foliage, but with a fine cluster of fruits. It was collected by G. R. Vasey in 1875, in what part of the State it is impossible to ascertain.

It is unmistakably Californian by the peculiar hue and venation of foliage that are common to all known Californian species, and which occur in no others; and its fruit is pubescent, as in none but Californian members of the genus. The type specimen is in the National Herbarium, sheet no. 321.

**52. *Ptelea ovalifolia*, sp. nov.**

Mature twigs of the season chestnut-color, lightly rugulose, quite as prominently tuberculate, minutely and not densely puberulent, those a year old glabrate, the tuberculation more prominent, the rugosity less so: leaves ample, firm, but not subcoriaceous, of a light vivid green on both faces and almost polished, a trifle paler and duller beneath, with mere traces of pubescence on veins and veinlets; terminal leaflet oval, 6.5 to 8 cm. long, 3.5 to 4 cm. broad, the pair smaller by one-fourth to one-third, obliquely oval, all sessile, nearly obtuse, some with a short and abrupt blunt point, all more or less crenate: samaras small for the foliage, subreniform-orbicular, the width being about 1.7 cm., the length only 1.4 cm., the base retuse, the apex only very obtuse; body broadly round-oval, large, its width notably greater than that of the wing, obscurely puberulent in full maturity, the rugosities tending transversely but almost wholly broken into pitted reticulations, each with a gland at bottom; style and stipe not obscure, both short.

The type, and only known specimen, I find on sheet 321, National Herbarium, collected in California in 1875 by G. R. Vasey, no other data given; in all the valuable collection of Californian *Ptelea* belonging to the California Academy there is nothing showing approach to this in respect to either its broad and large oval leaflets or its transversely elongated samaras.

**53. *Ptelea cinnamomea*, sp. nov.**

Twigs of the season of a rather bright cinnamon-red, glabrous, rugose and glandular-tuberculate but polished, those a year old similar but darker and not shining; leaves thin, of a vivid light-green above, paler beneath, copiously glandular and the glands colorless and pellucid, obscurely puberulent along the veins beneath, glabrous and shining above; middle leaflet 5 to 7.5 cm. long, obovate-oblong and obtuse as to those of the lower and fruiting branches, elliptic-lanceolate on vigorous sterile shoots, always obtuse, lightly crenate, the pair two-thirds as large, only slightly inequilateral; samara from suborbicular to somewhat obovate, about 18 mm. long, obtuse at base, at apex subulate-pointed, by the projecting style pervading a cusp-like continuation of the wing, the body very large, much wider than the width of the wing, suborbicular to round-obovate, the usual transverse ridges faint, apt to be broken into something like a reticulation, the intervals strongly glandular.

Vicinity of Ione, California, in the foothills of the Sierra, June, 1904, Ernest Brainton; type in the National Herbarium.

**54. *Ptelea crenulata* Greene, Pittonia 1: 216. 1888.**

*Ptelea angustifolia* Brew. & Wats. Bot. Cal. 1: 97. 1876, in part, not Benth.

*Ptelea crenulata* Greene, Pittonia 1: 216. 1888; Flora Franciscana 75. 1891; Man. Bay-Reg. 72. 1894, of all in part only.

Young twigs gland-dotted and sparsely hirtellous-villous, those of the second season dark brown or blackish, glabrate, glandular-tuberculate and rugulose; leaflets notably unequal, the laterals one-third to two-thirds the size of the terminal, this 4 to 7 cm. long, broadly to narrowly cuneate-obovate, all of rather light vivid green, gland-dotted and more or less puberulent, the feather veins strongly divergent and on the lower face whitish and very conspicuous, the margins crenulate, or in the largest and most vigorous specimens doubly subserrate crenulate, the apex acute or in some obtusish; branches of the inflorescence and the pedicels minutely hirtellous; filaments hirsutulous from base to above the middle; samara orbicular, 1.4 to 1.6 cm. wide, the length from slightly less to a trifle more, not flat but distinctly concavo-convex, sometimes a little retuse at both ends, sometimes at neither; body very large and thick, of nearly or quite twice the width of the wing, very broadly round-oval or almost orbicular, not circumvallate, closely but irregularly transverse-rugose and also marked, at least from the middle upward, by a broad, shallow furrow, the whole moderately gland-dotted and puberulent; style and stipe short, equal.

The description of this more common Californian species is here completed in the light of perfect material from Mount Diablo, partly as collected by the late Dr. Parry, July 4, 1872, and partly from a pocket of many mature samaras brought from the same locality, October, 1898, by Dr. C. Hart Merriam. Its habitat on that mountain seems to be in Mitchell's Canyon, on the northward slope, and, as Dr. Merriam informs me, at an elevation of about 300 meters. Flowering specimens were distributed from this station by C. F. Baker, collected by himself in April, 1903, the distribution numbers being 2942 and 2943. The species appears to occur at various other places up and down the Coast Range of middle California.

Number 5564 of Heller & Brown, from the Marysville Buttes, distributed for *P. crenulata*, I suspect may represent another and a more local species; but the specimens are, as usual, in flower only. A like degree of uncertainty exists in relation to a sheet from Kaweah, Tulare County, collected by Miss Eastwood, April, 1895.

**55. *Ptelea bullata*, sp. nov.**

Shrub dioecious, the male not known: growing twigs obscurely puberulent, rugulose; older branches dark-brown, glabrous: leaves of a light and vivid green, lighter beneath, glabrous on both faces except for a sparse short pubescence on the midvein beneath, sparsely gland-dotted and very minutely densely punctulate; terminal leaflet elliptic-lanceolate, 5 to 6.5 cm. long, acute at both ends, not very distinctly subserrulate, the pair more than two-thirds as large, more or less inequilateral; flowers many, in ample loose subcorymbose panicles, but these sessile, not equaling the foliage: samaras suborbicular or inclining to round-obovate, abruptly acute, the base truncate or subcordate, about 1.5 cm. long, 1.2 cm. wide above the middle; body large, round-ovate, much wider than the width of the wing, puberulent, faintly circumvallate, gland-dotted only while immature, in maturity finely transverse-rugose, but the intervals between the ridges elevated above them and as if inflated.

Anderson's Ranch, Lower Lake, Lake County, California, May 11, 1901, Agnes Bowman; type specimen in the Herbarium of the California Academy; no others seen. The species is a most notable one in the characters of its fruit, this being destitute of dot-like glands, and the surface of the capsular body rising in blister-like elevations between the uncommonly slender and low transverse ridges, all manifestly quite normal.

**56. *Ptelea cycloloma*, sp. nov.**

Young twigs and other growing parts puberulent, even older twigs and branches puberulent, dark-brown, tuberculate, but mature foliage more obscurely pubescent or puberulent, yet not glabrous on either face, wholly of a light but dull green; terminal leaflet oblong, lanceolate, obtuse, but at base abruptly acutish, 4.5 to 6 cm. long, somewhat crenulate, the pair about two-thirds as large, only slightly inequilateral: samaras variable as to size, the smaller 1 cm., the larger 1.5 cm., wide, orbicular, not notched or lobed or truncated at either end; body unusually large, commonly almost orbicular, its breadth nearly twice that of the wing, also unusually thick and double convex, with no trace of circumvallation, only a low transverse rugosity but with copious and prominent gland-dots.

Mountains near Mariposa in the Sierra Nevada, California, collected by J. W. Congdon, the fruiting specimens in July, 1893, the flowering in May, 1894; type in the Herbarium of the California Academy, sheet no. 12214. The flowering specimens are from the pistillate shrub, and the stamens therefore unknown. The species is most interesting, inasmuch as its fruits, with their unusually large and thick nut-like body and narrow wing, make some approach, not however any near approach, to those of the more southerly *P. aptera*.

**57. *Ptelea nucifera*, sp. nov.**

*Ptelea aptera* Brandegee, Proc. Cal. Acad. II. 2: 138. 1889, not Parry.

Evidently a low stunted shrub, the branches of the season and leaf-bearing twigs mostly less than an inch long, dark brown, puberulent, not strongly tuberculate; flowers and early foliage not known: mature leaves subcoriaceous, small, the leaflets very unequal, the lateral pair usually greatly reduced and unequally so, the odd leaflet narrowly obovate-oblong to obovate, lightly and not closely crenate, the whole leaf glabrous and coarsely gland-dotted above, scantily pubescent beneath: fruits oval, 2 cm. long, very thick and nut-like, encircled by a distinct though narrow wing, this and the body thickly beset with low tubercles frustulate at summit.

Las Huevitas, Lower California, May 20, 1889, T. S. Brandegee. Type in the Herbarium of the California Academy. It is mounted on the same sheet with some of Dr. Parry's specimens of his *P. aptera*, and even the fruits of *P. nucifera*, all detached from the twigs that supported them, have been recklessly placed within the same pocket containing those of *P. aptera*; but they are so different as to be

segregated without the least difficulty. They are fully three times—now and then four times—the size of those of *P. aptera*, but have a wing. The body has its own outline, being exactly oval in *P. nucifera*, whereas in *P. aptera* it is, as Dr. Parry said, “broadly ovate.”

The locality of *P. nucifera* is well down toward the middle of the Lower Californian Peninsula, and at some distance inland, in the vicinity of a desert water hole, while *P. aptera* is maritime, inhabiting hills that slope down to the sea, well toward the northern extremity of the peninsula.

Specimens of the fruit of *P. nucifera* appear to have been communicated by Mr. Brandegee to Dr. Parry; for in the Parry Herbarium I find attached to the type sheet two pockets, one containing his types of the fruit of *P. aptera* and so labeled; the other inclosing five perfect samaras of *P. nucifera*. This pocket is without a mark of any kind in Dr. Parry's hand; as if he may have entertained some doubt about its contents being referable to *P. aptera*.

#### 58. *Ptelea obscura* sp. nov.

Shrub slender, probably low, the slender twigs after the first season dark-brown, glabrate, closely rugulose and strongly glandular, all the growing parts, including both faces of the leaves, minutely and sparsely appressed-pubescent; odd leaflet about 3 cm. long, narrowly rhomboid-ovate, broadest in the middle or below it, acute at base, acutish at apex, lateral leaflets from less to more than half as large, inequilaterally oblong-ovate, the leaf as a whole of a light-green, the lower face lighter but not glaucescent; flower large, solitary, the petals oblong-obovate, short-unguiculate, densely puberulent without and within; filaments long, but stoutly subulate, glabrous throughout: fruit not known with certainty.

Near Santo Tomas, lower California, May 17, 1886, C. R. Orcutt; type in the United States National Herbarium. The locality of this is not, like that of *P. aptera*, maritime, but well inland among the peninsular hills and mountains, a fact which of itself would betoken specific difference, especially on our Pacific coast anywhere, and on the peninsula of lower California it would be little short of decisive. But there are excellent characters of foliage upon which to establish *P. obscura* as a species; and there is ground for a suspicion that its fruit furnished the type of the figure of so-called *P. aptera* in the third volume of Garden and Forest, as I have suggested below under that species.

#### 59. *Ptelea aptera* Parry, Proc. Davenp. Acad. 4: 39. 1884.

*Ptelea aptera* Sargent, Gard. & Forest 3: 333. fig. 45. 1890, in part.

Shrub much branched and rigid, about 2 to 5 meters high, all the growing parts appressed-pubescent, but twigs and branches after the first season dark-brown and glabrate, rugulose and glandular-tuberculate: mature foliage unknown, the leaves at early flowering small, with leaflets not very unequal, the odd one 1.5 to 2 cm. long, narrowly obovate, obtuse, crenulate, the crenatures commonly obscured by the revolute character of the whole margin: flowers solitary, or very few and corymbose, usually pentamerous, large, the filaments glabrous: fruit wingless and nut-like, round-ovate or subcordate-ovate, emarginate at apex, mostly less, rarely more than 1 cm. long, somewhat sinuately rugulose, and conspicuously dotted with coarse tubercles, depressed or flattened at summit as if pustulate when growing.

The above diagnosis is drawn wholly from Dr. Parry's original specimens as collected by himself and Mr. Orcutt from slopes of hills along the seashore at Punta Banda, northern lower California, January 24, 1883. These type specimens were made available through the courtesy of Dr. Pammel, of the Iowa Agricultural College at Ames, Iowa, where Dr. Parry's herbarium is now in keeping. I recall that Dr. Parry, immediately after his return to San Francisco from that expedition to the peninsula, reported to me the interesting discovery of a wingless-fruited *Ptelea*,

showing me specimens and remarking that the shrub was, at the time of collecting, in young leaf and early flower, but that on some branches, or else upon the ground beneath the bushes, Mr. Orcutt had first detected a few fruits, of which they succeeded, through diligent search, in obtaining a small quantity for distribution.

In addition to this sheet of type specimens I have one duplicate sheet before me, and that an excellent one, that he presented to the California Academy at the time. Another, less ample, was at the same time sent to the Herbarium of the Department of Agriculture (now in the National Herbarium) at Washington; but with this there are five good fruits. A sheet in the herbarium of Capt. John Donnell Smith, of Baltimore, in respect to the size of the branches and copiousness of flowers, the best of all, is also a part of the original collection as made by Mr. Orcutt.

The volume of Davenport Academy Proceedings, in which the species was published, was issued in 1884. Since that date there have been at least two other collections of *Ptelea* made on the peninsula, one by Mr. Orcutt at Santo Tomas, a locality not maritime but at some distance inland among the mountains; this in 1886, and another by Mr. Brandegee from an inland desert district much further southward; this in 1889. All these specimens, of both collectors, have been distributed for *P. aptera*, yet are not at all of that species. Their respective characters as distinct have been given above.

Of the figure, published in the third volume of Garden and Forest, purporting to represent *P. aptera*, there is somewhat to be said. As to the flowering branch, with immature and not even full-grown foliage, one can but admire its faithfulness to the specimens of the maritime original as in the herbaria; but the right-hand figure represents, first of all, a strong phytologic improbability. In no species of *Ptelea* is the foliage much more than half grown at flowering time; but here we have the representation of a fruiting specimen with foliage exactly like that of the flowering specimen, even as to size. This can not be true to nature. Again, no herbarium specimens of *P. aptera*—I mean the original, from Punta Banda—had been collected in mature foliage, or even with fruits attached to the branches, at the time that figure was made. Therefore the drawing must be thought of as in a degree fictitious. And a third reason for my thinking it a sad piece of patchwork is that no such fruits as those figured were collected either by Parry or Orcutt, at least at the original station of *P. aptera*. They differ from the originals greatly in size, being nearly three times as large, and they are most different in respect to outline. No one having the least command of botanical terminology could have described those figured as "broadly ovate" or as "round-ovate." Their form is subquadrate-oval; also their margins are evidently obtuse, while in real *P. aptera* they are not only acute but carinately so.

Of the artist's skill and faithfulness to the materials set before him to be put together, there is no question. The character of the tuberculation marking the whole surface of the nut, and so completely unlike that of any genuine *Ptelea*, is well brought out.

Now, since all the specimens on which this figure is based were collected either by Dr. Parry or Mr. Orcutt, I think it probable that Mr. Orcutt alone collected the fruits figured, and not at Punta Banda, but at some distance inland, namely at Santo Tomas, and in the middle of the month of May, in 1886, or three years and nearly three months later than the date of the gathering of the Punta Banda type. The only sheet I have seen of the Santo Tomas shrub bears specimens in mature foliage, but there is no fruit. On characters of the foliage alone, I have been obliged to make these specimens the type of a new species. But I trust that time and investigation may verify my conjecture that fruits of the garden and forest plate are those of my *P. obscura*.

Dr. Parry's remark that the main difference between the fruit of *P. aptera* and the other species of the genus lay in the absence of the wing, is one that came of a

rather superficial examination, and, one would say, of no comparison whatever. The total absence of those transverse rugosities and also of the small resiniferous dots that mark the body of the more genuine species of the genus, are to my mind more significant differences. Another distinction, and one which I note as more important than the absence of a wing is, that, while the seed-bearing part of the typical *Ptelea* samara is thin, so thin as to rise but a little above the wing on either face, the nut of *P. aptera* is thick and strongly double-convex. Lastly, this nut is dehiscent. Set upon edge and struck with a tack hammer, it splits into two valves as readily as an almond, whereas the seed-bearing body of the samara of ordinary *Ptelea* can be torn open but with difficulty, and at any other part with less difficulty than along the edges where the sutures ought to be.