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**TWENTY-FIRST ANNUAL REPORT**

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<sup>4</sup> Elected President of the School Board in October, 1910, to succeed Robert Moore, who had held that office for one year.

### ILLUSTRATED STUDIES IN THE GENUS *OPUNTIA* — III.

BY DAVID GRIFFITHS.

Studies in field and cultivated plantations during the past five years have brought together sufficient data to warrant the addition of the following species to the genus *Opuntia*.

#### ***Opuntia alta* sp. nov.**

A strictly arborescent species with distinct, short, cylindrical trunk, 3 to 3½ dm. in diameter and huge, spreading branches 1½ to 2 dm. in diameter, early becoming bare, brown-gray and scaly-cracked, 2½ to 3½ meters high in large specimens, mostly lower than this and often with a spread of 3 meters, mostly about 18 dm. high; joints sub-circular, ovate to obovate, quite uniform in size, about 18 by 25 cm. or possibly more often 17 by 21, blue-green, thin, with surface only slightly raised at areoles, turning gray-green and scaly-cracked in age; areoles obovate, about 3 to 5 mm. long and 3 cm. apart, slightly raised, closer on edges where they are also larger, rendering a somewhat congested appearance to spines and spicules, enlarging with age to sub-circular and often 1 cm. in diameter, tawny when young, becoming dirty black in age; spicules yellow, abundant, 8 mm. long, mostly scattered throughout the entire areole but more numerous above, increasing with age and filling and crowding the entire areole, the tissues of which proliferate slightly into a raised hemispherical structure, the outer spicules becoming dirty yellow and the central newer ones a brighter color; spines yellow, typically, one 15 to 20 mm. long, erect, and one 10 to 12 mm. long, and sloping down on sides of joints and two or even 3 long ones on edges, not increasing with age to any appreciable degree, at about 5 years of age and older the trunks becoming comparatively bare of spines but covered with the scattered, formidable, bunches of spicules only, slightly flattened and the largest ones faintly annular; flowers yellow, with broadly-rounded, wavy-margined, obovate petals, with abrupt cuspidate point, filaments yellow, greenish at very base, style white, stigma yellowish tinged, 10 to 12-parted; ovary broadly obovate to conical, about 2 by 3 cm. having small sub-circular areoles bearing spreading, unequal, yellow, fugacious spicules about 5 mm. long.

This species is distinctly arborescent in habit, one of the tallest and largest of our United States forms. It is very different indeed from *Opuntia cacanapa*, although one or

two of its characters seem to indicate a relationship. The type is yellow flowered, but there are forms which have flowers greenish-yellow, even lighter in color than the flowers of *Opuntia leptocaulis*. Owing to a constant tendency to segregation of species, it is considered preferable to recognize the yellow flowered form as typical, but I have little question but that the two forms must be considered specifically the same. The greenish-yellow flowers remain the same color throughout the day, but in the typical form where the flowers are lemon yellow they turn to orange in the afternoon, and when dried or closed upon the plant are distinctly reddish tinged, which is true of the type specimen. Corresponding changes in color take place in a large proportion of the species of the flat-jointed opuntias.

The description is a compilation of a description and two sets of notes made in the type locality when specimens were collected. The type is No. 9914 D. G., collected March 13, 1910, near Brownsville, Texas, the flowers being collected from the same plant April 20, 1910.—Plates 19 and 20, upper figure.

***Opuntia xanthoglochla* sp. nov.**

An erect to ascending, spreading, tuberous rooted species with radiating arms frequently resting on their edges on the ground, seldom over 3 dm. high, but often 8 or 9 dm. in diameter; joints usually widest near middle, but sometimes obovate, mostly more or less pointed above and below, about 10 by 15 cm., dark green, glaucous when young, wrinkled and decidedly raised-tubercular at the areoles; areoles about 4 mm. long, obovate, about 2 cm. apart, enlarging and becoming sub-circular in age, sometimes 1 cm. in diameter; leaves subulate, cuspidate, slightly flattened; spicules light brown when young, but soon turning light yellow, conspicuous and formidable, in compact, 4 to 5 mm. long tufts in upper portion of areole, increasing with age, the new ones coming from center of areole and longer from year to year, the annular growths being in concentric circles, but brown color only appears on young joints, the change in color beginning to take place early in May; spines delicate, flattened, often twisted, usually 1 or 2, the longest about 2 cm., erect, or when 2 or 3, one sloping downward; flowers lemon yellow, brownish red within, lax, 7 cm. in diameter, turning very light orange to pinkish, filaments greenish, style white, stigma white or very light yellowish, 5 to 6 parted; ovary long, obovate or obconical, somewhat tubercular with raised areoles which are small and sub-circular, about 12 mm. by 6 cm.

The plant belongs to the *Opuntia macrorrhiza* group, but, as will be noticed from the description of the plant body, it is very different from that or any other of the related species. The flowers are exceedingly variable in character. At times they are pure lemon yellow throughout with no indication of red at base of the petals. At other times the lower one-third may be red and all degrees of variations between these two extremes may be found. Sometimes the red is confined to the mid-rib of the petal, being uniformly distributed throughout its length.

The description is drawn from a cultivated plant grown from a single joint cutting set July 11, 1908. It was collected on that date near Milano, Texas. The description of the flowers and the notes on the flowers were made in the type locality from the type plants May 15, 1910. The type specimen is No. 9355 D. G., prepared May, 1910, from cultivated specimens bearing the same number.—Plate 20, lower figure.

***Opuntia Gomei* sp. nov.**

Plant ascending with main branches commonly on edge and secondary ones erect from them, mostly about 1 meter or less high and often 3 or more meters in diameter, the old centers containing much dead material when plants are large; joints sub-circular to ovate, rarely blue-green, varying to sometimes slightly yellowish green, 30 to 40 cm. in diameter, or often in last year's joints only 20 cm. in diameter and then almost invariably sub-circular, more or less raised at areoles and larger joints always more or less wavy; areoles obovate, 6 to 10 mm. in diameter, bright brown when young, changing to dirty brown and finally to gray-black, mostly raised and surrounded by an irregular, dry, brown-gray, slightly cracked rim or area, varying from 2½ to 5 cm. apart; spicules yellow, abundant, very prominent, about 1 cm. long, more abundant above, but often filling entire areole; spines yellow, somewhat flattened, often faintly annular, not twisted, 3 to 5 cm. long, erect, divergent, sometimes increasing irregularly with age, 1 to 5 in number, mostly 2 to 4; flowers yellow, stigma large, bright deep green, 9 to 10 parted; fruits reddish purple.

This species belongs to the *O. Lindheimeri* group. It inhabits the lower edges of the slight elevations in the delta of the Rio Grande River and often extends both into the huisache flats and the mesquite areas of higher elevations.

It is, therefore, in all probability, able to thrive upon land containing considerable soluble salts. It is often found growing scatteringly upon land entirely devoid of brush and which periodically overflows. In these areas, however, it frequently gets killed out on account of the overflows which occur at irregular intervals, and again becomes established thinly before another period of overflow occurs.

The description was drawn in the field when the type specimen was collected, notes on the flowers being subsequently secured. The type specimen is No. 9913 D. G., collected near Brownsville, Texas, March 13, 1910. It is named in honor of Mr. William Gome, whose assistance it is a pleasure to acknowledge.—Plates 21 and 22, lower figure.

***Opuntia pachona* sp. nov.**

Plant tall, arborescent, widely branching but not as divergent as *O. streptacantha*, with distinct cylindrical trunk 1 to 1.5 meters long, the whole plant normally 3 to 5 meters high; joints about 20 by 32 cm., obovate, deep dark green, with often a white bloom, similar to *O. streptacantha* in color but on the whole a little lighter; areoles 2½ to 3 cm. apart, ovate to sub-circular; spicules bright dark reddish brown, often formidable, in compact tufts in upper part of areoles, increasing in numbers and length with age, about 2 mm. long; spines white with bonelike tips, flattened or triangular, often slightly twisted, mostly slightly but never tightly recurved, 2 to 5 or 6 in number, mostly 2 to 4 on last year's joints, increasing on old trunks to 6 or 8 and becoming larger and stouter than on young joints, diverging in all directions upon old trunks although upon young joints they are slightly recurved or sloping downward; fruits about 40 to 45 by 50 to 55 mm. bright, glossy, purplish-red when mature, beset with rather large circular areoles containing formidable reddish brown spicules surrounded by the blackened ends of the dark tawny wool.

*Opuntia pachona* belongs to an important group of prickly pears of the highland of Mexico in which the expressed juice contains a large amount of solids in suspension. It is, therefore, one of the forms used in the manufacture of queso. Although similar in color to *O. streptacantha*, it can hardly be considered as closely related to this species, but should be looked upon as representing the *Opalillo-Lionero* group none of which, so far as I am aware, have satisfactory descriptions.

The description is a compilation from two sets of char-

acterizations, modified by several miscellaneous notes from various localities, one description having been written in the type locality and the other drawn from a three year old seedling. The type specimen is No. 8141 D. G., collected near Zacatecas, Mexico, September 19, 1905.—Plate 22, upper figure.

**Opuntia lubrica** sp. nov.

A low ascending, spreading species very similar in habit to *O. microdasys*, frequently 4½ dm. high and when well developed 10 dm. or more in diameter; joints sub-circular to obovate, about 15 by 20 cm., or in case of last joints of previous year about 12 by 15 cm., bright, glossy, leaf-green, very evidently papillate but scarcely pubescent under a lens; leaves subulate, cuspidate-pointed, 6 to 9 mm. in length; areoles 15 to 22 mm. apart, 4 to 6 mm in diameter, sub-circular, prominent; spicules prominent, 4 to 5 mm. in length, erect, bushy, in crescentic tufts in upper portion of areoles, becoming much more numerous in age, and at 2 to 4 years completely filling the areole, and, like *O. rufida* and some other species, becoming very abundant and conspicuous by proliferation of areolar tissue into short raised or columnar structures; spines exceedingly variable, sometimes [nearly absent, again quite abundant and irregularly distributed, none too many, mostly 1 to 3, becoming more numerous with age and in scattering areoles to as high as 16, mostly about 12 mm. long, but sometimes 2½ cm., yellowish, translucent, bonelike, sometimes darker at base; fruits decidedly acid, light red without with yellowish green rind and red pulp; seed small, thin shelled, about 3 mm. in diameter.

The habit of this species resembles that of *O. microdasys*, but it is a more robust plant with heavier glossy joints smooth to the touch and with color of entirely different character.

The description is a compilation of partial descriptions made in the type locality and notes upon cultivated, nearly mature plants. The type is No. 8439 D. G., collected near Alonzo, Mexico, August 23, 1906, backed up by several specimens put up from cultivated material. The cultivated plants have not yet bloomed, although one of them is now in the third year's growth from a single joint cutting.—Plate 23.

**Opuntia nigrita** sp. nov.

An erect, open-branching, stout, arborescent plant with distinct cylindrical trunk and spread of branch about like *O. pachona*, com-

monly 3 to 4 or more meters high, in cultivation plants have made a 12-dm. growth in 2 years from single joint cuttings; joints obovate, broadly rounded above, about 17 by 25 cm., papillate-pubescent under a lens, this scarcely detected by touch except in current season's growth, deep dark green, with young growth of course lighter in color; areoles at first brown turning dirty black, broadly oval to sub-circular or even obovate, about 5 mm. in longest diameter, 2 to 2½ cm. apart; leaves short, subulate, cuspidate, mostly only 3 mm. in length; spicules brown, in hemispherical bunches in upper part of areole, 2 to 3 mm. long at first, but developing anew from lower central portion of spicular area to often 1 cm. in length, this new development continuing for a couple of years; spines white, turning to a dirty gray, not very stout, but resembling those of *O. chaveña*, but longer, numerous, erect, spreading in all directions, 4 to 6 on last year's joints, but becoming very numerous in places on old trunks, even 25 to 30, varying in some areoles from 15 to 25 mm. in length; besides spines and spicules, current year's joints bear two delicate, hairlike, fugacious spines, about 5 mm. long; fruit small, about 3 × 3.5 cm. purplish red, with pulp deeper in color and seeds easily separable.

The species is one of the tree forms of the highland of Mexico of the southern Zacatecas and Aguas Calientes region. It is very different from any other species with which I am familiar, especially in size of fruit. My field notes indicate that when it was collected it was thought to belong to the *O. chaveña* group. Its brownish red spicules, however, make it appear quite different and its fruits are entirely different. It has been seen in cultivation in several localities and apparently native to the vicinity of Aguas Calientes.

The description was drawn in the main from a cultivated specimen in the third year of its growth from a single joint cutting, amended by notes from the type and other localities in Mexico. No flowers of it have been seen. The type specimen is one bearing my collection No. 8138, prepared from a cultivated specimen which was collected under the same number near Aguas Calientes, Mexico, September 16, 1905.—Plate 24.

***Opuntia Ellisiana* sp. nov.**

Plant spreading, ascending, laxly branched, 10 to 14 cm. high and 14 to 20 dm. in diameter, depending upon moisture and fertility conditions; joints light glaucous blue-green, obovate or ovate, about 20



by 24 cm., slightly elevated at areoles when young; areoles at first white, almost cottony, turning gray and finally black, small, 2 or 3 mm. in diameter; leaves long, prominent, circular in section, subulate, cuspidate, soon recurved, 12 to 15 mm. in length; spicules yellow, but never prominent except on fruit where there are only a few in upper areoles, all but absent from joints; spines entirely absent; flowers deep yellow, changing to orange, reddish when closed, some of the outer perianth segments tinged with dull greenish red in bud, about 6 cm. in diameter when fully open, filaments and style white. stigma very light greenish yellow, 7 parted; fruit pyriform, deep reddish purple.

The species is known only in cultivation and only from southern Texas. It is rather common in gardens at Corpus Christi and Brownsville, especially. It was received first through Mr. James Anderson, Jr., and Professor J. Coswell Ellis, from Corpus Christi, and afterwards collected there by myself. It is only remotely related to any other spineless opuntia described. It is about as smooth as any species, much more hardy than the *O. ficus-indica* group, and is said never to be injured by cold weather at Corpus Christi and is apparently hardy at San Antonio.

The description is a compilation of two sets of notes taken upon a cultivated plant. The type is a specimen bearing No. 8626 D. G., prepared from a cultivated plant, the cuttings for which were secured by myself in Mexican gardens at Corpus Christi, Texas, on 1907.—Plate 25.

***Opuntia Wootonii* sp. nov.**

A very open spreading, ascending species, about 6 dm. high (3 years old) and 1½ to 2 meters in spread of branch, the main limbs horizontal, ascending or resting on edge on ground, the secondary ones erect from them; joints widest near the middle, pointed at either end, about 18 by 32 cm., glaucous, light blue-green becoming more yellow in age; areoles broadly oval, about 5 to 7 mm. in length and 3½ to 4 cm. apart, increasing in size with age, at first tawny and then gray, leaves large, slightly flattened, erect, but recurved at tip in age, subulate, cuspidate-pointed, 15 to 20 mm. long; spicules long, formidable, in an unequal, hemispherical tuft in upper portion of areole, often 1½ cm. long above and on edges of joints, increasing with age and often filling the entire areole; spines very long, formidable, erect-spreading, flattened, twisted, faintly annular, the longest often 9 cm. in length and shortest about 1 cm., but the long ones greatly predominating and more commonly about 7 cm., 4 to 6 on last year's joints and increasing

on old trunks to 8 or 10, the longest ones sometimes 11 cm. long, tips bonelike, changing abruptly to white or often yellowish or even translucent which in turn fades into various degrees of reddish brown or even nearly black at base; flowers yellow to deep orange-red; fruit reddish-purple.

This species has been cultivated several years by Professor E. O. Wooton in whose honor it is named. It is one of the most striking of our native opuntias and is easily recognized by its large joints, pointed at both ends like *O. occidentalis*, and exceedingly formidable, showy spines which resemble those of *Opuntia tricolor* more closely than any other species with which I am familiar.

The description given above is taken from a cultivated plant in the third year of its development, supplemented by notes upon flowers and fruits grown at Messilla Park, N. M., by Professor Wooton, who collected the species originally in the Organ Mountains of New Mexico. The type bears my collection No. 9171 which was prepared May 4, 1910, from a cultivated plant the cutting for which was secured in April, 1908, from Professor Wooton's collection. The species was originally collected under Professor Wooton's No. 3030. The plants from which the above description was drawn bore but one flower bud this year, the third season from planting.—Plate 26, upper figure, and Plate 27.

***Opuntia atrispina* sp. nov.**

Plant 7 to 10 dm. high and 12 to 15 dm. in diameter or often smaller, the main branches spreading with edges on the ground or ascending, the secondary branches mostly erect; joints obovate, rounded above to sub-circular, mostly slightly raised at areoles, about 11 by 15 cm. and 1 cm. thick, yellowish green; areoles obovate, or on young joints mostly elongated and raised below, about 5 mm. long and 25 mm. apart; spicules yellow, prominent, unequal, occupying a large triangular area in upper part of the areole, but finally scattered throughout its entire area but more numerous above, 6 to 12 mm. long, increasing with age; spines jet black to reddish brown at base with yellow tips, the transition between the two colors being quite abrupt, but the proportion of the two colors varying tremendously in different individuals, mostly one large, sub-erect one, 25 mm. long and one smaller, recurved one about 13 mm. long immediately below it and 2 shorter beside and a little below the latter about 6 mm. long; scattered among the spines are a few fugacious, reddish brown spic-

ules with yellow tips, all finally fading to a dull dirty gray or brown; flowers yellow changing to orange, about 4 or 5 cm. in diameter when fully opened, greenish within with filaments yellowish above and greenish below, style white, stigma yellowish, small, 7 parted; fruit small, pyriform, slightly to quite deep pitted above, reddish purple without and greenish yellow within, rind quite succulent and pulp small in amount having a slight aroma when first cut, covered with small, sub-circular areoles not over 1 mm. in diameter and 5 or 6 mm. apart.

The species is more closely related to *O. phaeacantha* than any other species, but differs decidedly in many characteristics as indicated above. Well matured plants are quite different in habit. Although always greenish yellow within, the fruits differ decidedly in size.

The description was drawn in the type locality and has been amended by subsequent notes secured near Devil's River, Texas. The type is No. 9411 D. G., collected near Devil's River, Texas, July 20, 1908.—Plate 26, lower figure.

***Opuntia Sinclairii* sp. nov.**

An erect or ascending, open branching species making a shrub 12 dm. high and 1½ to 2 meters in diameter; joints broadly obovate and broadly rounded above, commonly 20 by 22 cm., although often larger and smaller, blue-green, mostly somewhat glaucous, especially when young; areoles sub-circular to obovate, 5 to 6 mm. in length, at first brown, becoming dirty black; leaves 6 to 8 mm. long, sub-circular in section, subulate, cuspidate-pointed, mostly recurved; spicules reddish brown, numerous, scattered, unequal, 5 to 6 mm. long, the tips often fading to yellow and even dirty grayish; spines yellowish, bonelike to chalky white with light brown bases, mostly 3 or 4, often 2 to 5, erect, divergent, increasing with age to often about 8, the longest 4 to 4½ cm. long, flattened, usually not twisted, faintly when at all annular; flowers yellow, fading to orange, filaments yellow, style white, stigma bright green, 8 to 9 parted; fruit reddish purple throughout; seed small.

This species is rare in the type locality and is rather closely related to *Opuntia Lindheimeri*, from which it differs in having reddish-brown spicules and spines colored at base, these characters being constant and distinct. It has been in cultivation with us now for the past 6 years and usually produces flower and fruit in abundance the third year from single joint cuttings.

The description is a compilation of several drawn from a number of cultivated plants, together with subsequent notes upon the flowers. It is named in honor of Mr. Wm. Sinclair to whom I am greatly indebted for assistance. The type is No. 9003 D. G., prepared from a cultivated specimen May 2, 1910. The original cuttings were secured near San Antonio, Texas.—Plate 28.

#### EXPLANATION OF PLATES.

Plate 19.—*Opuntia alta*, from type plant.

Plate 20.—Above, *Opuntia alta*, type plant. Below, *O. xanthoglochis*, from cultivated plant.

Plate 21.—*Opuntia Gomei*, from type plant.

Plate 22.—Above, *Opuntia pachona*, showing a diseased spot, from a cultivated seedling. Below, *O. Gomei*, type plant.

Plate 23.—*Opuntia lubrica*, from cultivated plant grown from cutting.

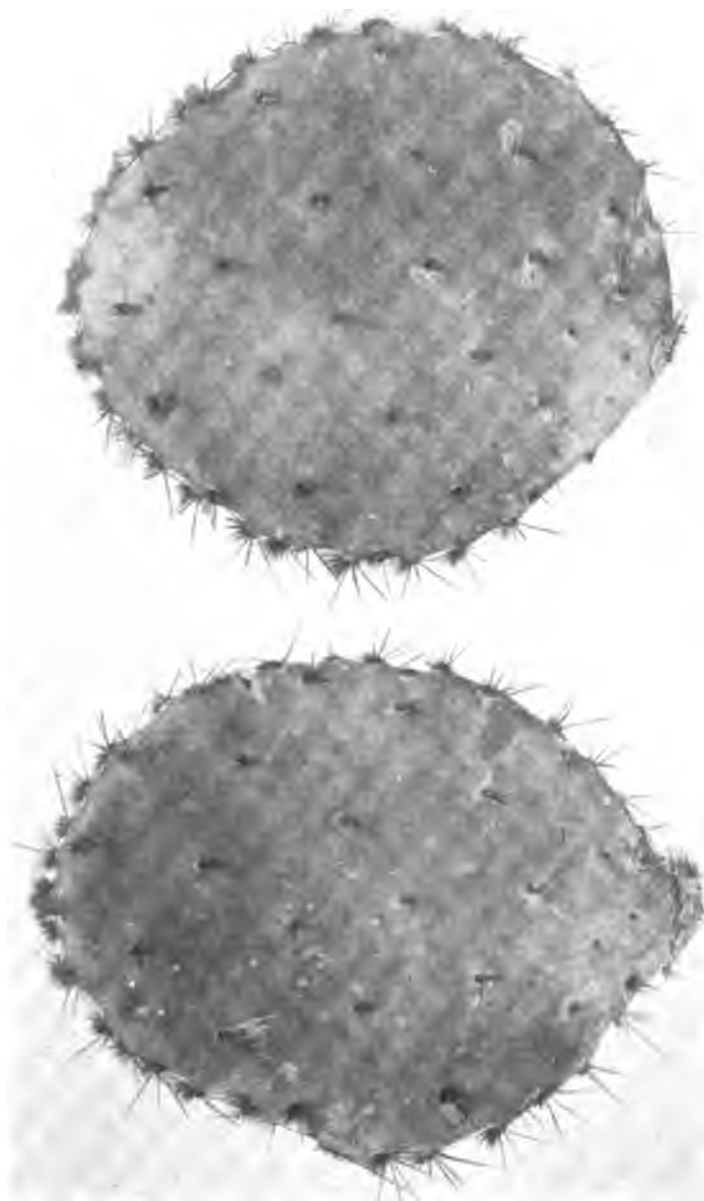
Plate 24.—*Opuntia nigrita*, from a nearly mature plant cultivated from a cutting.

Plate 25.—*Opuntia Ellisii*, from a cultivated plant grown from a cutting secured in cultivation at Corpus Christi, Texas.

Plate 26.—Above, *Opuntia Wootonii*, in third year's growth from a cutting from Professor Wooton's plantation. Below, *O. atrispina*, from Devil's River, Texas. A small plant.

Plate 27.—*Opuntia Wootonii*. See upper figure in plate 26.

Plate 28.—*Opuntia Sinclairii*, from a plant cultivated in the type locality.



OPUNTIA ALTA.

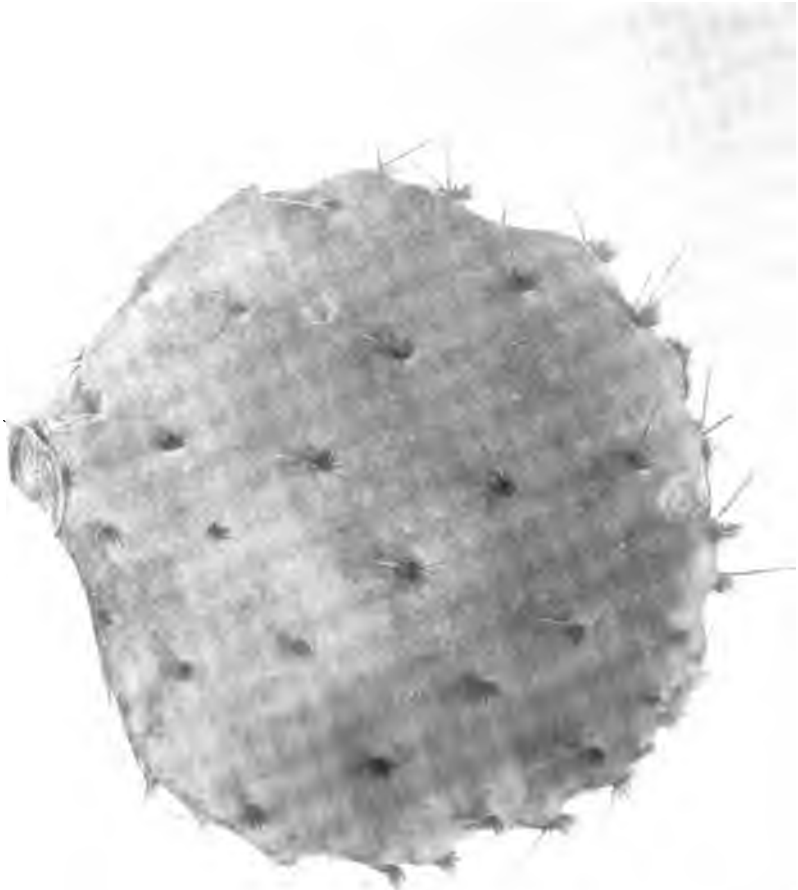




OPUNTIA ALTA AND O. XANTHOGLUCHIA.

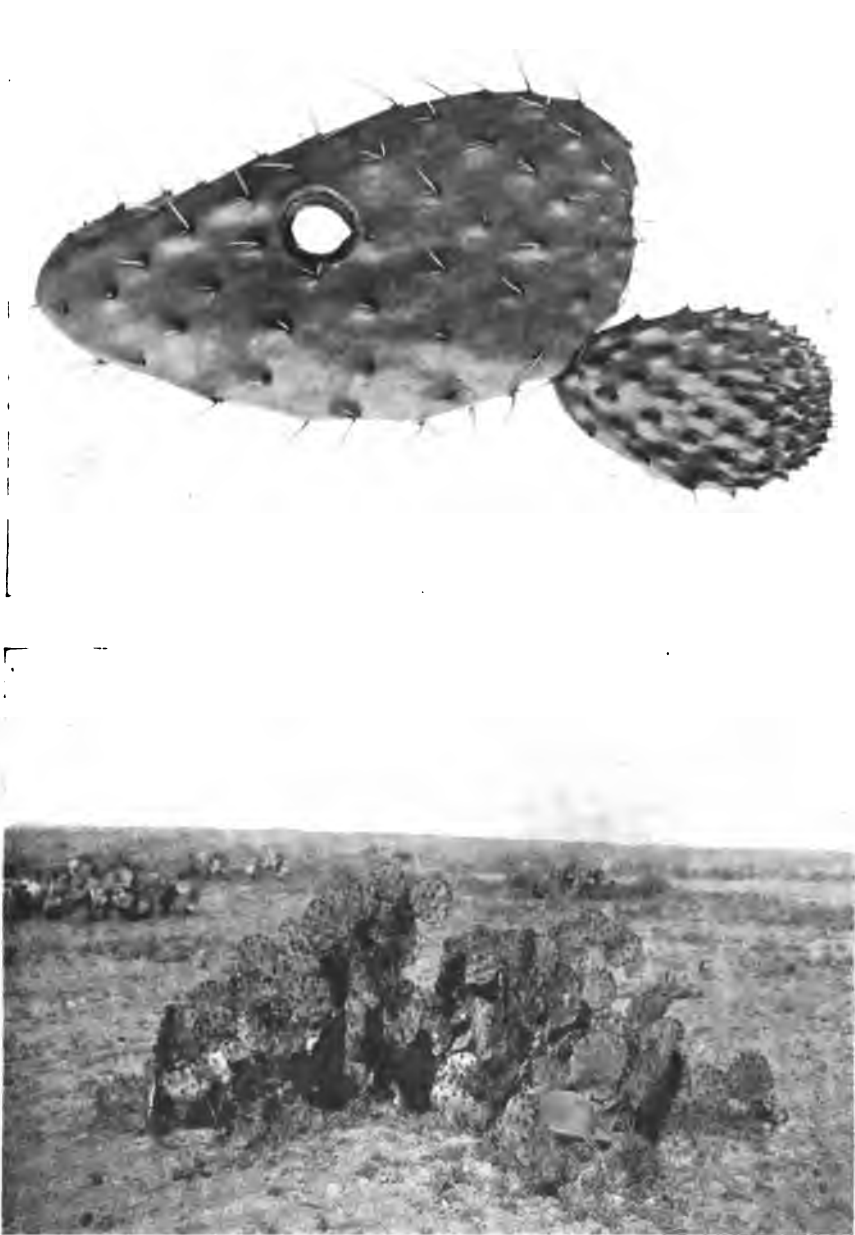






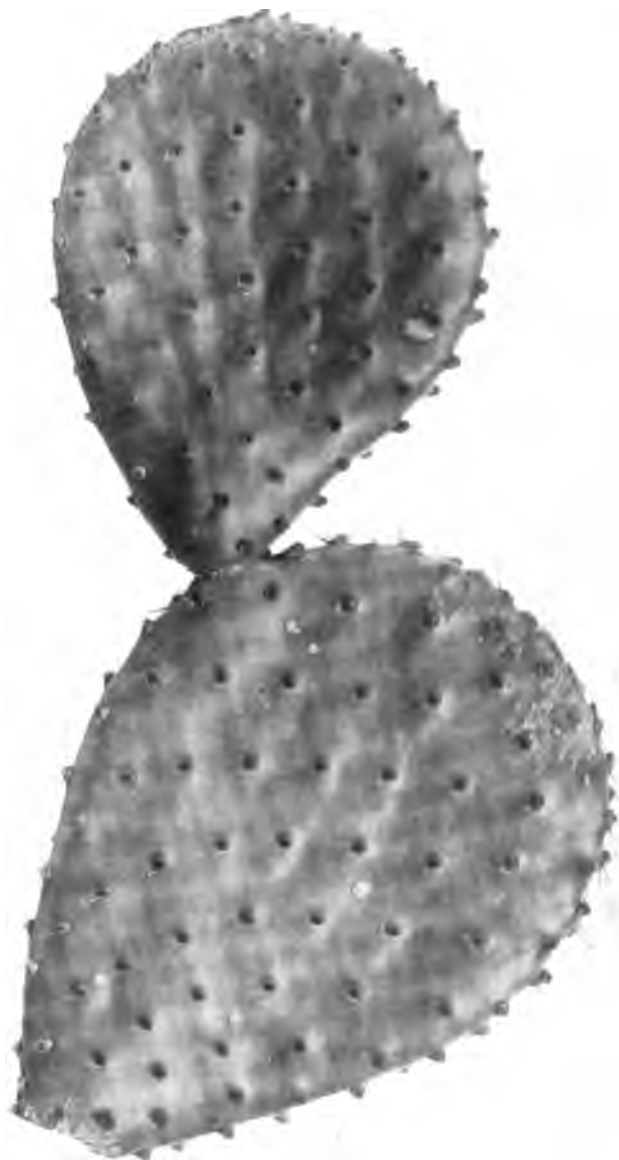
OPUNTIA GOMEI.





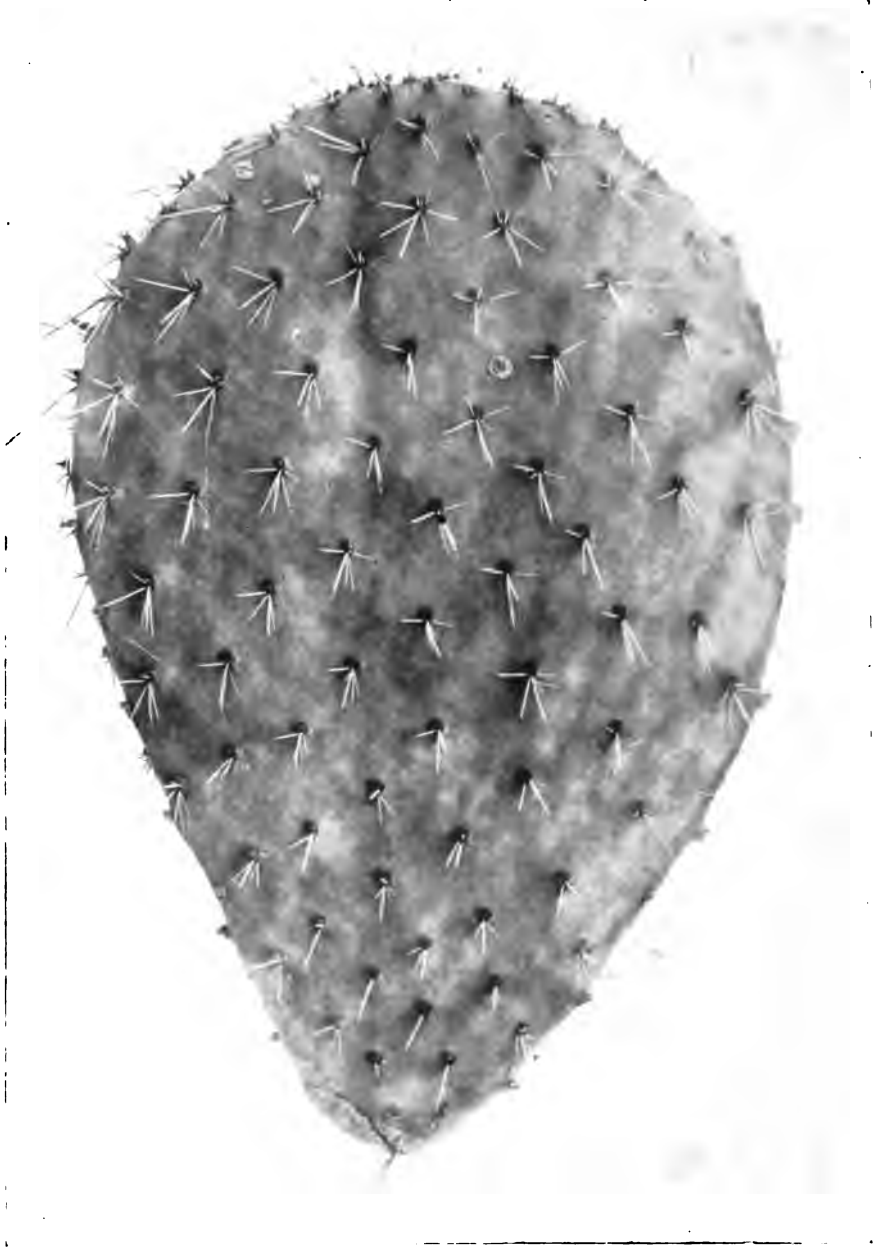
OPUNTIA PACHONA AND O. GOMEI.





**OPUNTIA LUBRICA.**

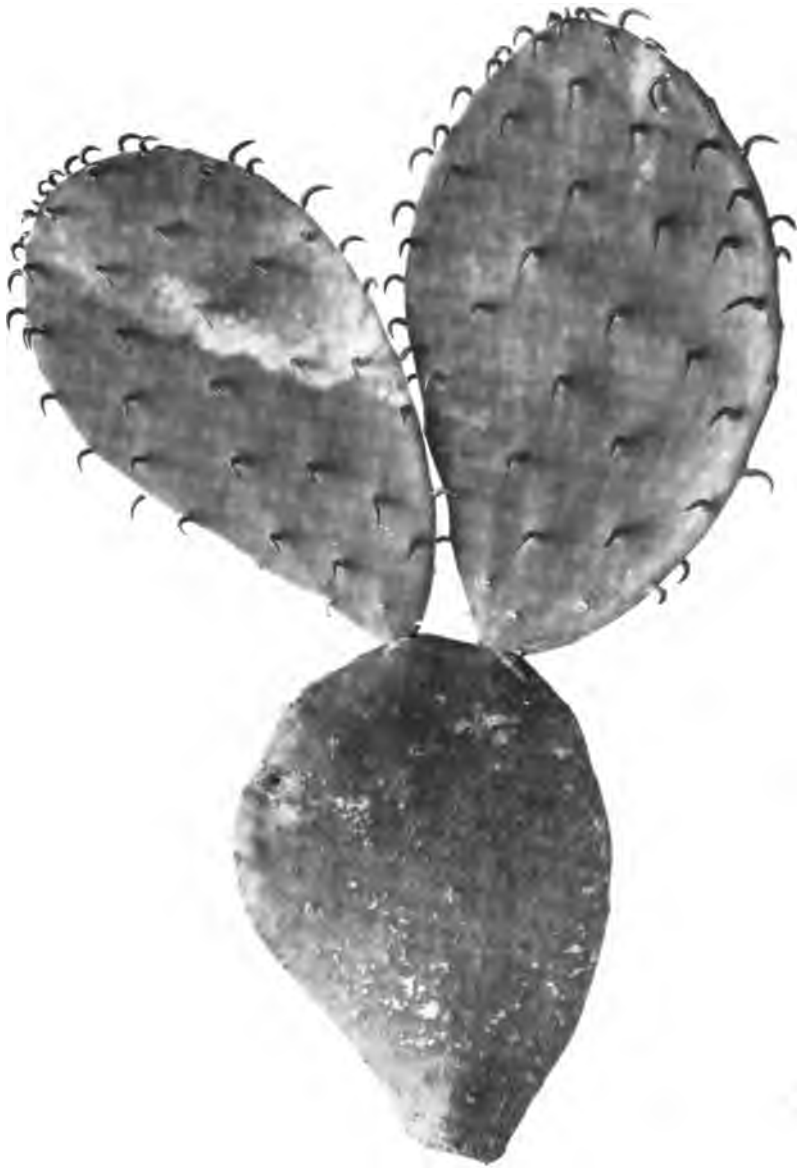




*OPUNTIA NIGRITA.*







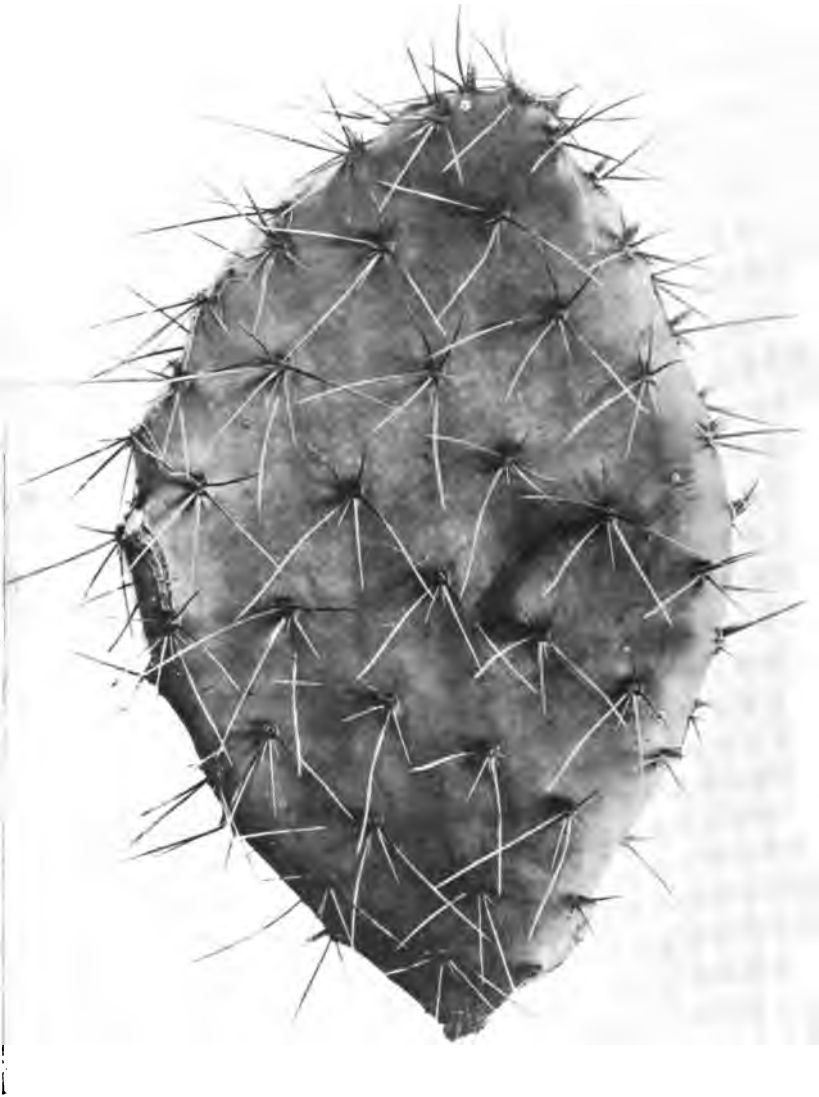
OPUNTIA ELLISIANA.





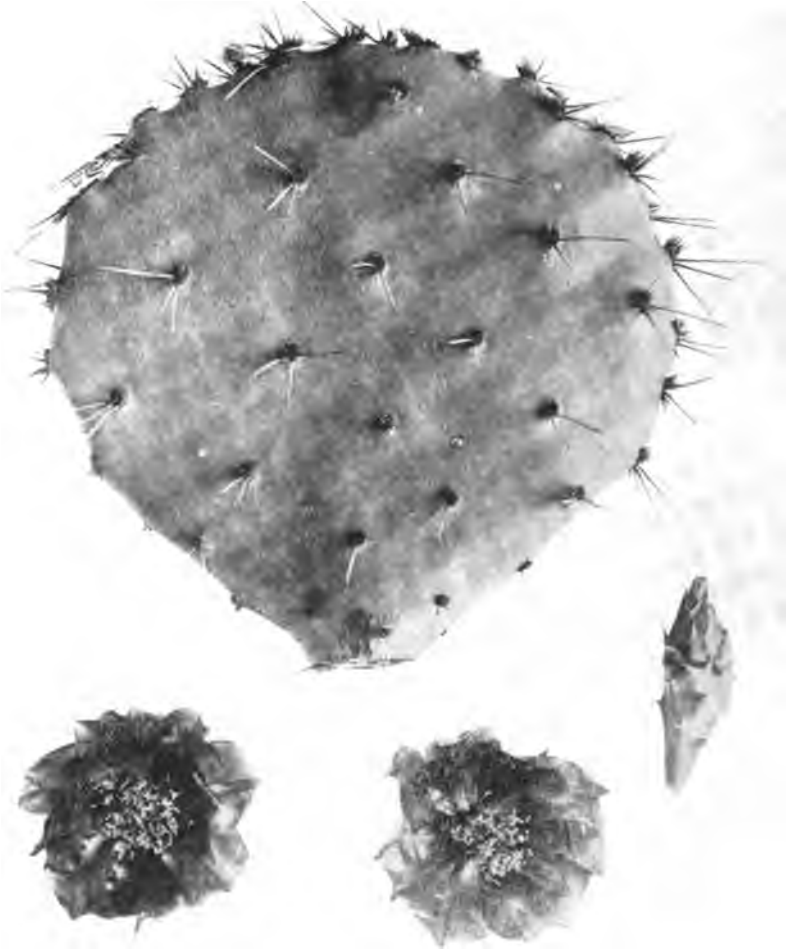
OPUNTIA WOOTONII AND O. ATRISPINA.





*OPUNTIA WOOTONII.*





*OPUNTIA SINCLAIRII.*

