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NEW SPECIES OF OPUNTIA.

BY DAVID GRIFFITHS.

This seventh* installment of formal descriptions of new species of *Opuntia* has been somewhat delayed to secure more complete data from the mature cultivated plants. The types will be preserved in the U. S. Department of Agriculture and duplicates will be prepared for other herbaria.

***Opuntia magnarenensis* sp. nov.**

A large hemispherical shrub 100-125 cm. high and 2 m. in diameter when fully developed, with main arms radiating and either ascending or resting on their edges, the secondary ones always erect from them; joints obovate, sometimes widest at middle, but usually widest slightly above middle, pointed both above and below, yellowish-green, slightly glaucous, about 18 by 30 cm.; leaves very large, flattened, prominently acuminate-cuspidate, 10-12 mm. long; areoles very large, oval to obovate, the largest ones on edges of last year's joints commonly 4 by 6 mm. and smallest about 3 by 5 mm., brown turning prominently gray and enlarging with age; spicules yellow, very prominent, scattered, unequal, 1 to 1½ cm. long, increasing tremendously with age in both length and numbers, the areoles becoming very prominent; spines white with light, bright reddish bases, flattened, stout, not annular, spreading in all directions, sometimes twisted, 2-5 mostly 3, the central upper one very long and porrect, 3-5 cm. long, others shorter spreading around it; flowers yellow, 7 cm. in diameter, filaments yellow, style white to greenish tinged, stigma dark green, 7-parted, buds dull greenish-red, pointed, with lax sepals; fruit purplish-red throughout, with abundant bloom, long, obovate, about 4 by 7 cm., its areoles tawney, about 20, bearing spicules 4 mm. long.

This species is common on the Big Sandy, 30-50 miles south of Kingman, Arizona. It is one of the conspicuous species on the bench lands above the river bottoms. In its main characteristics, it resembles more

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closely *Opuntia engelmannii* than any other species. The type is preserved under my inventory number 10,560, collected near Owens Post Office, Arizona, May 3, 1912.

***Opuntia intricata* sp. nov.**

Plants large, half prostrate, with long tangled arms often nearly a m. in length, mostly lying in a mass, one on top of the other; joints obovate, commonly 11 by 20 cm. glaucous blue-green, variable in size but outline quite uniform, prinosity lost with age; areoles obovate, 3 mm. long on sides, and 4 mm. on edges of joints, with conspicuous wool, brown and tawney white at margin when young, changing in age to dirty gray; spicules rather bright yellow in a compact triangular tuft in upper portion of areole, about 2 mm. long, increasing in age, and at 2 or 3 years filling entire areole which becomes enlarged and subcircular; spines scattering, only on edges of joints, at apex 1 to 3, mostly 1 to 2, basal portion light yellowish brown, fading to white at about half its length, 2 to 3 cm. long, flattened, twisted, not consistently but frequently annular; flowers light purplish, filaments pinkish above, greenish below, style white with a tinge of reddish above, stigma light green, 8-parted; fruit obovate, pyriform, light purplish-red with abundant bloom, rind and pulp tinting tardily, about 4 by $6\frac{1}{2}$ cm.

This species is rather common in the lower parts of the mountain valleys, and upon the sandy alluvial bottoms at the mouths of washes above San Bernardino, California, and in similar positions southward. Old, mature plants have the habits described above. When grown under cultivation, however, the plants may be erect, or ascending until the arms reach a length of 50 to 75 cm., when they begin to bend over in a tangled mass upon the ground; or as is frequently the case in cultivation, break off at the articulations. This species is found in some of the European collections, and there is not much doubt but that their material was secured originally from A. H. Alvord of San Bernardino, California, who made extensive collections in the region. It has been referred by European collectors as a variety of *Op. basilaris* but it does not belong to that group. This description has been prepared from various notes made in the field, and from cultivated plants grown at Chico, California. The type bears my collection number 10,372 from near San Bernardino, California, May, 1912.

***Opuntia aciculata* sp. nov.**

A low hemispherical shrub, 1 m. high, and $1\frac{1}{2}$ to 2 m. in spread of branch, erect or main arms ascending or even resting on edge, and the secondary erect from them; joints ovate to obovate, mostly pointed above and below, 15 by 20 cm., but the older joints on our plants only 12 by 17 cm., dark green with some bloom; leaves circular in section, subulate, cuspidate, 7 mm. long, gradually recurved as they age; areoles subcircular, varying from 4 to 6 mm. in diameter with the conspicuous brown wool 1 mm. or more above the surface of the joint, about $2\frac{1}{2}$ cm. apart on sides of joints; spicules bright brown, conspicuous and formidable, 5

to 7 mm. long, and tips lighter colored, nearly uniformly scattered throughout the areoles, the tips of the tufts measuring 10 to 12 mm. in spread; spines very few, only an occasional one on an occasional areole, brown, sloping down, 1 to 2 cm. long; flowers yellow with greenish centre 9 cm. in diameter, filaments greenish tinged, style white, stigma dark green, subglobose, 8 to 10-parted; fruit pyriform, deep purplish-red all the way through, having a little bloom up to early maturity.

The type is preserved under my inventory number 10,300, and was collected near Laredo, Texas, June 26, 1911. The description was drawn from cultivated plants grown at Chico, California, May 21, 1914. The distinguishing characters of the species are prominent, brown, abundant spicules, pointed joints, and remarkably few spines. It differs from *Opuntia tardospina* in being smaller in stature throughout, in being almost spineless even in age, and in having differently shaped joints.

***Opuntia cretochaeta* sp. nov.**

Plants tall, arborescent, open-branched, 4 m. high or more in nature, with a distinct cylindrical trunk a meter or more long; joints obovate, 17 by 32 cm., widest at or above the middle, usually broadly rounded above and narrowed below, yellowish-green at maturity, but dark green when young, especially in shaded portions, smooth; areoles obovate, about 4 by 5 mm. and 3 to 3½ cm. apart, at first prominent, turning gray; leaves conical, 4 mm. long, cuspidate; spicules light-yellow, not conspicuous until toward close of growing season but then becoming formidable in a large compact tuft, 5 mm. long in the upper portion of areoles, increasing greatly in length and numbers in age; spines white, at first, single porrect, then 2 and spreading, but at 1 year of age 3 to 5 spreading, the longest 4 or 5 cm. in length, the others shorter, flattened, twisted, and variously bent, increasing greatly in length and numbers in age, often becoming 6 or 7 cm. in length, and 12 to 18 in number, often in transversely elongated areoles a cm. in width at 4 years of age; flowers deep orange-red when opened, dark greenish red with tinge of purple in bud, 5½ cm. in diameter when fully opened; filaments greenish below and white with very faint reddish tinge above, style bright glossy red, with tinge of purple at top, stigma very light greenish with slight purplish tinge on side of dorsal groove, 6-parted; ovary obovate to clavate, 28 by 50 mm., tubercular-raised at areoles, with small brown areoles 1½ mm. in diameter, 8 mm. apart; fruit light purplish-red, the entire surface areolated, bearing commonly 1 white spine in upper areole, obovate, about 3½ by 5 cm.

This species was collected originally near Dublan, Mexico, August 31, 1906, under my inventory number 8465. It has been grown at Chico, California, as well as at Brownsville and San Antonio, Texas.

***Opuntia eocarpa* sp. nov.**

A reclining to ascending, spreading shrub, 75 cm. high and 150 cm. or more in spread, the main branches commonly resting on their edges and

ascending at extremities; joints broadly obovate, often as broad as long, about 20 cm. in diameter, yellowish-green with a little bloom, slightly raised at areoles even at second year; areoles dark, broadly obovate, 5 to 6 mm. in length; spicules yellow, 2 to 3 mm. long on sides of joints and compact along upper edge of areole, but on edges of joints they are divergent, prominent, 8 to 12 mm. long; spines formidable, divergent, stout, flattened, twisted, having light reddish-brown bases and gradually fading distally to white, 3 to 4, large, 3 to 4 cm. long, and 1 or 2 short white ones below, 1 to $1\frac{1}{2}$ cm. long; flower deep yellow, red within, turning deeper yellow and red centre enlarging as day advances, $7\frac{1}{2}$ cm. in diameter when fully opened, resembling that of *O. phaeacantha brunnea*, but larger throughout, filaments light-greenish below, style white, stigma large, very light green, 12-parted, with narrow segments; fruit light red with a tinge of purple and a little bloom toward maturity, but almost none when fully ripe, obovate to elliptical, about 4 x 5 cm. with a sunken, large, roughened scar, rind greenish and pulp colorless, areoles tawney, 2 mm. in diameter, spicules yellow, 2 mm. long, unequal, fugacious spines yellow but lighter and often white distally, 5 to 12 mm. long.

The species belongs to the *phaeacantha* group and differs from any of the described forms in that group in being larger throughout, and in having a different spination. The color of the spines resembles most closely that of *phaeacantha brunnea* of the second year's growth, but is even lighter colored than that. It is found rather commonly in the foothills of the Rellito and Santa Cruz Valleys of Arizona. The type specimen was collected near Pantano, Arizona, in September, 1911, under my collection number 10,452.

***Opuntia recurvospina* sp. nov.**

An erect, open-branched species, 1 m. or more high and $1\frac{1}{2}$ to 2 m. in spread of branch; joints obovate, contracted below into a stipitate base, but often widest at middle, commonly narrowed above into a sharply rounded apex, mostly about 18 by 32 cm., having a little bloom on last year's growth but current season's joints a clear, slightly yellowish-green and decidedly yellowish-green in age; areoles subcircular to broadly oval, brown with compactly formed wool, 1 to $1\frac{1}{2}$ mm. high, 5 to 6 mm. long, enlarging slightly in age; spicules comparatively few, yellow, scattered through upper edges of areoles, unequal, 4 mm. or less in length in an occasional areole only, increasing but slightly with age; spines white with light brown to flesh-colored bases, flattened, twisted, 2 to 5 in number, mostly 2 or 3, spreading in all directions the second year and after that tightly recurved in all directions; flowers light yellow, 8 cm. in diameter, slightly greenish tinged within, filaments light above, greenish below, style white, stigma light-green, globose, 10-parted; fruit obovate, pyriform, about 4 by 7 cm., deeply pitted, purplish-red throughout, having a little bloom up to maturity but after that deep dark-red, its areoles tawney, with prominent wool, spicules yellow, 4 mm. long, unequal, located in central upper portion of areole, fugacious spines, remarkably prominent,

varying from close to length of spicules to 20 mm., and often 12 in number.

This species inhabits the foothills regions of the Rellito and Santa Cruz Valleys of southern Arizona. It is characterized by its large joints, peculiarly shaped for this group, recurved spines, and large, pyriform fruit. The type was collected near Pantano, Arizona, in September, 1911, under my inventory number 10,456.

***Opuntia superbospina* sp. nov.**

Plants low, spreading, 30 to 40 cm. high and having a spread of 125 cm. or more, main arms resting on edge with distal segments ascending and secondary branches erect or ascending from the primary; joints obovate, about 10 by 19 cm., rather sharply rounded above and contracted below, with a moderately long stipitate base, very glaucous gray-green, slightly raised at areoles for about 2 years, turning yellowish-green in age; areoles large, obovate to oval, with prominent brown wool, about 6 mm. long; leaves short, subulate, cuspidate-pointed, pinkish, slightly recurved, 4 to 5 mm. long; spicules very prominent in a large tuft in upper portion of areole, yellow, 1 cm. long, continuing to increase for 2 years at least, in successive zones, from central areolar area; spines long, formidable, at first brownish at bases, especially at apex of joints, and white on sides, but all becoming white or nearly so in age, all but the lowermost areoles armed, 1 below to 3 or 4 above, stout, porrect-spreading, with the lowermost in the areole recurved and shorter than the others which are 6 cm. long on current year's growth, ranging to 8 cm. the second year and even longer than this in age; flowers yellow, red within, 7 to 8 cm. in diameter when fully opened, fading to pinkish and becoming more red in centre toward close of day, filaments pink, style white or slightly tinted, stigma white, 6-parted; fruit dull grayish-red with abundant bloom, rind greenish and pulp colorless, areoles about 18, gray to dull tawney, small, subcircular, 2 mm. in diameter, spicules yellow, 2 to 3 mm. long, fugacious spines, 2 to 5 or 6, and merging from length of spicules to 6 mm. in length, all yellow and much duller in color than the spicules of the stem.

The species is characterized by its very glaucous aspect, prominent yellow spicules and long, nearly white spines which are so numerous and formidable that it is impossible to get down into the centre of the plant. It was secured under my collection number 10,574, about 15 miles southeast of Kingman, Arizona, and has been observed in several localities in the same general region.

***Opuntia caesia* sp. nov.**

Plant a spreading shrub with main arms resting on their edges and the secondary ones erect from them, 60 cm. high and 2 m. in spread when fully matured; joints deep, glaucous blue-green, becoming yellowish-green in age, obovate, about 11 to 15 by 20 to 24 cm., gradually narrowed below to a stipitate base; areoles 4 mm. long, brown; spicules dark-brown in a compact tuft in the upper portion of areoles, 4 to 5 mm. long,

except at very apex of joints where in extreme cases they may be 15 mm. in length; spines the first year 2 to 4, dark-brown except the lower downward sloping shorter ones, 15 to 20 mm. long, which are white, the others porrect and the longest often 6 to 8 cm. in length; the second year fading to light-brown or yellow flesh-color, becoming white with age and increasing slightly in numbers, some of those on old wood very much flattened and twisted, annular at the base, especially the second season; flowers yellow with red centres, filaments yellow but greenish at base, style white, stigma large, subglobose, light-green; fruit purplish-red with a deep bloom and much lighter colored within, the rind simply streaked with red and pulp slightly mottled, only at complete maturity is the color of the rind and pulp diffused and light-red, areoles small, elongated, $\frac{1}{2}$ to 2 mm. long when wool is removed but before removing wool 3 mm. long and broadly oval, dull, dark gray, tawney with wool protruding 1 mm. and the brown, unequal spicules 2 mm. longer than the wool, fugacious spines irregular, 6 to 11 mm. long, lighter colored, often brownish to yellowish-white at maturity.

The species is easily recognized by the densely glaucous aspect of plant and fruit and shape of its joints. It has nearly as much bloom as the *O. robusta* group of the Mexican highlands. The type was collected between Crozier and Hackberry, Arizona, the first of May, 1912, under my inventory number 10555. It has been observed in several situations in that general region and one other collection has been made and cultivated.

***Opuntia expansa* sp. nov.**

A low, spreading species with long, radiating arms, 50 cm. high and having a spread with us now of 160 cm. but in natural habitat the radiating arms often 130 cm. in length and the entire plant $2\frac{1}{2}$ to 3 meters or more in diameter and reaching an extreme height of one meter, main arms radiating and resting on edge; joints obovate, at first glaucous but losing its plumosity and becoming yellowish-green with age, about 11 to 13 by 20 to 22 cm., rounded above and contracted below into a more or less stipitate base; areoles broadly obovate to subcircular often 6 mm. in length on edges but commonly only 4 mm. on sides of joints, brown turning dirty black, becoming very prominent, subcircular and often 3 mm. high on old joints; spicules yellow to light-brown, in a compact tuft above, scarcely as long as the protruding wool with a few scattering bristles, more numerous and longer in age especially on edges toward apex of joints, sometimes 8 mm. long and always yellow in situ; spines light-brown at base, white distally, toward apex of two-year old joints there are commonly 4 to 5, the lower being white, 1 to $1\frac{1}{2}$ cm. long, the next situated directly above usually 3 cm. long, white throughout or dirty yellow to brownish at base, the other 2 or 3 slightly shorter and more deeply colored, commonly brownish below and yellowish distally but color variable; flowers $8\frac{1}{2}$ cm. in diameter, yellow with dull red centre, the red coloration streaking upward through the veins late in the day, buds with decidedly glaucous-greenish sheen and scales lax; fruit

deep purplish-red all the way through with a little bloom in early maturity, but almost maroon when fully matured, obovate, deeply pitted, about 3 by $5\frac{1}{2}$ cm., areoles $2\frac{1}{2}$ mm. in diameter, tawney, bearing yellowish spicules 2 mm. long and about 4 fugacious spines 5 to 6 mm. long in upper areoles.

This species is rather common among the piñons and junipers of the Anton Chico region of New Mexico and is commonly found associated with *Op. engelmannii cyclodes*. The type was collected under my inventory number 10,324 near Anton Chico, New Mexico, in August, 1911. It has also been received and secured under other numbers from Casaus and the mouth of the Gallinas.

***Opuntia xerocarpa* sp. nov.**

A low spreading species 25 to 35 cm. high and a meter in spread, the main arms usually resting on their edges and the secondary growth erect from them; joints mostly obovate, thick and turgid, 7 to 9 by 11 to 14 cm., glossy yellowish-green, broadly to sharply rounded above; areoles broadly obovate to subcircular, 3 mm. long, at first brown with a marginal white zone soon turning completely tawney-brown and then dirty gray; spicules light-brown but inconspicuous on current year's growth, but on last season's wood 1 to 2 mm. long and continuing to develop in successive interior zones and frequently becoming 5 mm. in length in very much enlarged areoles; spines white, commonly 1 central 3 or 4 cm. long, flattened, twisted and sloping down, and 2 or 3 recurved downward sloping radials below, 1 cm. long or less, on edges of joints, however the centrals may be 2 or even 3 and the radials lengthened to 2 cm. and increased to 4 or 5; flowers yellow, 5 to 6 cm. in diameter, slightly greenish within, filaments yellow above and greenish at base, style white, stigma dark green, about 7-parted; fruit dry, $3\frac{1}{2}$ to 4 cm. long and $1\frac{1}{2}$ cm. in diameter, obovate to cylindrical, when fully matured green with a blush of red on one side, bearing about 24 small subcircular areoles, 6 to 8 mm. apart and bearing a small tuft of brown spicules and 1 to 3 or 4 short white spines, commonly 5 to 7 mm. long, and 2 or 3 to several fugacious spines of similar length.

This is a very characteristic, dry-fruited, flat-jointed *Opuntia* of the western slope of the San Francisco highlands. It is readily distinguished from other species of its dry-fruited allies by its spines, shape of joints and color of plant body. The type was collected about 15 miles southeast of Kingman, Arizona, in May, 1912, under my inventory number 10,579 and has been in cultivation since that time, other collections having been grown previously.

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