

STUDIES IN THE NORTH AMERICAN OPUNTIA

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In the years of 1891 and 1892 while a student in Denver, Colo., the writer became closely associated with Prof. F. E. Scanlon and Dr. J. F. Saler. Prof. Scanlon was an assayer and mine expert of high standing while Dr. Saler was a physician and chemist. Both of them were also good botanists. During the summers of 1891 to 1895 we visited and camped in several localities in Colorado, Arizona and New Mexico. In 1896 I returned to Illinois, maintaining regular correspondence with my former chums.

In 1900 both of them made itineraries into Mexico in the interest of different mining concerns and in their travels collected much botanical material which was sent to me to care for and to identify.

Unfortunately the activity of my friends was of short duration. Mr. Scanlon succumbing to some form of fever in the State of Oaxaco, April 3, 1902, and Saler was last heard from in Cerco Blanco, Chile, June 9, 1903.

Among other important correspondents the writer has been much aided with material and data by Prof. Mackensen, San Antonio, Texas; Dr. Forrest Shreve, Tucson, Arizona; Jesus Gonzales, Paras, Mexico; J. E. Brown, Sanborn, Kans.; B. R. Russell, San Saba, Texas; L. B. Childs, Boerne, Texas, and Pacific Grove, Calif.; F. H. Young, Haines City, Fla.; Ella Huber, Ybor City, Fla., and scores of others. From the plants received the following new species have been described and published in the Galesburg Republican Register, July 20, 1915:

Opuntia youngi, sp nov.

Type loc: nine miles northeast of Tampa, Fla.

Distribution: Extending northward probably to Atlanta, Ga. Diffuse and prostrate with young joints ascending or erect. Roots fibrous. Joints moderately thick, ovate, obovate or circular. 4 to 6 cm. wide and 5 to 10 cm. long. Bright green, areoles tinged purple, tuberculate, causing the margins to become indented and undulate. Specimens dant have borne from 1 to 3 needle-like spines 5 to 20 mm. long. Variegated or gray with darker tip and base. Wool sparse, light gray bristles in pencilate tufts, dingy yellow to almost gray. Flowers opening yellow shading to orange with brownish center. Fruit long pyriform with shallow umbellicus.

Opuntia seguina, sp nov.

Type loc: Seguin, Texas.

Distribution: Lococit, and surrounding country.

Prostrate, joints obovate, bright green, moderately thick. Slightly wrinkled and with elevated areoles. 4 cm. wide by 5.5 cm. long. Wool not apparent. Bristles light brown. Spines 1 to commonly 2, unequal, 12 to 25 mm. long. Variegated or brown with lighter to white tips, sometimes 1 to 2 smaller secondary ones. Flowers yellow with brownish center. Fruit long clavate. 5 cm. long by 1 cm. broad, greenish purple, with few low linear tubercles and areoles bearing brown bristles, umbellicus funnel form, seed proportionally large. 3.5 mm. thick, sub-reniform white, and slightly beaked with the small but broad border. Also frequent in loose sand south of San Antonio.

Opuntia longigloch sp nov. (Mackensen, No. 125).

Type loc: San Antonia, Texas.

Distribution: Lococit, and southwestward.

Erect and spreading with age, often forming a dense bush 9 to 12 cm. high. Joints obovate bright glossy green 1.5 cm. long and 1 cm. wide. Areoles large, filled with remarkably long, coarse and bristle-like bristles. Brown in crescent form tufts 1 mm. long. Spines 1 to commonly 2, compressed and twisted, about 4 cm. long, sulphur yellow to amber at the base. Fruit clavate, one-half inch thick and two and one-half long. Umbellicus funnel form. Flowers not in perfect condition, apparently light yellow with brownish or redish center, characterized by its remarkably long and brush-like tufts of brown bristles.

Opuntia shreveana. sp. nov.

Type loc: Tucson, Arizona.

Distribution: Tucson, south and westward.

Plant 60 to 140 cm. high, nearly as broad as tall with a short and somewhat definite trunk. Joints circular or broader than long. 2dm. or more. Blue green, with a space about the areoles and the margins deep purple or sometimes especially in new growth pinkish or purplish throughout. Areoles 1.5 cm. apart bearing chestnut brown bristles, usually spineless, when present usually 1 or 2, needle-like and chestnut brown, 2 to 4 mm. long. Flowers deep yellow, 6 to 7 cm. across. Fruit purplish, short oblong with shallow umbellus. One of our handsomest platoptunia material and data furnished by Forrest Shreve, Desert laboratory, Tucson, Arizona.

Two specimens also in Mackensen's collection without data or number, one from Haines Wells, Arizona. While other genera of the family have also been considered, the *Optuna* on account of their more diversified characters and more abundant distribution has furnished the best field and in addition, the following notations may be useful to future botanists who undertake their study.

It was my original idea to adjust the descriptions to the more definite types of already well defined species so as to cover the frequent large quantity of near related and not sufficiently distinct types, so that the great maze of variations can be definitely referred to some recognized type, and to exact a type locality where typical specimens of each species and variety accredited to the United States can be secured.

The portion east of the Mississippi except part of the lower regions of Florida has been fairly well canvassed and examined and the following species can be reported: *Opuntia opuntia* occurs intermittently along the Atlantic coast from Rhode Island south at least to Titusville, Fla., eastward in Florida and very abundant in Polk County. *O. austrina* (not true to description, very much resembling *O. tennispina*, but always smaller and sub-prostrate) Palm Beach to Miami and inland.

O. Tuna. Key West, Fla.

Specimens of what is supposed to be *O. dillenii* have been secured from the main coast of Florida. The most perfect by E. N. Reasoner. None show any definite difference from *O. Tuna* except in size.

O. pes-corvi. Sand wastes North and South Carolina, more abundant in the mountain regions in Virginia and West Virginia. This species although often resembling *O. opuntia* is always smaller and the older growths always prostrate.

O. youngi. Sand wastes a few miles below Atlanta, Ga., to Ybor City, Fla.

O. pollardii. Coast near Biloxi, Miss.

O. Tracayi. Sand wastes northward of Biloxi. One of our smallest and spineist optuna. Spines are often more than twice the length of the joint.

O. humifusa. Havana, Ill., and southward along the Illinois river. Raffinesque's type was undoubtedly from near either Quiver or Beardstown. Therefore the true type is either procumbent or prostrate, with redish brown bristles, 1 to 2 strong variegated spines and 1 to 3 secondary gray ones. Flowers bright yellow. Fruit greenish or purplish on upper side, small areoles bearing short bristles, pyriform, with deep umbellicus, seed light gray.

The unlimited number of variations extending from this locality westward well into California and merging into *O. camanchica* in the prostrate forms and *O. leptocarpa* in the upright forms unless well marked cannot reasonably be separated as species.

Opuntia fragalis. Distribution, sterile but often moist situations, Lake Michigan to the foot-hills of eastern Colorado, thence southward into New Mexico, where it becomes *var. brachyarthera*. Northern limits extending into Canada southern limits; Kansas, central Iowa and southern Wisconsin. The only dry fruited species east of the Mississippi. This little *Opuntia* is also the most widely distributed and the most definite in character of any in the genus.

There is also a small red bristled *opuntia* peculiar to Ohio, which in the near future is very likely to be recognized as a species.

Regarding the great quantity and variation in these plants in the southwest, Botanists of recent years have shown an inclination for defining every type into a species. The writer can hardly agree with either this idea or the idea of referring all near related to one species. The prevailing specific requirements should be adhered to in this class of plants the same as in all others. We are all familiar with the vast variations in our cultivated apple. Several types of well marked fruits; color of bark both on old trunks and twigs, also difference in color of the leaves. But they are all of one species and no Botanist would think of dividing it into as many species as there are even decided variations. Neither would we think of referring the apricot to the peach or plum on the supposition that it is a hybrid between the two.

In *prunus Pennsylvanica* and *P. serotina* we have much less difference in the trees and leaves than we have in some of the forms of the apple and their specific difference is chiefly in their mode of flowering and fruiting.

We would therefore suggest that by applying the same methods to the *opuntia* as is applied to other plants, and basing their specific status on definite characters it is no question but what these plants can be defined and understood as accurately as any other.

As an illustration, *O. leptocarpa* was established by Mackensen by its fruit, still the plant itself is more definite than the fruit. Experiments by B. R. Russell, San Saba, Texas, developed that ten cuttings from the same plant produced six forms of fruit, but all the plants retained the resemblance of the parent.

Many instances of confusion among recent botanists are also evident, many of which can be traced by the difference in geographical location while others can be accounted for by the difference in geological conditions.

We have in *Opuntia arizonica*, Griffiths, C. N. H. 12:402, 1909, wherein Dr. Rose also states that he had probably recognized this *opuntia* as a new species, does not occur in Arizona as described. If the specimen in the writer's col-

lection and identified by Dr. Griffiths as a good type is correct, then the description needs amending. It is the only type that can be taken as *O. arizonica*, although it is more plentiful in New Mexico than any place in Arizona and very common in central Texas.

There is also *O. discata*. Griffiths. Rep. Mo. Bot. Gard. 266, 1908. Type locality also near Tucson, has proved by cultivation to be only a more glaucous and spreading form, with more circular joints than the true *O. engelmannii* Salm-Dyck. Bost. Jour. Nat. Hist. 6; 1850, which may be regarded as typical in the St. Ulalia mountains.

A peculiar instance also is the two names of *Opuntia microcarpa*.

O. microcarpa. Eng. Emory mil. recon. Folio 7, 1884. Reported by Emory to be abundant in the Del Norte and Gila regions, which would be in southwestern New Mexico.

O. microcarpa. Schum. Gesem, Cacteen, 1899. Cul Du Sac. Haiti. It is difficult to understand Drs. Britton and Rose's opinion that Schumann's name is a homonym of Engelmann's (Smith Misc. coll. 50:522). Thorough investigation evidences that no opuntia answering to Dr. Engelmann's description exists in the given locality. Nor has any been collected and authentically reported since. Neither is there any herbarium specimen known. Engelmann's description was from a drawing which may not have been accurate. But even then berries three to four inches long are not small for an opuntia.

O. pharacantha is the smallest opuntia in this locality and *Engelmannii cyclodes* the most common. Therefore if Schumann's plant proves a good species it could retain the name and Engelmann's name could be regarded as a nom-nudum. There also appears to be a misunderstanding in *Opuntia griffithsiana*. Mack. and *O. Mackenseni*. Rose. The descriptions of the two plants differ very little and the specimens received from Prof. Mackensen differ less.

By eliminating the many indefinite characters on which many species have been based we can recognize the following as good types of the tall growing opuntia. Engelmannii, N. W. Mexico and Ariz. (var. *discata*), dark green and glaucous, short almost black bristles and gray deflexed spines.

Lindheimeri. New Brunsfels, Texas. South, north and westward. Bright green. Bristles and spines various but always yellow or greenish yellow. *O. arizonica*, Tucson, Arizona; eastward far into Texas. Bright green. Bristles various shades of brown. Spines yellow with colored base. *O. occidentalis* and *litoralis* come under the lindheimer type as does also *linguiformis* but are well described in other literature and quite distinct. *O. chlorotica* can hardly be classed here on account of being smaller in every way.

O. Toumeyi is also much smaller than *O. arizonica*, although of the same type. *O. castillea* Griff. Tucson, Ariz., is of the *Ficus-Indica* type. Dark green slightly glaucous and few spined. *O. fusicanlis* appears to be a variety of it with thicker and larger joints.

Another peculiar incident is *O. Elisiana*. Griff. the only good types definitely known are those cultivated and advertised by B. R. Russell, San Saba, Texas, as his natural spineless cactus. It appears by Emory's records that this plant also received the unpublished name of *anacantha* by Engelmann. From information by old settlers it appears that in earlier years this plant like *mammillaria lasiacantha* was abundant in central Texas, and the former very likely also in New Mexico. Many reasons for their near extinction have been proposed, the most logical being that they were obliterated by the vast herds of grazing cattle.