

found a number of plants having gigantic fruits held over from the previous season. These had remained fleshy and had continued to grow instead of drying at maturity as do normal fruits (L. Benson 13682).

Opuntia aurea Baxter may be a nearly spineless (both on the joints and on the fruits) form of this variety. However, the status of the proposed species has not been determined with certainty, and it may be more closely related to *Opuntia basilaris*, or it may be distinct from either. Mr. Peebles reports "an amazing variety of forms" to occur at the type locality, some of them intergrading to *Opuntia erinacea* var. *xanthostema* (as *Opuntia rhodantha*).

18. *Opuntia Nicholii* L. Benson, sp. nov. Low-growing prickly pear forming mats up to 6 feet in diameter, 4-8 inches high, the stems many-jointed, these forming long series along the ground; joints obovate to narrowly obovate, flat, 4 or commonly 5-8 inches long, 2 or mostly 3-5 inches broad, glabrous; areoles $\frac{1}{2}$ to $\frac{3}{4}$ inch apart, all spine-bearing; spines about four to seven per areole, the longest ones from the upper areoles mostly 3-5 inches long, slightly flexible, strongly flattened, at maturity white or very pale gray, when immature often reddish, markedly twisted; glochids short and inconspicuous, insignificant for a prickly pear; flowers unknown; fruits evidently dry at maturity, persisting at least as dry structures resembling those of *Opuntia erinacea* and *Opuntia acanthocarpa*, with markedly barbed horizontally-spreading spines, these particularly long and numerous toward the upper part of the fruit, the minute barbs in a differentiated area at the apex of the spine.

Platyopuntia, humilis, patens ad 2 dm. alta, 2 m. lata; geniculis obovatis, circa 1.2-2 dm. longis, 0.7-1.2 dm. latis, glabris; areolis 12-18 mm. distantibus; aculeis 4-7, 1.7-1.2 dm. longis, albidis, complanatis tortisque; fructibus obovovoidis spiniferis.

Rocky hillsides, flats, and ravines on the broad shelf be-

tween Echo Cliffs and the Marble Canyon of the Colorado River southeast of the Navajo Bridge, Navajo Indian Reservation in Coconino County, Arizona. The plant is known from the following collections: One-eighth mile east of the Navajo Bridge, L. Benson 13517, 14250; 4 miles southeast of the Navajo Bridge, A. A. Nichol in 1940 (specimens in the University of Arizona Herbarium as well as the Pomona College Herbarium); 5 miles southeast of the Navajo Bridge, L. Benson 14247 (type).

The species shows some resemblance to *Opuntia erinacea*, particularly in the unusually long, white, deflexed spines occurring over the entire length of the joint and in the dry, spiny fruits. It is similar to *Opuntia phaeacantha* in size and shape of the joints and stoutness of the spines as well as in the reddish color of the spines when they are young. The differences from *Opuntia erinacea* are shown in the key. The new species differs from *Opuntia phaeacantha* as follows: fruit dry, spiny, the spines markedly barbed; spines occurring over the entire stem joint, very long, twisted, deflexed, white or pale gray at maturity, with greater development of barbs in an apical differentiated area; glochids insignificant.

The population southeast of the Navajo Bridge is relatively uniform as prickly pear populations go, despite the possibility but by no means certainty that its remote origin may have been by selection of certain hereditary character recombinations occurring among the second hybrid (F_2) generation derived from an ancient cross of *Opuntia erinacea* and *Opuntia phaeacantha*. The apparent hybridization of these two species near Springdale, Utah, described on page 44, suggests this possibility, and the writer has looked for both possible parents or for plants approaching their characters in the population of *Opuntia Nicholii*. *Opuntia erinacea* was not found to occur with *Opuntia Nicholii*, although it may do so. It was collected 18 miles south of the Navajo Bridge at a somewhat higher elevation (L. Benson 14242). One plant occurring just east of the Navajo Bridge suggested in vegetative

characters *Opuntia phaeucantha*. It had no fruits, and, of course, in October no flowers. (L. Benson 14248). A few others were short-spined (L. Benson 14249).

Hybrid or other highly heterozygous prickly pears may reproduce by growth of detached joints, and consequently even types which could not reproduce sexually or which would not form a uniform local population by this means may do so asexually. That this is not the case with *Opuntia Nicholii* is indicated by variation in some characters from individual to individual, despite relative constancy of most of the characteristics differentiating the species from its nearest relatives.

Type collection: Hills at 5,000 feet elevation along the highway 5 miles south of Navajo Bridge, Navajo Indian Reservation in Coconino County, Arizona, October 16, 1949. L. Benson 14247. Type in the Herbarium of Pomona College, No. 277226.

19. *OPUNTIA FRAGALIS* (Nutt.) Haworth. Minute prostrate or decumbent prickly pear forming remarkably dense clumps about 1 foot or more in diameter and 4 to 8 inches high, the stems usually two- to five-jointed; joints obovate, usually turgid, 1 to 2 inches long, about 1 inch broad; spines about five to nine, white or pale gray, as much as $\frac{5}{8}$ inch long, slender, tapering, circular in cross section; petals yellow or with a greenish color (magenta in some specimens), the flower about 2 inches in diameter; fruit dry, spiny. (Pl. XIV B.)

Grassland, sagebrush, juniper-pinyon, and yellow pine areas at 4,500 to 7,000 feet elevation. From the Utah boundary southward to the Hualpai Indian Reservation, Williams, Heber, and the Puerco River. Eastern British Columbia and Washington to Wisconsin, Arizona, and northwestern Texas. (Fig. 11 lower right.)

20a. *OPUNTIA COMPRESSA* var. *MACRORHIZA* (Engelm.) L. Benson (*Opuntia plumbea* Rose. *Opuntia delicata* Rose. *Opuntia Loomisii* Peebles.) Creeping prostrate prickly pear forming clumps a few inches high and a foot or more in

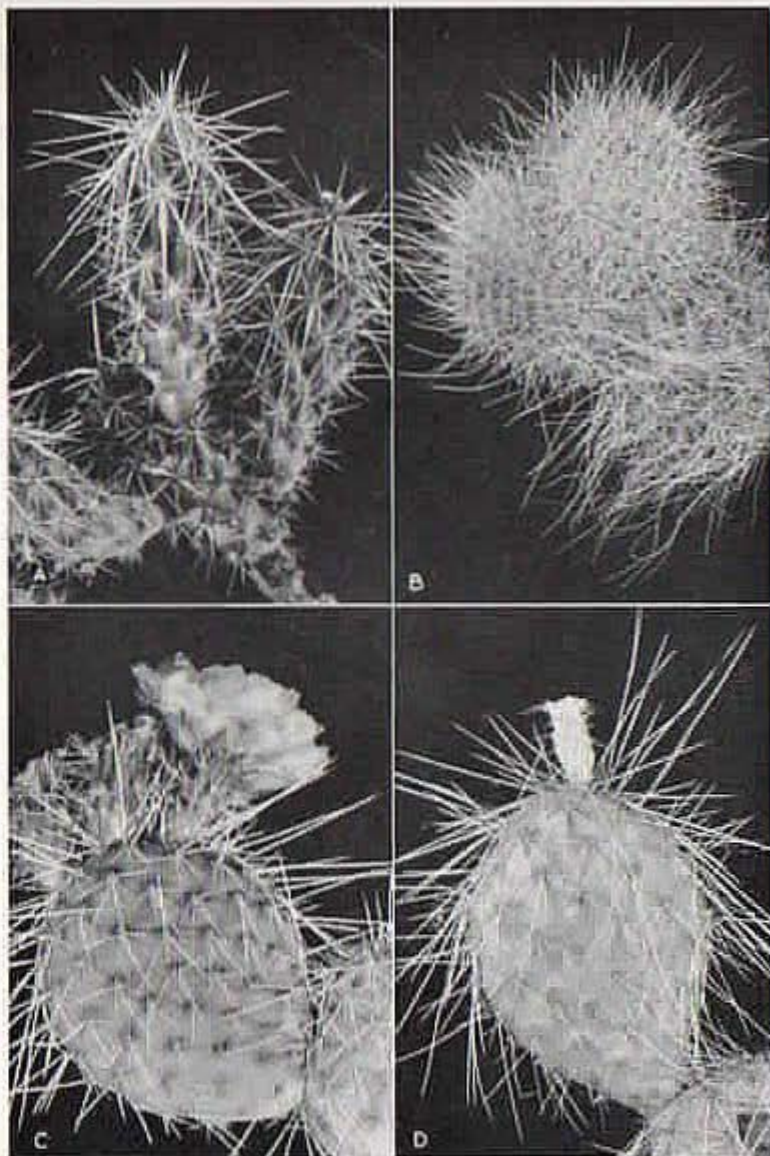


PLATE XIII—Chollas and prickly pears: A one of the low-growing chollas with flattened, nearly sheathless spines, *Opuntia Stansyl* var. *Kunzei* (x 1/2); B, the grizzly bear cactus, *Opuntia erinacea* var. *urina*, showing the long, threadlike spines (x 3/10); C, *Opuntia erinacea* var. *hystericina* in flower (x 3/5); D, *Opuntia erinacea* var. *hystericina* in fruit (x 2/5); the mature fruit is dry and somewhat shriveled. (Photographs by R. H. Peckles.)