# Palm Forests of the Bolivian High Andes

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*Cochabamba, Bolivia*

The first reference to the big palms of Chuquisaca in Bolivia seems to have been that of a Carmelitan friar, Antonio Vazquez de Espinosa, who travelled for about 12 years through America from Mexico to Chile before 1622. In his manuscript, "Compendio y Descripción de las Indias Occidentales," kept at the Vatican Library, he says that a mile beyond the city of La Plata or Chuquisaca there begin to appear the big native trees which continue far away in the direction of the warm lands and mountain ravines to form there dry forests. Among these trees he mentions *soto*, *tarco*, *nogal*, *aliso*, *algarrobo*, *palma*, *ceiba*, *villca*, *uruche*, *mara*, *sutarpo*, *ayayanta*, and *trusumo*.

The Indians used the nuts of these palms probably long before the Conquest. The name they give them today in Quechua is *janchi coco*. The word *janchi* is certainly Quechua and means "oil harsh bagasse" and *coco* is rather a universal word for palm nut. Thus *janchi coco* means chewing nuts to suck the sweet oil and spit out the remaining material. People here in the home of *janchi coco* do not realize where it comes from. The Indians living near the *palmares* or palm forests are the only known traders of the nuts which they bring to the cities of Sucre and Cochabamba and sell for a dollar a pound.

Alcide d'Orbigny from the Natural History Museum at Paris, a well known explorer of South America, was the first scientist to see one of these palms when he visited Chuquisaca in 1832. He discovered this new palm cultivated in a garden on the outskirts of Chuquisaca (Sucre), made the necessary drawings, and took field notes from which Martius described the new species as *Diplothemium Torallyi* in *Palmetum Orbignianum* published at Paris between 1842 and 1847. Later on, Barbosa Rodrigues from Brazil created the new genus *Polyandrococos* in which he included the Chuquisaca palms. The well known palm specialist, Hermann Wendland, transferred the Chuquisaca species again in 1878, this time to the genus *Jubaea* of Humboldt, Bonpland and Kunth. Finally, Max Burret diagnosed another new genus of palms called *Parajubaea* and included in it two species of South America that grow at high altitudes, *Parajubaea cocoides* from Ecuador and and *P. Torallyi* from Bolivia.

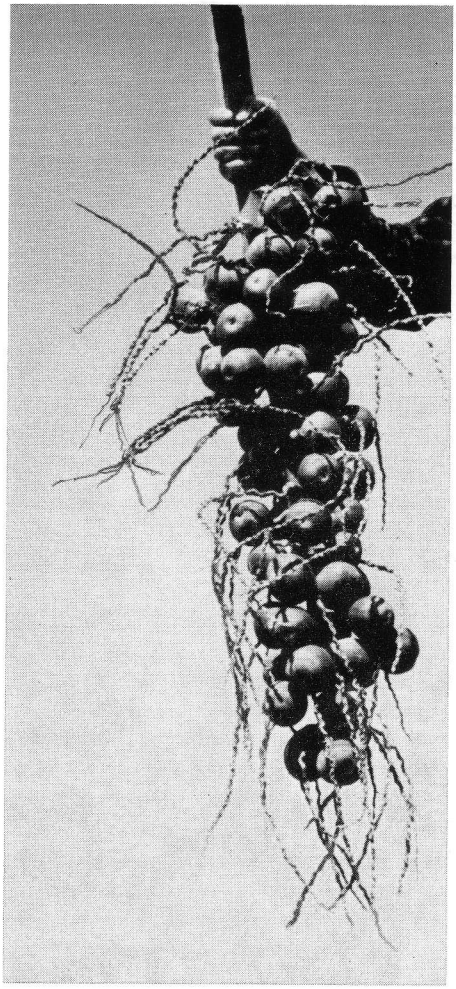
The first reference I had about this palm of Chuquisaca was a photograph taken by the agronomist Otto Braun 25 years ago at Soroma, Province of Tomina, Department of Chuquisaca. I was not interested in these palms at all until 1959 when I received a request from the Fairchild Tropical Garden to send seeds of all the palm species of Bolivia. Then I asked Ing. Luis Mendoza, a former student under my direction at the School of Agronomy, University of San Simon, Cochabamba, who was at that time Director of the Agricultural Extension Service at Chuquisaca, to send seeds of the Soroma palms. Some 200 seeds averaging 3 cm. (1 3/16 in.) long were received in two bags labelled "Palmar Grande" and "Palmar Chico." About 50 seeds from both were sent to the Fairchild Tropical Garden. Some complete seeds were also planted in pots. After one or

1. The Pasopaya palms, *Parajubaea Torallyi*, in their native habitat. From color transparency by M. Cárdenas.

2. Inflorescences of *Parajubaea Torallyi* among the leaves. From color transparency by M. Cárdenas.

two years, there was a vigorous little plant which now, after nine years, is already 2 m. (about 6 ft.) tall. Three years ago, we began to organize a City Botanical Garden in Cochabamba at an altitude of 2,576 m. (about 8,456 ft.). On this occasion, while planting some native trees to make up the future main avenues of the garden, we remembered the Chuquisaca palms for our central avenue. On the other hand, we knew various specimens of this palm growing here at the Monastery of Santa Teresa, at Sucre in the Central Park and the Jesuits College of Sagrado Corazon. The latter plant was known as *palmera de Pasopaya*. The garden where d'Orbigny discovered *Diplothemium Torallyi* was located at Garcilaso, 1.5 km. (0.9 mi.) east of the Central Park. It is reported that the garden still exists and the d'Orbigny palm also. I do not believe that the existing specimen is the same seen by d'Orbigny in 1832. The fruits of these palms germinate when fallen so one sees under a big palm many small plants of various sizes.

At the beginning of May, 1969, I decided to go to the *palmares* to collect seeds and herbarium specimens with the



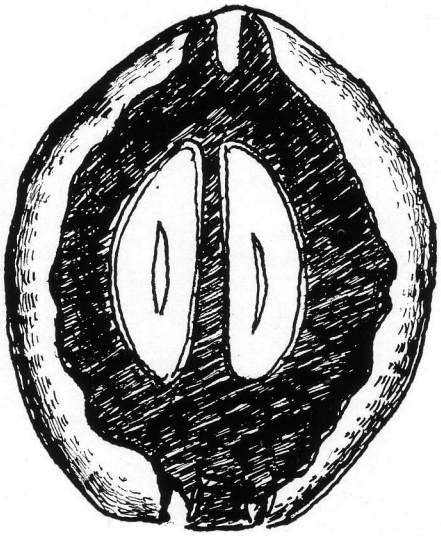
3. An inflorescence of *Parajubaea Torallyi* with fruits. From color transparency by M. Cárdenas.

assistance of my former student, Ing. E. Meneses. I went to Sucre by plane and continued the next day by jeep to Presto about 250 km. (156 mi.) from Sucre. From Presto, there was only a very rough stony road of about 40 km. (25 mi.) to Pasopaya. From Pasopaya, the first *palmares* appear at about 15 km. (10 mi.) in the ravines of sandstone mountains. Pasopaya was an important hacienda before the "Agrarian Reform."

4. Kawana, the Indian from "Palmares" close to a nine-year-old *Parajubaea Torallyi* in a garden at Cochabamba.

Its last owner was Mr. Humberto Malpartida, now living at Sucre, who gave us interesting references about the trade of *janchi coco*. Actually Pasopaya is inhabited by the Indians as it is the *palmar*. The population there, with a rural school, is only some 200 people.

The palms occur in dense groups in the somewhat fertile and humid ravines from 2,400 to 2,700 m. altitude (7,872 to 8,856 ft.). They are very handsome with cylindric trunks of an average height of 14 m. (46 ft.) and a diameter of about 0.50 m. (1 ft. 8 in.). The pinnate leaves attain a length of 4.5 to 5 m. (13 to 16 ft. 5 in.). The whole inflorescence measures 1 m. long (3 ft. 3 in.) with 40 to 60 flowering branches. Most of the flowers are staminate but ordinarily each inflorescence branch bears



5. Tangential section of a fruit of *Parajubaea Torallyi*, natural size, showing two of the three crests of the irregularly roughened endocarp at the top and two seeds. The pores are at the base of the endocarp. Drawing by M. Cárdenas.

two fertile fruits at its base. A whole inflorescence shows over 100 fruits which are slightly ovoid, averaging 5 cm. (2 in.) long. The epicarp is green-grayish and smooth. The mesocarp is rather hard and fibrous but sweet because of a yellow pulp which is eaten. The endocarp is very hard, irregularly pitted, dark brown to blackish, with one to three seeds about 1.5 cm. (19/32 in.) long and three germinating pores below. The freshly collected fruits bear persistent perianth parts. The fruit examined by d'Orbigny in 1832 and appearing as an illustration of *Diplothemium Torallyi* is spotted. This does not occur on the hundreds of fruits we have seen. Thus we think that the plant discovered by this French explorer at Garciloso had some kind of virus or fungus disease.

The plants growing as cultivated specimens in the monasteries and central parks today must have been planted about a century ago but we can't say whether they came from Soroma or Pasopaya regions. The palm existing in Cochabamba at the Monastery of Santa Teresa might be of Soroma origin because the size of its fruits is rather small compared with those of Pasopaya.

The scenery of the *palmares* in the district of Pasopaya is fantastic. On sandstone mountains where it does not rain for eight or ten months, one finds thousands of these handsome palms in the rather humid ravines. The whole landscape suggests to the exotic fancy the long past Tertiary Age.

In a backward country like Bolivia, nobody realizes the value of this natural treasure for science and the oil industry. It is a pity that so far these *palmares* have not been declared national parks. The Indians, who know nothing about culture or economic value of plants, are accustomed to burn the palm shells after they have removed the nuts on a primitive stone crusher. The Indian who was sent by us to the place to collect the fruits for sowing in our botanical garden arrived early in November and he said that a violent wind blew a fire on a whole ravine where thousands of palms were entirely burned.