

HISTORY AND TAXONOMY OF *NEORAIMONDIA HERZOGIANA* (CACTACEAE)

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Abstract. A more accurate knowledge of various aspects of *Neoraimondia herzogiana* (Back.) Buxb. & Krainz is given, complementing recent anatomical work (Mauseth and Kiesling, 1997). Included here is a history of knowledge about *N. herzogiana*, its distribution, ecology, and a description of the genus *Neoraimondia*, emended to include this species, which has been known as *Neocardenasia herzogiana* Back. A description of the morphology of the species is included and uses are mentioned. A list of studied material is given, typification is discussed, and a lectotype is designated—an original specimen by Cárdenas identified and signed by Backeberg.

Introduction

The genus *Neocardenasia* has only one species, *N. herzogiana* Back., which occurs in the medium altitude mountains of central Bolivia. Backeberg (1949) created the genus *Neocardenasia* distinct from *Neoraimondia* based on *N. herzogiana* being greatly separated geographically from the neoraimondias, which occur only on the coast of Peru (Ostolaza, 1992; Ostolaza et al., 1985; Rauh, 1958). Not only do neoraimondias occur a long distance from *N. herzogiana*, but the high altitudes of the Andes also act as a barrier between them. Morphological differences were also used as justification for separating *N. herzogiana* from *Neoraimondia* (Table 1), but now those differences are considered to be of minor importance. As a consequence of recent anatomical and morphological studies (Mauseth and Kiesling, 1997), we consider the combination *Neoraimondia herzogiana* (Back.) Buxb. & Krainz to be the correct name.

History

Neoraimondia herzogiana was first identified by Cárdenas (1947) as *Neoraimondia macrostibas* (K. Schum.) Britton & Rose. He mentioned it as the most noticeable species of the cactus forest in central Bolivia (Fig. 1) and pointed out its unusual distribution, being widely separated from the original population of *N. macrostibas*, which is on the Peruvian coast. Furthermore, he noted several morpho-

logical differences: the presence of a trunk in the Bolivian plants (Fig. 2), their height of more than 10 m and their shorter spines compared with those of the Peruvian *N. macrostibas*. He mentioned that the plants were known by the common name Caraparí, which is known widely in Bolivia. Cárdenas (1947) stated that the species was photographed by Theodoro Herzog in 1909 along the mule path between Cochabamba and Santa Cruz; the specific epithet—*herzogiana*—was probably suggested by Cárdenas.



Fig. 1. Forest of *N. herzogiana* near Mataral.

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Fig. 2. Two specimens of *N. herzogiana* between Aiquile and Pulquina, Dept. Cochabamba. Notice the spiny trunk and the unarmed branches.

Backeberg (1949) later described this plant as a new genus and species (*Neocardenasia herzogiana*) based on Cárdenas' information, photographs, presumed herbarium material (see Typification), and perhaps living material. In several papers (Backeberg, 1949; Cárdenas, 1952, 1953, 1966, 1969a and especially 1969b), it is stated that the original description was made with material and information taken from a small locality named Tacko Laguna, west of Pérez, in the Department Cochabamba.

Cárdenas also mentioned a large population of *N. herzogiana* in southern Bolivia, close to the Argentinean border, near a town named Caraparí, which is the vernacular name for the

plant. Accordingly, it is very plausible that the species also occurs on the Argentinean side of the border, near Tartagal in Salta Province. One of us (RK) made a special trip to this area of Argentina in November 1995 to locate this species but was unable to find it. At least, it is not now growing near the main route or several secondary routes in that area. Surprisingly, an arroyo a few km south of the Bolivian-Argentinean border has the name Caraparí, but neither the meaning of the name nor the plant we were searching for was known to the local people. The local river has its origin at, and is named for, the town of Caraparí in Bolivia, thus giving the rivulet in Argentina the same name.

From the first mention by Cárdenas (1947), it has been clear that *Neocardenasia* is closely related to *Neoraimondia*. The formal combination *Neoraimondia herzogiana* (Back.) Buxb. & Krainz was published in the second edition of the catalog of the Städtische Sukkulentensammlung in Zürich (Krainz, 1967). Buxbaum (1969), Ritter (1980), Hunt and Taylor (1990) Hunt (1992), and Kiesling (1999) also were of the opinion that *N. herzogiana* was truly a member of *Neoraimondia*. Backeberg (1949) and Cárdenas (1952) were the only ones who defended the segregation. Their arguments seem weak and some fail when we tried to corroborate them. As Table 1 shows, the differences appear to be trivial. The most important difference—receptacle spiny vs. hairy with inconspicuous spines—is a question of developmental timing. Fruits of *Neoraimondia* also have spines, they simply develop more slowly than those of *N. herzogiana*. Anatomically, *N. herzogiana* is almost indistinguishable from *N. arequipensis* ssp. *roseiflora* (Mauseth and Kiesling, 1997, as *N. roseiflora*).

Distribution and Ecology

At present *N. Herzogiana* is known to occur only in Bolivia, in the Departments of

Table 1. Differences between *Neoraimondia* and *Neocardenasia*.

<i>Neoraimondia</i> :	<i>Neocardenasia</i> :
Trunk absent, branching from the base.	Trunk present, branching at 1.5—2 m above the soil.
Branches parallel to the central stem (except in one species).	Branches slightly divergent.
Short shoots very well developed, long, some branched.	Short shoots not as well developed, short, never branched.
Several (2—4?) flowers present at one areole at one time.	Usually only one flower present at one areole at one time (up to 3 have been observed by us).
Flower receptacle with hairs and inconspicuous spines (1 cm long on <i>Kiesling 1923!</i>).	Flower receptacle with fascicles of thin spines.
Fruits not edible (edible according to C. Ostolaza; pers. comm.).	Fruits edible.

* For this comparison the following materials of *Neoraimondia* s.s. have been examined: *N. arequipensis*: Peru, Lima, cerca de Chosica, Km 70, 2—5 m alt.; flores rojas; *M. Cárdenas 5017*, BOLV!, LIL! *N. roseiflora* (Werd. & Back.) Back.: NW de Lima, Sta. Rosa de Quives, 3-III-1980, *R. Kiesling 1923*, SI! (receptacle spines 1 cm long); Prov. Lambayeque; La Puntilla, 25 Km E de Chiclayo, Sept. 29, 1935, *S. West 3582* (BA 33025!).

Chuquisaca, Cochabamba, Potosí, Santa Cruz and Tarija. It is abundant in the southeastern region of Department Cochabamba (Pérez region) and the western area of Santa Cruz (Mataral, Pulquina, and Saipina). It also grows in large populations at some localities in the Departments of Chuquisaca and Tarija (Fig. 7).

The largest populations occur between 1500 and 2000 m. A sterile herbarium specimen is labeled as being from Department La Paz, but G. Navarro informed us (pers. comm.) that the plant grows only in the area to the east of Cochabamba, to the west of Santa Cruz, and along the Pilcomayo river from near Sucre to near Tarija. *N. herzogiana* is cultivated as an ornamental at churches and houses at elevations up to 2600 m. Cárdenas (1969a) once mentioned that this species grew in a very low altitude (ca. 500 m) at Izozog in Department Santa Cruz. It would not be surprising to find it at the Argentinean border with Bolivia near Tartagal, Province Salta.

Plants of *Neoraimondia herzogiana* grow in dry regions with Chaco vegetation, sometimes with arboreal vegetation, characterized by *Schinopsis haenckeana*, *Acacia* spp., *Prosopis* spp., *Caesalpinia paraguayensis*, and *Cochlospermum tetraporum*. At other times they are found in open places with many other cacti, such as *Castellanosia caineana*, *Cereus* cf. *hankeanus*, *Cleistocactus* spp., *Corryocac-*

tus pulquinensis, *Pereskia diaz-romeroana*, *P. sacharosa*, *Opuntia salmiana*, *Opuntia* cf. *schickendantzii*, *Samaipaticereus corroanus*, *Weingartia pulquinensis*, and others. The *Neocardenasia* population expands when the woodland is partially destroyed, due to a lack of competition (Navarro, 1996).

Uses

According to Cárdenas (1969b), the fruit was the most delicious he knew, either native or cultivated. He said it had a taste reminiscent of pineapple and strawberry. The fruits were sold at the local markets of Aiquile and Mizque, according to Cárdenas, but they are too soft to be transported to more distant markets. Goats immediately eat the fruits as they drop to the soil.

Description

NEORAIMONDIA Britton & Rose, The Cactaceae 2: 181. 1920. (Emended description to include *N. herzogiana*.)

Plants large, up to 10(-15) m tall, columnar, with or without a definite trunk. Branches erect, 4-7-ribbed. Spines large, up to 20 cm long on trunk areoles. Flowering areoles elongate, forming short shoots (brachyblasts), felted, spiny or not. Flowers single or several si-



Fig. 3. Felted short shoot (areole) with a bud (at Mataral).

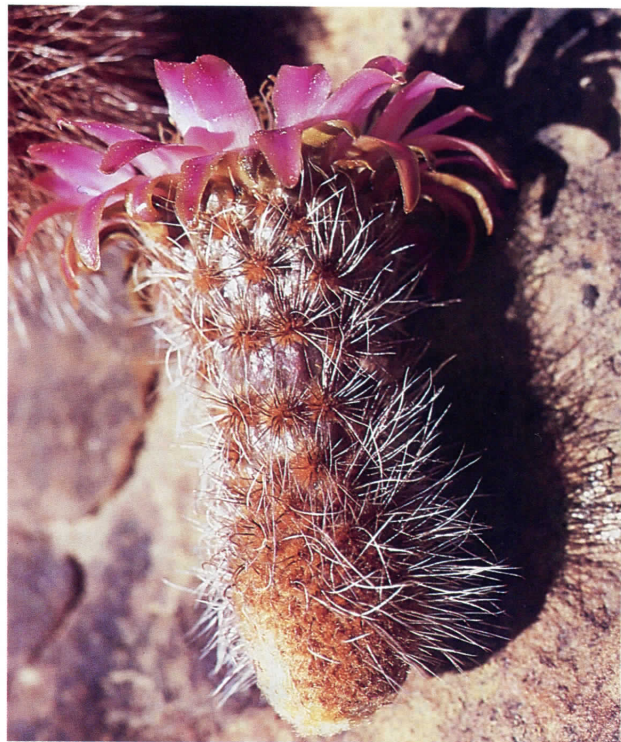


Fig. 4. External view of the flower (Aiquile to Sucre).



Fig. 5. Fruiting branch (at Mataral). Note that some short shoots (areoles) have two fruits or one fruit and one bud. Each short shoot flowers more than once each season.

multaneously from one short shoot, funnelliform, the receptacle stout, longer than the limb, with the axil of the scales hairy and with bristle-like spines; perianth segments shorter than the receptacle; fruit ellipsoid to globular, covered by prominent deciduous areoles with hairs and slender bristle-like spines; seeds dull black or brown, corrugate.

Type of the genus: *Neoraimondia macrostibas* (K. Schum.) Britton & Rose, *Cactaceae* 2: 182. 1920. = *Neoraimondia arequipensis* (Meyen) Back., *Blätt. Kakteenf.* 1936, number 9.

Two species, one of the Peruvian coast and one from Bolivia.

NEORAIMONDIA HERZOGIANA (Back.) Buxb. & Krainz, in Krainz, *Katalog der in Kultur stehenden Arten, Zweiten Auflage*: 87. *Städtische Sukkulentsammlung Zürich*. 1967. *Neocardenasia herzogiana* Back., *Blätt. Sukkulenkunde* 1: 2. 1949.

Columnar plants, trunk to 10(-15) m tall, 40-60 cm diam., branched at 1.5-2 m above the soil, the basal part cylindrical and very spiny, the upper deeply ribbed and with only short spines or none. Branches 3-11, ca. 10-15 cm diam., somewhat divergent, 6-7 ribbed. Ribs deep, ca. 5 cm high, with nearly parallel sides. Areoles prominent, globular, nearly 3 cm diam., only rarely longer than wide, brown-felted, accrescent (Fig. 3). Central spines lacking; radial spines produced over a period of years, 10-15 on trunk areoles only 2 or 3 years old,

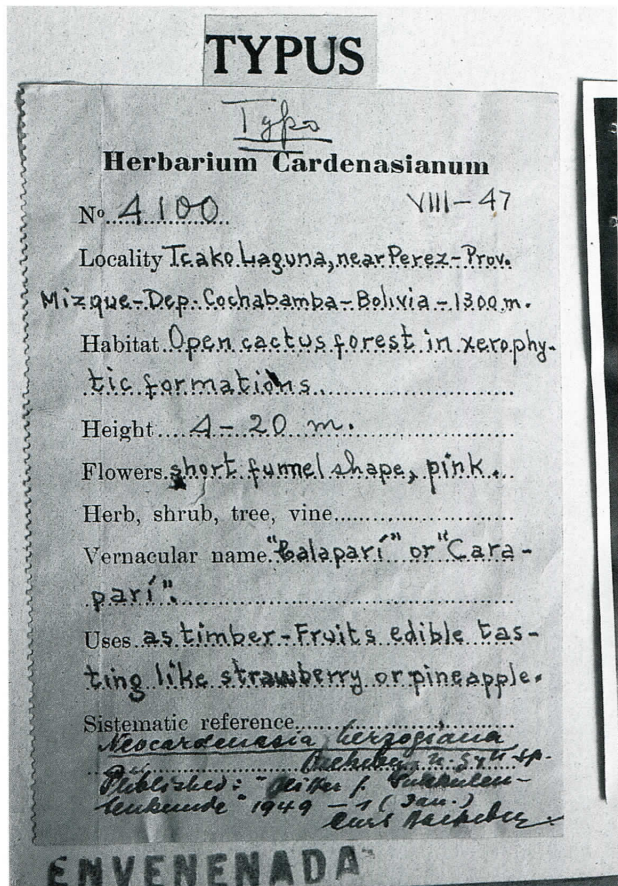


Fig. 6. Label of the type specimen of Lillo, collected by Cárdenas and annotated by Backeberg.

15-25 on very old trunk areoles, 2-18 cm long, absent or only few and short (1 cm) at the base of floriferous areoles.

Flower 1-3, more or less simultaneous at each areole, 6-7 cm long. Receptacle nearly cylindrical, ca. 3 cm diam., with many areoles, densely covered by thin spines 1-3 cm long. Ovary chamber globular or elongated, ca. 1 cm diam., 1.5 cm long. Nectar chamber conical, ca. 2 cm long. Stamens many, in a single spiral series extending from above the nectar chamber to the perianth, exerted, yellow. Perianth pink (salmon) with short tepals. Style cylindrical, nearly 5 cm long, exerted, yellow at the base, pink under the stigma. Stigma 1 cm long, papillose, lobes ca. 10, acute (Fig. 4).

Fruit ovoid, 5-6 cm long, 3-4 cm diam., the areoles easily detachable when mature, epidermis thin, pink (Fig. 5). Mucilaginous, very sticky, pink or white. Seeds brown, very rugose, crested, 1.5 mm long, 1 mm wide.

Common name: Carapari or Kalapari (only for the fruit or also for the complete plant).

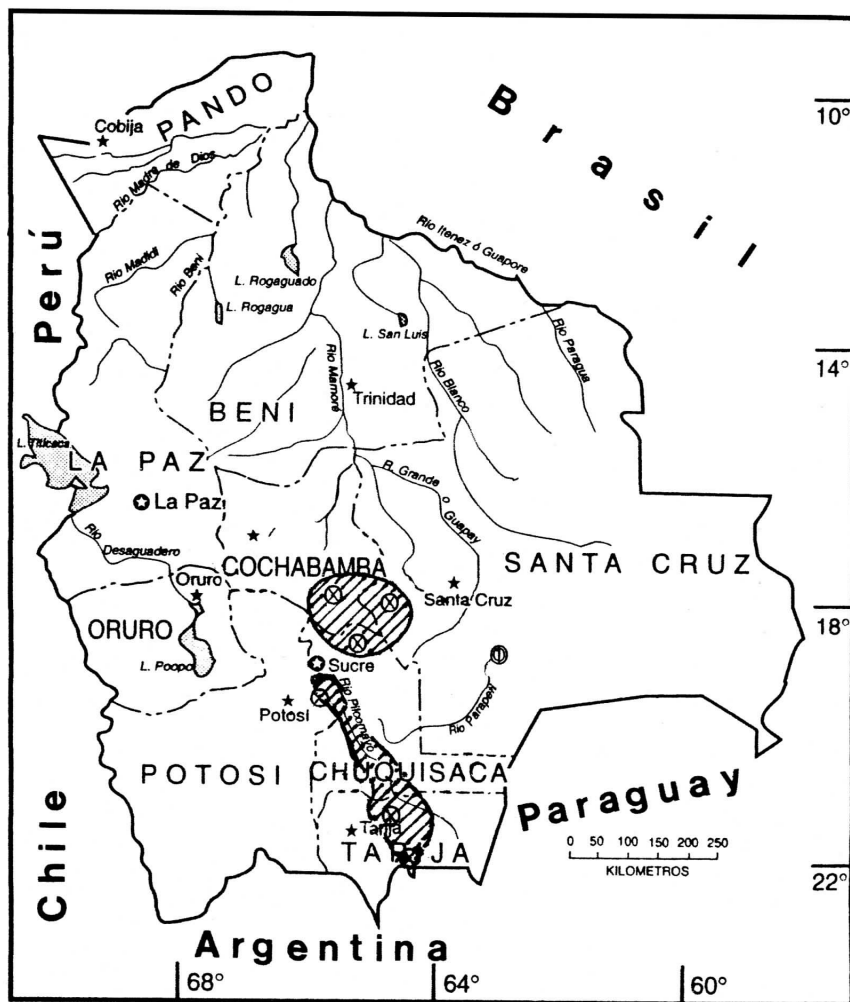


Fig. 7. Map of Bolivia showing the distribution of *N. herzogiana*. The cross-hatched areas within the continuous lines show the area of probable distribution. The circles with crosses inside indicate localities based on herbarium specimens, references in Cárdenas' papers or site-visits by the authors.

Typification

In the original description no specimen was mentioned (although Backeberg wrote: "Typus: ... bei Pérez, halbwegs zwischen Cochabamba und Santa Cruz wachsend, ... 1300 m"), and consequently a type must be designated. The two photos in the original description could be considered lectotypes; the one at the left (reproduced by Backeberg in 1959, Abb. 806, and in several editions of *Kakteenlexikon*, 1966, 1970 and 1976, as photo 251) might be given priority. Fortunately we were able to examine the Cárdenas herbarium, now at LIL (Lillo Institute, Tucumán, Argentina), where one of the specimens is kept.

The label on the specimen (Fig. 6) has the same locality and date found in the original description, also later mentioned by Cárdenas,

and at the lower part of the label is the determination, place of publication, and Backeberg's signature. Therefore we assume Cárdenas sent Backeberg not only the photos and a description of the plant but also the herbarium specimen, which was later returned to Cárdenas. Although it may be that Backeberg did not see the specimen before he published the name, that seems improbable.

Lectotype, designated here: Bolivia, Dept. Cochabamba, Pov. Mizque, Tacko Laguna, near Pérez, 1300 m, VIII/1947; *M. Cárdenas* 4100 (LIL 531553, lectotype, seen; US 2342639 and US 2342640, isolectotypes, not seen).

Studied Material of *N. herzogiana*

BOLIVIA. Dept. Cochabamba. Prov. Mizque, Tacko Laguna, near Pérez, open cactus forest in

xerophytic formations, height 4–20 m (sic), flowers short funnelshape, pink, “calapari” or “carapari”, used as timber, fruits edible, tasting like strawberry or pineapple, *Cárdenas 4100* (LIL 531553, not seen; US 2342639 and US 2342640, not seen). Prov. Mizque, Mizque, flor rojo claro, altura 4–5 m, VI-1940, 2000 m, *Cárdenas 2145* (BA 40795, LIL). Prov. Campero, Río Mizque, camino de Totora a Aiquile, 7-Febr-1990, *G. Navarro 871* (BOLV). De Cuesta del Meadero a Aiquile, 21-XI-1993, *R. Kiesling (8438)*, *O. Ferrari*, *D. Metzling y W. Rausch* (LPB). **Dept. Tarija.** Prov. Gran Chaco, de Villa Montes a Palos Blancos, III-1995, *Kiesling & Mauseth s.n.* (SI); entre Palos Blancos y Boyuibe, July 1954, *T. Meyer s.n.* (LIL 18481). **Dept. Santa Cruz.** Prov. Caballero, Comarapa a Tambo, *G. Navarro s.n.* (BOLV). Prov. Florida. Matarál, III-1995, *Kiesling & Mauseth s.n.* (SI).

There is a sterile specimen (Dept. La Paz, Prov. Inquisivi, entre Miguillas y La Plazuela, 1400 m.s.m., Bosque seco sobre Río La Paz, 25 de Abril, 1992, arbol 10 m, con numerosas ramificaciones, DAP 40 cm, estéril; *S. Beck 21140*, LPB, SI) whose reported locality is far outside the known and expected distribution of the species. It may be from a cultivated plant or from a different species.

Acknowledgements

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