

Two new *Opuntia* species (Cactaceae) from Bolivia and Argentina

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Summary: We describe two new species of the genus *Opuntia* (Cactaceae): the yellow flowering *Opuntia fuscolineata* Starmühler & Mucher spec. nova from the province Chiquitos in the most southeastern part of Bolivia and the white flowering *Opuntia mucheri* Starmühler spec. nova from the province Salta in the northeast of Argentina.

Keywords: *Opuntia fuscolineata*, *Opuntia mucheri*, Cactaceae, Bolivia, Argentina, new species

The east, the southeast and the south of Bolivia is covered by the Chaco, a dry woodland with mainly spiny shrubs, only 1–6m high. The Chaco is the succeeding vegetation after deforestation of the natural woody vegetation. From December to January there is only sporadic rainfall. All over the year, occasional rainy weather (no rain periods), coming up from the south, brings some rain into the Chaco area. In spite of the ideal growing conditions for Cactaceae, just about one dozen genera of the Cactus family occur in Bolivia at all.

In Argentina, cacti grow in the Chaco (in the north, northeast and northwest of Argentina) as well as in the Andes mountain range. Here the conditions are similar to those of the Chaco, but the cacti in the Andes are not sheltered by shrubs and grow commonly in open habitats. Thirty three genera are known from Argentina (LAMBERT 1993).

Enlarging of the distribution area is hardly influenced by animals, but by the growth of the human population. New crop fields often destroy complete populations of cacti. Nevertheless, the populations are of enormous extents. If any locality is destroyed, the number of untouched sites is still so high, that we believe even rare species not to be seriously endangered in this area.

Materials & methods

The results in this paper are based on three excursions to Bolivia and Argentina, and on observations of cultivated specimens over seven years. The excursion to Argentina took about two months, from October to November 1997. We visited *Acanthocalycium*-, *Frailea*-, *Gymnocalycium*-, *Lobivia*- and *Parodia*-sites in the provinces Entre Rios (in the surrounding of Gualaguaychu), Corrientes (*Gymnocalycium* and *Frailea* in the adjacent region of Mercedes), Misiones (*Frailea* and *Notocactus* near the town Santa Ana), Formosa (*Gymnocalycium*, *Echinopsis* and *Monvillea* few km east of the village Estanislao del Campo), Salta (*Gymnocalycium* and *Opuntia mucheri* 4km west of the village El Galpón; *Acanthocalycium* and *Gymnocalycium* near the town Cachi), Jujuy (*Gymnocalycium* and *Parodia* around the village Tumbaya), Tucuman (*Gymnocalycium* and *Lobivia* in the adjacent region of Los Cordones), Catamarca (*Acanthocalycium*, *Gymnocalycium* and *Parodia* near the village El Alto) and Cordoba (*Gymnocalycium* in the Sierra Chica).

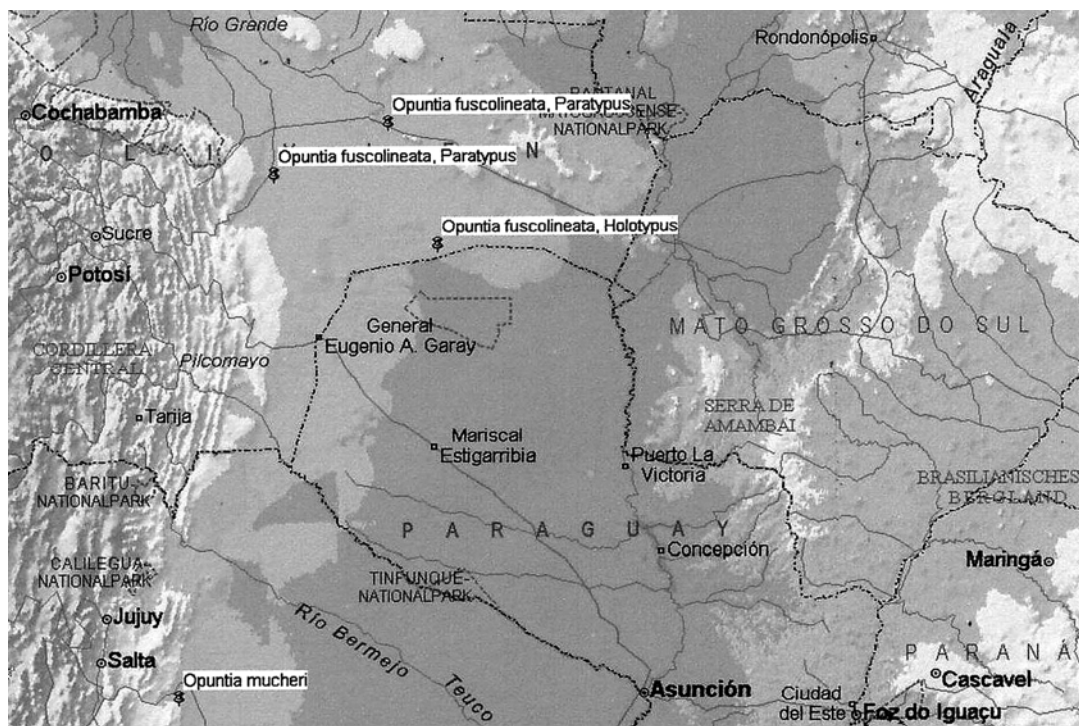


Figure 1: Localities of the types of *Opuntia fuscolineata* and *Opuntia mucheri* in Bolivia and Argentina.

The excursions to Bolivia took place from October to November 1998 and from September to October 2003 and led easterly of the town Sierra de la Cruz towards Brasilia (*Discocactus*, *Gymnocalycium*, *Frailea* and the new described *Opuntia fuscolineata* near San Jose; *Gymnocalycium*, *Frailea* and *Opuntia fuscolineata* near Robore), southeasterly towards Paraguay (near Fortin Ravello: *Gymnocalycium*, *Frailea* and *Opuntia fuscolineata*) and southerly to Argentina (*Gymnocalycium* and *Echinopsis* near Villamonte). Then we visited the Andes from Taricha in the south to Cochabamba in the north at altitudes of 2000m in Entre Rios (*Lobivia*, *Echinopsis*), 3850m in Curqui (*Parodia*, *Sulcorebutia*), 2750m in Cana Cruce in the Paicha valley (*Gymnocalycium*, *Lobivia*, *Parodia*), 3300m in Otavi (*Lobivia*, *Parodia*), 2500m in Sucre (*Lobivia*, *Weingartia*, *Sulcorebutia*), and 1600m in Perereta (*Gymnocalycium*, *Weingartia*).

The plants newly described here have been photographed in their natural habitat (figs. 2, 3, 4, 7) and the accompanying plants have been documented. For investigation and description of the new taxa and for observations in culture, we removed three terminal stem segments. They are cultivated in Graz since 1997 (*Opuntia mucheri*), 1998 and 2003 (*Opuntia fuscolineata*). Photos of flowers as well as the characteristics of the stem segments were made from cultivated material (figs. 5, 6, 8, 9, 10). Holotypes, isotypes and paratypes were made from cultivated, original material from the cited locations in Argentina and Bolivia. Data in the description relate to plants of the original sites in nature and observations of cultivated plants.



Figures 2–6: *Opuntia fuscolineata*. 2) Chaco with type population of *Opuntia fuscolineata* in Bolivia, province Chiquitos, SE San Jose de Chiquita, S Robore, about 2–4km SE of the military camp Fortin Ravello near to the border to Paraguay, along the Palmito National Park, 320m alt. 3) Type population of *Opuntia fuscolineata*. 4) Flowering *Opuntia fuscolineata* in Bolivia, province Chiquitos, SE San Jose de Chiquita, 7km E Robore. 5) Flower of *Opuntia*

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fuscolineata from Bolivia, province Chiquitos, 77km S San Jose de Chiquita, S 18°28.553', W 60°48.693', ca. 300m alt. and 6) its stem segments with 1–2cm long narrow dark brown downward acute stripes below the areoles. (5 & 6 cultivated and photographed in Graz).

Results

***Opuntia fuscolineata* Starmühler & Mucher species nova**

Figs. 1 (map), 2–6.

Diagnosis: Planta procumbens vel dumetosa, 20–100(–150)cm alta, ramificatio originem ductis terminaliter, segmenta procumbenter ex areolis segmenta directa crescent, segmenta caulina elongato-elliptica, (15–)20(–25)cm longa, (1.5–)3(–4.5)cm lata, plerique fere 1cm crassa, grave virida cum lineis 1–2cm longis obscure fuscis deorsum acutis infra areolis (in cultura in tepidario lineae subfusca vel obscure viridis fierens), spinae 1–3(–6), robustae, usque ad 2.5cm longae, a segmentis juvenilibus primo erecte patens, posterius recte patens, ad extremum deorsum accumbens, flores lutei, 3cm Ø.

Description: Plant procumbent to shrubby; 20–100(–150)cm high. Branching originally terminal, procumbent segments develop from the areoles on the upside vertical segments. Stem segments elongated elliptical, (15–)20(–25)cm long, (1.5–)3(–4.5)cm wide, mostly about 1cm thick, deep green with 1–2cm long, narrow dark brown, downward acute stripes below the areoles (in culture in the greenhouse, the stripes become light brown to dark green). Spines 1–3(–6), stout, up to 2.5cm long, on young stem segments at first upright patent, later right-angled outspread, at least downwards accumbent. Flowers deep yellow, 3cm Ø.

Etymology: This new species of *Opuntia* is called ‘fuscolineata’ (= brown striped), because of the characteristic brown stripes on the stem segments below the areoles.

Holotypus: Plant cultivated in Graz/Austria; leg. W. Mucher sen., 12.09.2003 (Bolivia, province Chiquitos, SE San Jose de Chiquita, S Robore, about 2–4km SE of the military camp Fortin Ravello near to the border to Paraguay, along the Palmito National Park, 320m alt.; sandy, stony soil, open Chaco with 1–4m high shrubs within 2–4m distance from each other, accompanying plants: *Agave lecheguila*, *Cleistocactus* sp., *Dyckia* sp., *Frailea* sp., *Gymnocalycium* sp., orchids, *Pereskia* sp. etc.; leg. H. Amerhauser, G. Hold, W. Mucher & W. Schneeberger, MU-136, 26.09.1998) [GZU].

Paratypus: Plant cultivated in Graz/Austria; leg. W. Starmühler, 22.04.2005 (Bolivia, province Chiquitos, 77km S San Jose de Chiquita, S 18°28.553', W 60°48.693', ca. 300m alt.; white, sandy soil at the margin of the Chaco with 0.5–4m high shrubs, accompanying plants: *Tillandsia* sp. and orchids; leg. H. Amerhauser, G. Hold, W. Mucher & W. Schneeberger, MU-128, MU-129, 22.09.1998) [ZSS].

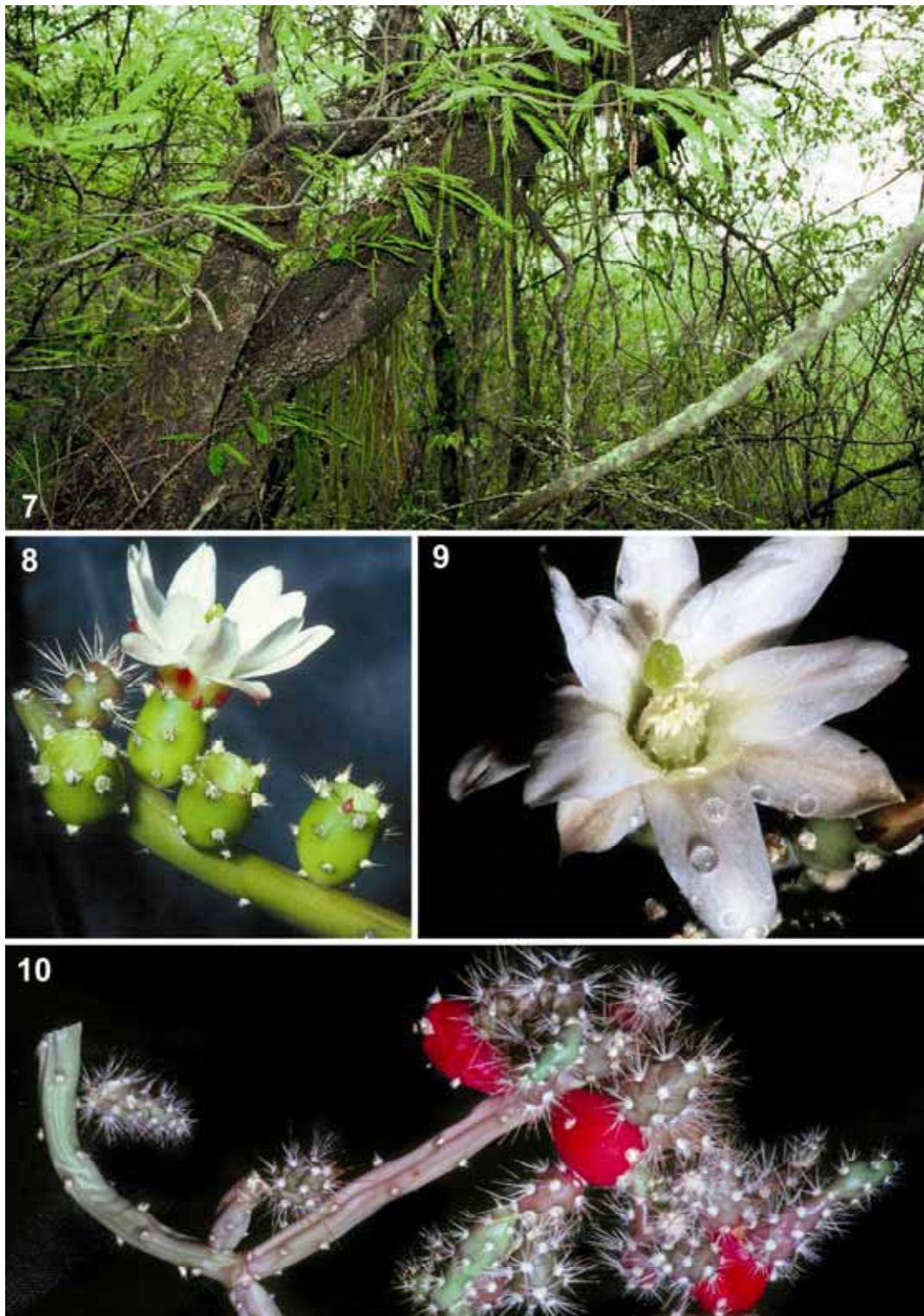
Paratypus: Plant cultivated in Graz/Austria; leg. W. Starmühler, 22.04.2005 (Bolivia, province Chiquitos, 29km W Robore towards San Jose de Chiquita, 450m alt., S 18°13.870', W 59°58.187', open Chaco on a flat ascending hill with big brown globular stones, stony, sandy soil in between, accompanying plants: 1–3m high spiny shrubs within 1–2m distance, short grass, mosses, *Dyckia* sp., bromelias, *Echinops* sp., *Frailea* sp., *Gymnocalycium* sp.; leg. G. Hold & W. Mucher, MU-368, 23.09.2003) [KL].

***Opuntia mucheri* Starmühler species nova**

Figs. 1 (map), 7–10.

Diagnosis: Planta subarbuste dumetosa, 10–40cm alta, ramificatio terminaliter lateraliterque, segmenta caulina cylindracea, 10–20cm longa, 0.8–1.2cm Ø, grave virida, plerique tantum modo 2–3 segmentis caulinibus per ordinem, flores albae, 1cm Ø.

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Figures 7–10: *Opuntia mucheri*. 7) Chaco with the type population of *Opuntia mucheri* in Argentina, province Salta, department Salta, between El Galpón on the Route 14 and Ovejera, 850m alt. 8) Flowering stem segment. 9) Flower of *Opuntia mucheri*. 10) Stem segments with fruits. (8–10 type collection cultivated and photographed in Graz).

Description: Plant dwarf shrubby, 10–40cm high. Branching terminal and lateral. Stem segments cylindrical, 10–20cm long, 0.8–1.2cm Ø, deep green, mostly 2–3 stem segments in a row. Flowers white, 1cm Ø.

Eponymy: This new species is dedicated to Walter Mucher sen. from Graz (born 26.03.1942 at Eibiswald), who found the new plant on his first excursion to Argentina.

Holotypus: Plant cultivated in Graz/Austria; leg. W. Mucher sen., 12.09.2003 (Argentina, province Salta, department Salta, between El Galpón on the Route 14 and the village Ovejera, 850m alt., dense Chaco on a flat ascending hill with 1–4m high mainly spiny shrubs, with single about 6m high *Chorisia speciosa*, sandy soil. Accompanying plants: *Aporocactus* sp., *Cleistocactus* sp., orchids, *Rhipsalis* sp., *Tillandsia* sp. etc.; leg. H. Amerhauser, W. Mucher & W. Papsch, MU-96, 03.11.1997) [GZU].

Isotypes in [ZSS] and [KL].

Discussion

Opuntia retrorsa, occurring in Argentina (LAMBERT 1993), is quite similar to the newly described Bolivian *O. fuscilineata*. Nevertheless, several important morphological differences can be found: *Opuntia retrorsa* has violett stripes downwards from the areoles (not dark brown as *O. fuscilineata* → fig. 6); 4–6 spines in the areoles, which are about 3–4cm long (*O. fuscilineata* has 1–3 spines, which are only 2.5cm long, in older areoles only additionally 1–3 minor spines are found, which are about 1cm); and the flowers in *O. retrorsa* are 4–6cm in diameter (in *O. fuscilineata* about 3cm in diameter → fig. 5).

There is another species with purplish stripes below the areoles in the adjacent region: *O. paraguayensis*. However, the stem segments in this *Opuntia* are much wider (5–8.5cm), spines are usually absent (occasionally one yellowish), and the flowers are much bigger (to 8cm) and orange (ANDERSON 2001).

Opuntia braunii (syn. *Tacinga braunii*) from Brasilia is similar in habitus and shape of the stem segments but it grows up to 6m (more than 3 times higher as *O. fuscilineata*). Its stem segments are grey-green to purplish or glaucous (not deep green as in *O. fuscilineata*) and without brown stripes below the areoles. The flowers are smaller (only 2cm Ø) as those of *O. fuscilineata* (3cm Ø) and show additional differences which led to the split off of the genus *Tacinga* from *Opuntia* (HUNT & TAYLOR 2002).

As observed in the natural habitat, it is typical for *O. fuscilineata* that the whole plant is lying on the ground. If the weather conditions are very dry, roots are developed from the areoles (fig. 3). Under humid weather conditions, especially after rain periods, the stem segments grow upright and the blossoming is generally richer than in dry periods (fig. 4). In dry periods, the upright stem segments remain in their position only as long as they can lean on shrubs or if the plant has not reached a height about approximately 50cm. Otherwise, they lay down within short time.

In our opinion, *O. fuscilineata* is closely related to *O. retrorsa* (not to *O. braunii* and *O. paraguayensis*) and belongs to subfamily Opuntioideae, sectio Opuntia, series Opuntiae.

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Opuntia mucheri is known only from the type locality so far. We place it to the Argentinian species *O. salmiana* into subfamily Opuntioideae, sectio Cylindraceae, series Salmianae (BENSON 1982). *O. mucheri* differs from *O. salmiana* in smaller flowers (only 1cm Ø in *O. mucheri* → fig. 8–9, but 2–3.5cm Ø in *O. salmiana*), which are pure white in *O. mucheri*, but pale yellowish to whitish in *O. salmiana*. By the way, *O. salmiana* is a very robust plant with stem segments to 1.5cm in diameter and up to 2m high. On the other side *O. mucheri* is a delicate plant with stem segments between 0.8 and 1.2cm in diameter (fig. 10) and with a height up to than 40cm, as observed in nature as well as in culture over several years.

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