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Content

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Cover picture: *Gymnocalycium berchtii* Neuhuber at type location (photo: M. Wick)

Editorial

Dear Gymnocalycium enthusiast!

We would never have thought that the first issue of our Gymnocalycium Online Journals SCHÜTZIANA would attract such a wide interest among our readers. Since the day of publication of this issue our web pages have been visited more than 4500 times and the first issue of SCHÜTZIANA has been downloaded more than 1600 times. We would like to give thanks to our readers for being greatly interested in the journal, for the many helpful hints and for the unanimous positive feedback.

We would like to extend our special thanks to Mr. Graham Charles (United Kingdom), who supports us with the English language and helpful hints, to Mr. Takashi Shimada (Japan), who translated SCHÜTZIANA into Japanese and to Mr. Daniel Schweich (France), who has mirrored or publication under: http://www.cactuspro.com/biblio/.

Meanwhile, the registration of SCHÜTZIANA as an official journal took place and we got ISSN 2191-3099. The last and the future issues were printed out and will be sent to selected accepted botanical libraries. With this, the potential fear should be taken from authors who consider SCHÜTZIANA not to be quotable:

- Botanische Gärten der Friedrich-Wilhelms-Universität Bonn, Bonn, Germany
- Botanischer Garten Berlin-Dahlem, Berlin, Germany
- Department für Botanische Systematik und Evolutionsforschung der Universität Wien, Wien, Austria
- Desert Botanical Garden, Phoenix, Arizona, USA
- Instituto de Botánica Darwinion, San Isidro, Prov. Buenos Aires, Argentina
- International Organization for Succulent Plant Study, Sherborne, Great Briton
- Jardin Exotique de Monaco, Monaco
- Kirstenbosch National Botanical Garden, Claremont, South Africa
- Royal Botanic Gardens, Kew, Great Briton
- Sukkulenten-Sammlung Zürich, Zürich, Switzerland.

From the beginning of this year SCHÜTZIANA can also be found on facebook.

Even if we don't have shortage of material for the next issues of SCHÜTZIANA, we would like to invite you to communicate your observations and opinions to us in order to share it with other Gymnocalycium-friends and to discuss Gymnocalyciums on a wider basis. So, please don't hesitate.

In this issue we again have prepared three articles.

Tomáš Kulhánek, in his first contribution on the *G. berchtii*-species group, discusses *G. berchtii* itself from a more unusual perspective – the perspective of geology.

Massimo Meregalli conducts us through his second contribution on Gymnocalyciums from Uruguay, this time to the southern districts of the country, to *G. hyptiacanthum*.

I would like to present to you *G. fischeri* at its natural locations in the province of San Luis, Argentina.

Happy reading!

Gymnocalycium berchtii species-group: Part one - *G. berchtii* Neuhuber

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ABSTRACT.

This article contains the first part of the author's study dealing with taxa related to *Gymnocalycium berchtii*, indicated here as the *G. berchtii* species-group. In this article the geological regions of the Sierra de San Luis are mentioned and lithological units of the eastern region, which the *G. berchtii* species-group occupies, are presented as well as phytocoenoses accompanying and indicating habitats of the *G. berchtii* species-group. The important characteristics designating this species-group are demonstrated. Known habitats of *G. berchtii* s. str. and taxon variability have been introduced.

INTRODUCTION.

Since the first description of *G. berchtii* (Neuhuber 1997) so far two taxa belonging to *berchtii* species-group have been published: *G. nataliae* and *G. morroense* (Neuhuber 2005, Kulhánek *et al.* 2010). The purpose of this study is the presentation of important characteristics of this group and included taxa, the demonstration of different populations and their natural biocoenosis. For better understanding of taxa distribution, geological maps of basement rocks, which also correlate with the appearance of the species-group, are presented. These remarks can help for a better insight into the relationship of presented taxa. The articles should be a helpful step for better classification of the *G. berchtii* related species. The conclusion of the whole study can lead to significant changes in the current classification made by Till *et al*. (2008).

Till *et al*. (2008) have developed interspecific categories referred to as Aggregates (Agg.). Certainly, this category is not fixed in ICBN. Agg. *Berchtiana* was developed for Gymnos of subg. *Gymnocalycium* growing in the Argentinean Province of San Luis. Among the typical characteristics appertaining are a greyish cuticula on a dark green or metallic brown epidermis, and flower mostly funnel-shaped with a narrow receptaculum (Fig. 20). The fruits are mostly clavate with an olive-green to plum-blue cuticle on the pericarp (Fig. 21). The names of the Aggregates used by Till have not been presented with their contents, that is the main characteristics typical for all species belonging there. I think it was one of the points which led him to make some mistakes in the distribution of taxa

in his Aggregates. The distribution of the *G. berchtii* species-group is not a problem, only taxon intervening from the west, such as *G. poeschlii* Neuhuber, should be focused on more in detail. The name *Berchtiana* is derived from the first valid name *G. berchtii* (Neuhuber 1997).

Till *et al*. (2008) included in this Aggregate two more species: *G. nataliae* Neuhuber (2005) and *G. poeschlii* Neuhuber (1999). Charles (2009) indicated *G. nataliae* as a local form of *G. berchtii* with a south-western area of distribution. Charles (2009) equating *G. poeschlii* with *G. fischeri* Halda *et al.*, which Till classifies in Agg. *Capillensia,* together with another species *G. sutterianum* (Schick) Hosseus. This submission is quite a misunderstanding and should be explained in another article. The latest taxon described as *G. morroense* by Kulhánek *et al*. (2010) is also closely related to *G. berchtii* (Kulhánek 2007; Sperling and Bercht 2010; Kulhánek *et al*. 2010).

The most characteristic feature of all plants included here is a bluish or greyish cuticula developed on a dark epidermis. But many Gymnocalyciums which grow in a hot climate with some dry periods develop this type of cuticula. The climate in the province San Luis is relatively dry during the spring months and also very hot until the autumn, especially the plateaux spreading out of the Sierra de San Luis. The rains arriving during the hot summer months are mostly situated around the mountains and are often very strong.

Habitats can be found on the eastern side of the Sierra de San Luis and the associated Sierras del Morro and Yulto, on very moderate slopes and bases of hills with drops of a few meters to 50 m. For plants belonging to this group to appear, the type of basement rocks – geological setting and type of phytocoenoses are important.

Geological setting.

The Sierra de San Luis belongs to the Eastern Sierras Pampeanas (Whitmeyer and Simpson 2004, Siegesmund *et al*. 2010). Geological development started in ediacaran is specified as Pampean orogeny, this evidence is provided by Pb/Pb garnet age of 564 ± 21 Ma (Siegesmund *et al*. 2010) (Fig. 2). Generally, the Sierra de San Luis consists of broad, NNE trending bands of greenschist through upper amphibolite facies pelitic and quartzo-feldspathic rocks (Ortiz Suárez *et al*. 1992, Prozzi and Ortiz Suárez 1994, Steenken *et al*. 2004). Distinctive suites of Ordovician and Devonian granitoids (intrusions of pegmatites, tonalites, granites) rude the metasedimentary rocks (Rapela *et al*. 1992), and Terciary volcanic rocks crop out through the centre of the region (Ramos *et al*. 1991) – Cerros Largos, Cerros del Rosario, Cerro Morro (see Figs. 1-2). Metasedimentary lithologies are divided into three groups: western complex, central region and eastern region (see Fig. 2). The last mentioned region attracts our interest. This eastern region, of biotite-grade through migmatitic quartzo-feldspathic schists, quartzites and minor pelites, comprises the Conlara metamorphic

complex (Fig. 1) - eastern basement complex (Fig. 2) of Sims *et al.* (1997), Von Gosen and Prozzi (1998). The metamorphic rocks include mostly gneisses and schists with metamorphic layering, metaquartzites, pegmatites and amphibolites. Generally the basement rocks are of greenschist facies, with local zones of biotite gneiss and pegmatites reaching intermediate grade. Pelitic schists are uncommon, and decrease in outcrop frequency to the east. Silimanit + biotite + muscovit schists are abundant in the south along with K-feldspar migmatites. Migmatitic biotite + quartz schists and quartzites occur near the eastern margin of the Sierra de San Luis. Plutonic rocks are predominantly S-type biotite + muskovit ± garnet granitoids with an elliptical, discordant outcrop pattern. In several locations, plutons crosscut metamorphic isograds, indicating that emplacement was postpeak metamorphism, crystallization age of zirkons from metamorphic and plutonic rocks are mentioned by Whitmeyer and Simpson (2004) and Siegesmund *et al*. (2010) (see Fig. 2).

This complex of different plutonic and metamorphic rocks and post Pampean structural evolution with a combination of edaphic and climatic factors could have had an important influence on phytocoenoses types as well as *G. berchtii* species-group colonisation. If we compare a distribution map of *G. berchtii* species-group „blues“ made by Mario Wick (Sperling and Bercht 2010) with geological maps presented here, we can infer the influence of this Conlara complex on the *G. berchtii* species occurrence. This also indicates the occurrence of known habitats of *berchtii* group in areas of regional peak metamorphism grade and along plutonic rocks. These habitats could be fixed to migmatitic fields which mostly occur along the margins of granitoid intrusions or in metamorphism zones. Habitats are mostly fixed on migmatites intrusioned by different types of granitoids (mostly pegmatite) or on biotitic quartz schists and gneisses abundant in reach quartzites. The *G. berchtii* species-group could occasionally share some habitats with *G. sutterianum* aff. sensu Till and Amerhauser (2008). These places could be located at a little bit higher altitude (up to ca. 900 m.s.m. or more) on margins of devonian granitoids where they have often been found. This could explain the occurrence of *G. sanluisiense* nom. nud. inside the area of the G. *berchtii* species-group as was also mentioned by Sperling and Bercht (2010). Especially see batholits of Las Chacras, Renca and other granitoid basements of younger age shown on geological maps (Figs. 1-2).

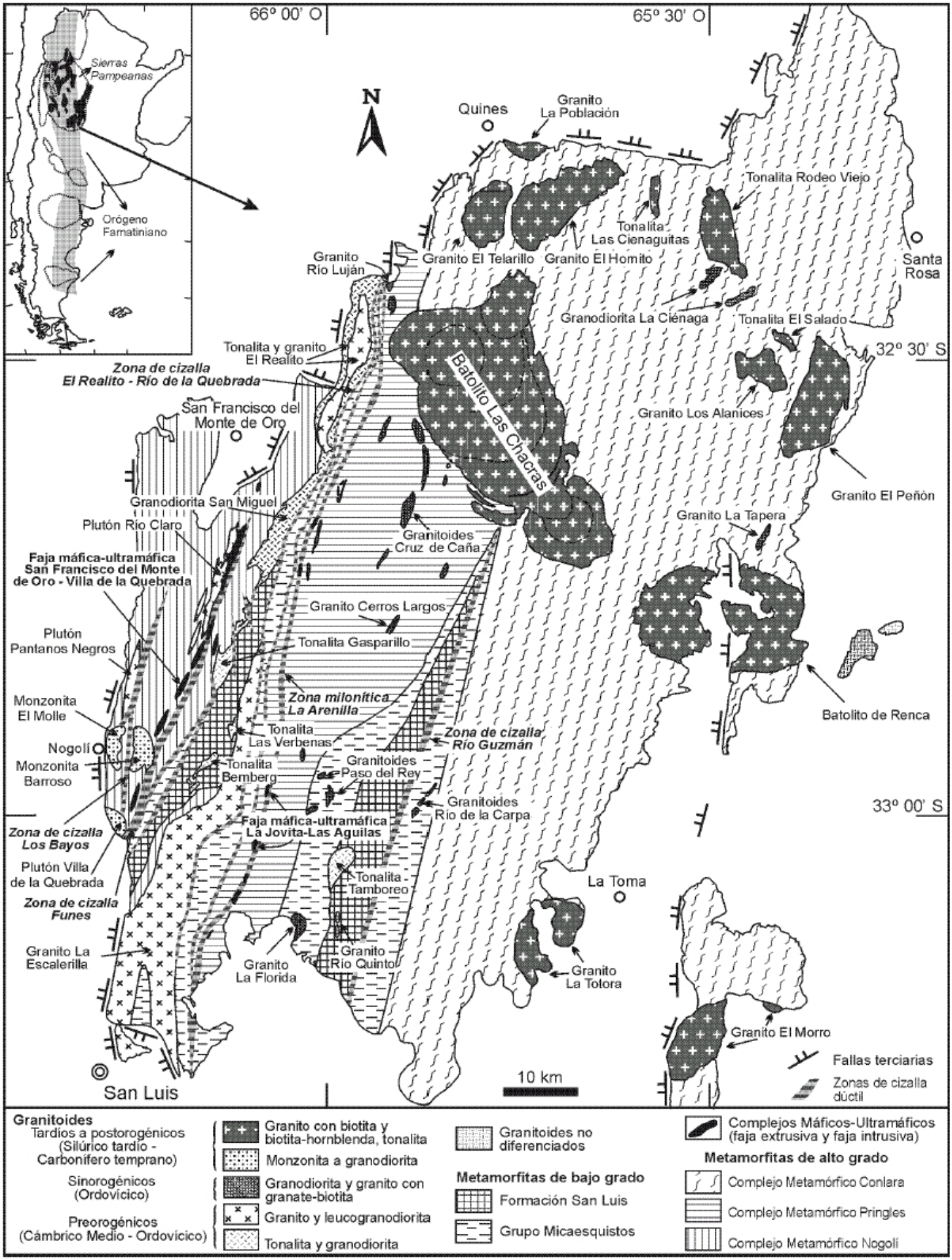


Fig. 1: Geological map of the basement of the Sierra de San Luis (used from Sato *et al*. 2003)

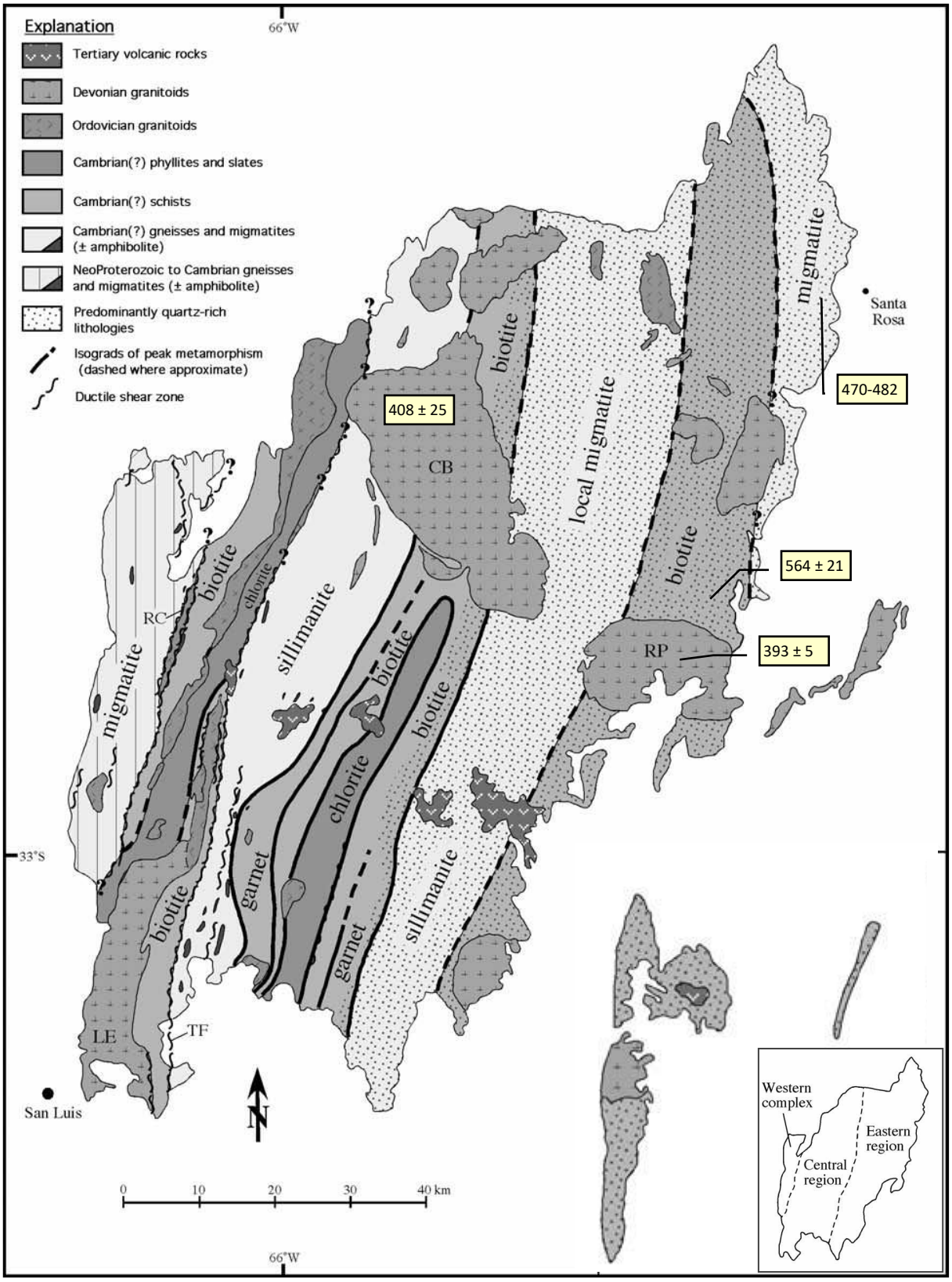


Fig. 2: Geological map of the Sierra de San Luis showing isograds of regional peak metamorphism. CB-Chacras batholit, RP-Renca pluton. U/Pb crystallization ages (Ma) of zircons from plutonic rocks (Brogioni 1993, Stuart-Smith *et al*. 1999) and metamorphic monazites (Siegesmund *et al*. 2010) (map combinated from Whitmeyer and Simpson 2004)

Ecology.

The area of our interest belongs mostly to the Ecoregion **Chaco Seco** (Fig. 3), including the subecoregion **Chaco serrano** covering the bigger part of the Sierra de San Luis and **Chaco árido** (Burkart *et al*. 1999, Torrella and Adámoli 2005) with its zone **Chaco árido leñoso** where habitats of *Berchtiana* are mostly located. The Sierra del Morro and nearby Sierra del Yulto are already referred to ecoregion **Espinal** (Caldenal form, Fig. 3), but the vegetation type at the habitats is specifying as "Estepa arbustiva herbácea".

The climate is characterized by its humid and hot summers (October to April) and mild, dry winters (May to September) (Cabido *et al*. 1993), with an annual rainfall of 300-500 millimetres (mm), and an average temperature of 18-20°C. The average temperature in January is 25°C, and in July, 10°C (Morello 1986). Absolute maximum temperatures can reach 48°C, while absolute minimum temperatures can go down to -8°C (Cabido *et al*. 1993). Plants more commonly associated with this subecoregion **Chaco árido** are *Aspidosperma quebracho-blanco* (quebracho-blanco) as a dominant, *Prosopis flexuosa* (algarrobo negro), *Prosopis torquata* (tintinaco), *Bulnesia retama* (retamo), *Mimoziganthus carinatus* (lata), *Cercidium praecox* (brea), *Geoffrea decorticans* (chañar), *Atamisquea emarginata* (atamisqui), *Condalia microphylla* (puiquillín), *Monttea aphyla* (pico de loro), *Ximenia americana* (albaricoque) and *Larrea tenuifolia* (Jarilla). In zones of **Chaco serrano** dominate *Schinopsis haenkeana* (horco-quebracho), co-dominate *Lithraea ternifolia* (molle-blanco), *Fagara coco* (coco), *Celtis chichape* (tala), *Acacia caven* (churgui), *Aspidosperma quebracho-blanco*, *Schinus areira* (molle), *Prosopis torquata*, *Jodina rhombifolia* (sombra de toro), *Ruprechtia apelata* (manzano de campo), *Acacia visco* (visco), *Aloyisia gratissima* (usillo), (Cabrera 1971, 1976). This vegetation type can be seen at the type habitat of *G. berchtii* near Los Chañares.

The most frequented habitats are presented on Figs. 4-15. There can be seen a shruby form of *Acacia caven*, *Prosopis torquata* and rarely *Larrea cuneifolia* as degradated elements of **Chaco seco**. At these habitats, which are mostly open with minimal woodland covering, there are species-rich grasslands phytocoenosis (grassy steppes included *Stipa*, *Festuca*) mostly without woody plants or with occasional shrubs with low habitation rate. *Eupatorium buniifolium* and *Heterothalamus allienus* (*Asteraceae*) are rather often dominant shrubs on these "**estepas arbustivas**" (Anderson *et al*. 1970). This vegetation type is belonging to **Romerillal** (Figs. 5-7) and is also one of the most frequent phytocoenoses at habitats of the G. *berchtii* species-group.

Submerged plants of *Gymnocalycium* grow between the stones in a shallow layer of soil or use slate streamlined rock crevices filled with soil. The climate is warm and dry with summer rains. As happens with other phytogeographic provinces, it has great temperature variations and high average precipitation. It is a mostly flat plain with low hilly areas. Soils are loessoid or sandy.

Accompanying species from the *Cactaceae* family can be *Gymnocalycium lukasikii* Halda & Kupčák, *G. lukasikii ssp. emilii* Halda & Milt (*aff. borthii*), *G. ochoterenae*, *G. achirasense* H. Till & Schatzl ex H. Till, *A. spiniflorum*, *E. aurea* and *O. sulphurea*, *Notocactus submammulosus,* and on some lower-situated habitats also *G. borthii*, *E. leucantha, Pterocactus tuberosus, A. salmiana* and *Cereus aethiops*. At some habitats can be found *G. sutterianum* aff. sensu Till and Amerhauser (2008).

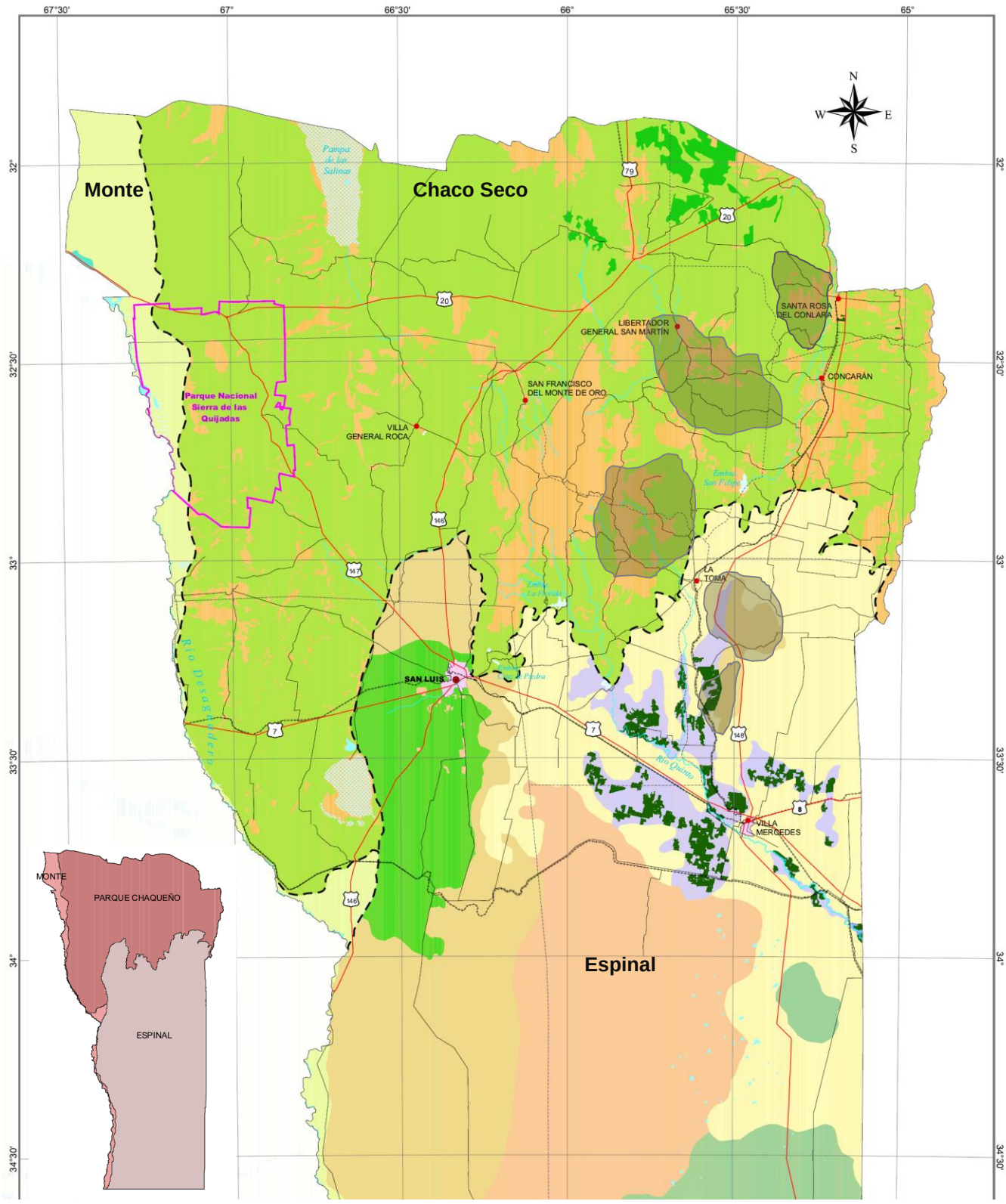
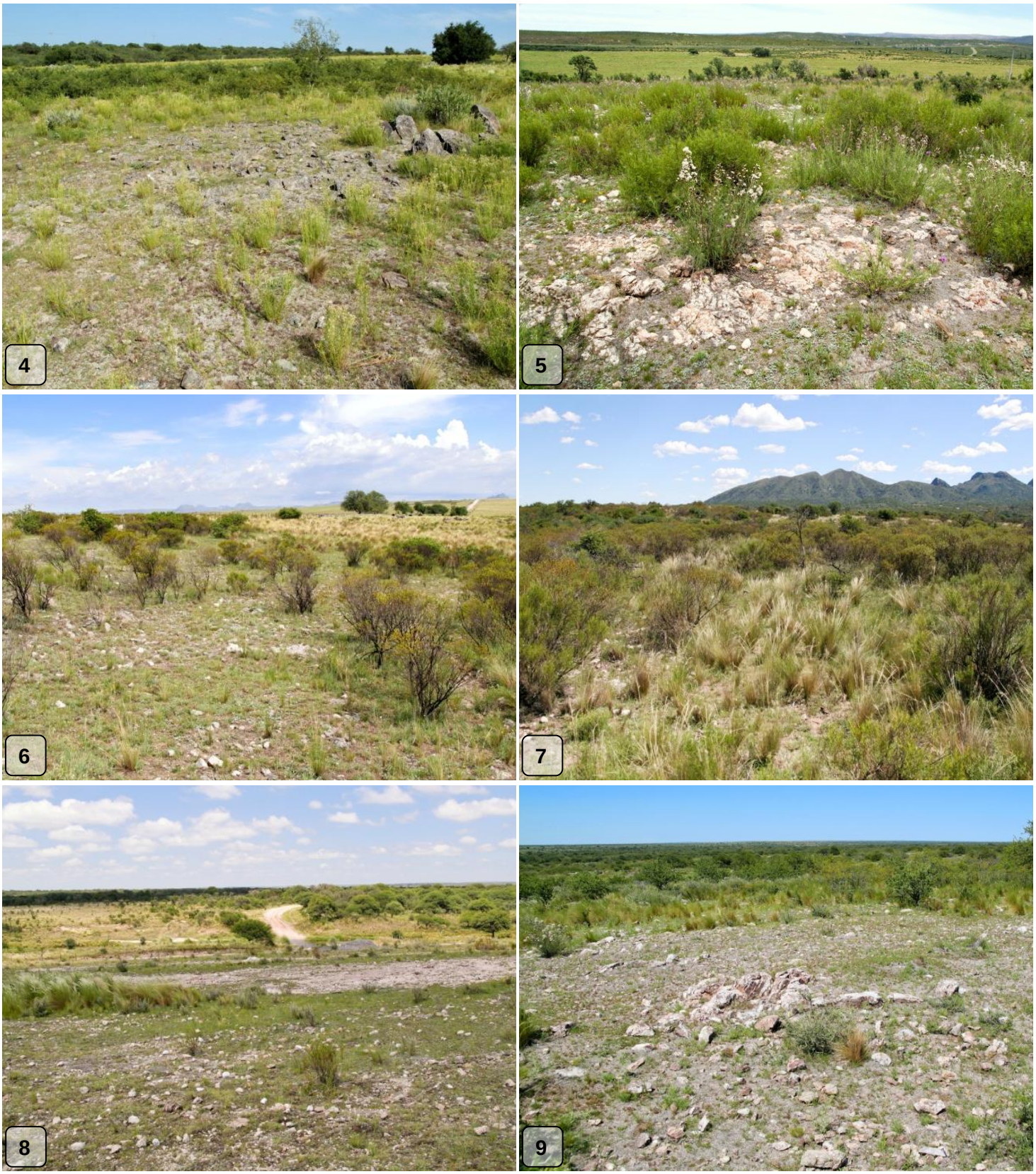
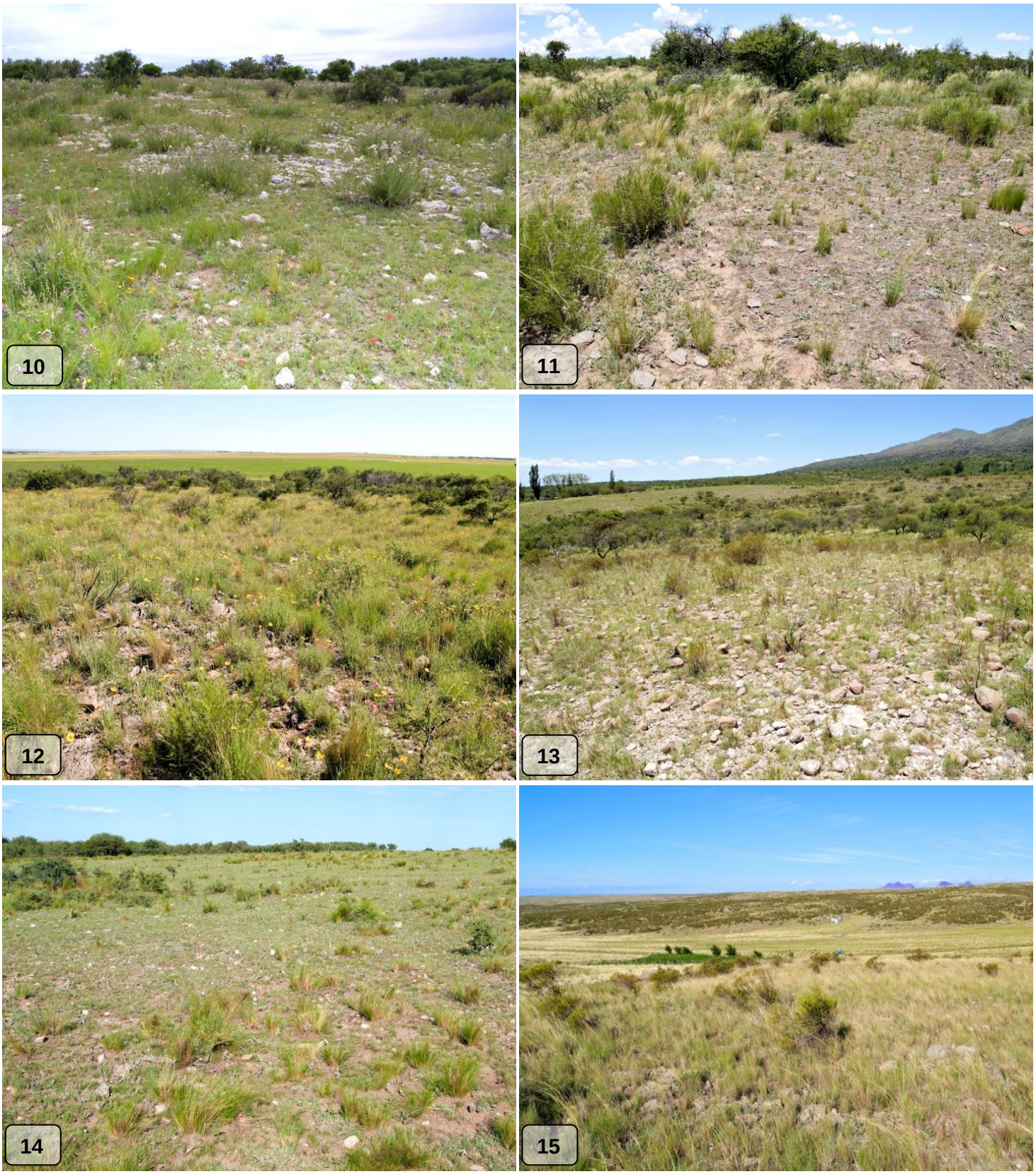


Fig. 3: Distribution of ecoregions in the Province of San Luis, classification according to UMSEF (2002). Inset shows approximate distribution of the *G. berchtii* species-group.



Figs. 4-9: Types of habitats where populations of the *G. berchtii* species-group can be found, Fig. 4: habitat of degradated Chaco seco near Los Duraznitos on margin areal of micaschist, gneissis and migmatites, Fig. 5: Romerillal vegetation on pegmatites, Est. Noria, Pampa de San Martin, Fig. 6: Romerillal N of Los Membrillos, Fig. 7: Romerillal S of Paso Grande, Fig. 8: Estepas near San Isidro, Fig. 9: Degredated Chaco seco near Los Arguellos on pegmatites, N of Santa Rosa del Conlara



Figs. 10-15: Types of habitats where populations of the *G. berchtii* species-group can be found, Fig. 10: Est. La Noria, Pampa de San Martin, Fig. 11: Chaco árido N of Paso Grande, Fig. 12: Romerillal vegetation, Sierra del Morro, La Toma – Los Morillos, Fig. 13: Estepas near Cerro Guanaco, Sa. del Morro, Fig. 14: Estepas arbustivas, Sierra del Yulto, near Coronel Alzogaray, Fig. 15: Habitat near Cruz Brillante on biotitic schists and gneisses

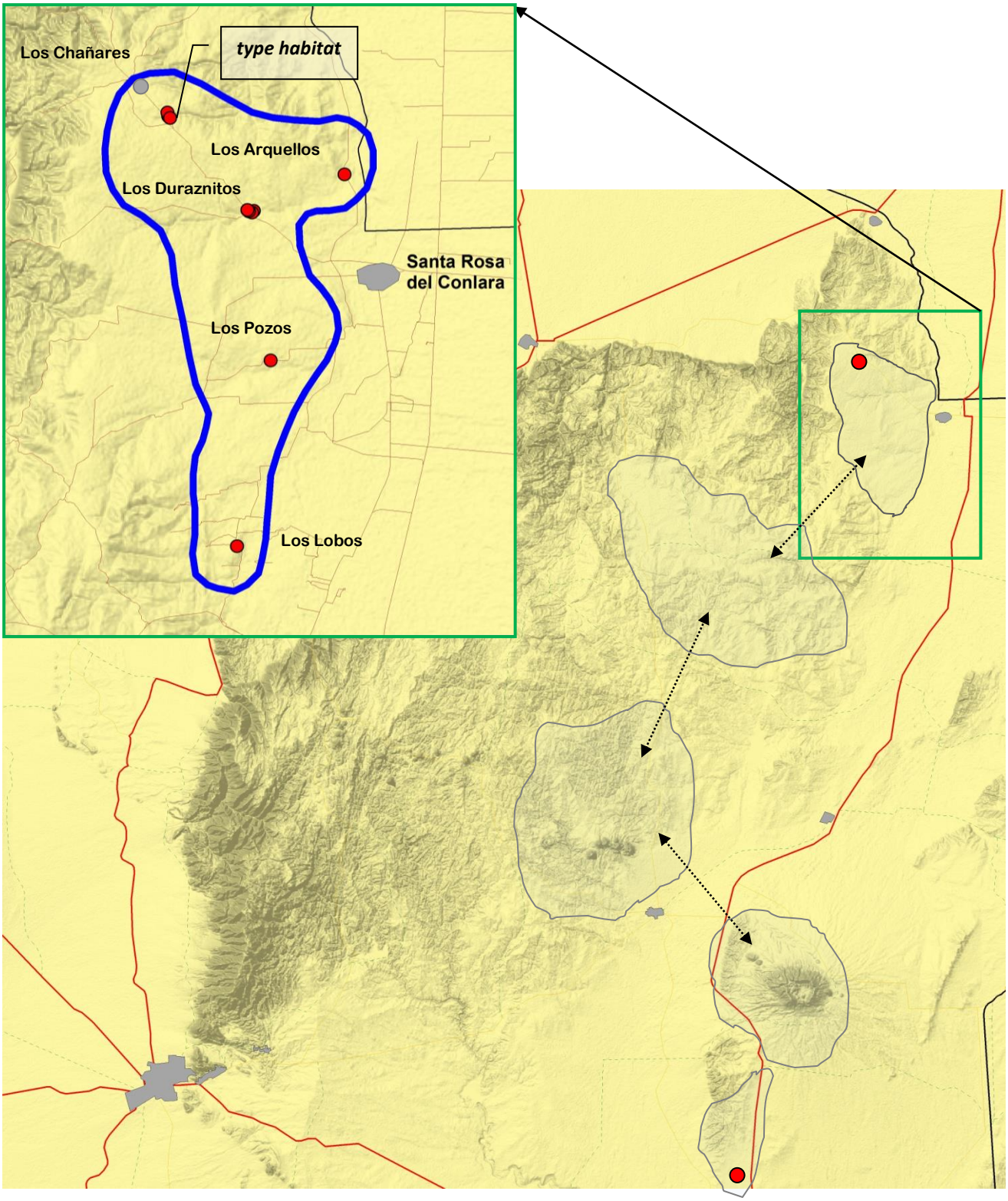


Fig. 16: Distribution map of the *G. berchtii* species-group and enlarged scale of *G. berchtii* s. str. areal, ● = Northern-most and southern-most population of the group, borders of mentioned areals are not sharp, arrows indicate transition zones (base map by Mario Wick).

Different types of habits and spine arrangements. Fig. 17: *G. berchtii* s. str., Fig. 18: *G. nataliae*, Fig. 19: *G. morroense*

Fig. 20: flowers of the *G*. *berchtii* species-group. Fig. 21: fruits of the *G*. *berchtii* species-group.

***G. berchtii* Neuhuber**

[Gymnocalycium 10 (3) 1997: 217-220]

The first description was published by Neuhuber (1997) and subsequently was cited also by Charles (2009) and Sperling and Bercht (2010) in their articles. The articles are very well known and it is not needed to cite this again, but in the conclusion of this work will be published a table with all the described important characteristics of the presented taxa.

The plant was found by Ludwig Bercht and Gert Neuhuber during their trip to Argentina in December, 1989. The type habitat is not so far from Los Chañares, near Arroyo del Chañar. This place is situated in the northern part of the province of San Luis and currently belongs to the northern area of distribution of the *berchtii* species-group. Habitats of *G. berchtii* sensu stricto are situated N and NW of Santa Rosa del Conlara, S of Quebrada de Cautana and its surroundings in the range 590-730 m.s.m. The next populations are distributed on the east and south of Santa Rosa del Conlara (Sperling and Bercht 2010). The area of distribution on the north is probably limited by different lithology with broken topography on the NW side of the Conlara metamorphic complex. In this area the base is developed from micaschists with migmatites and tonalites, in some places are injected micaschists and phyllites to micaschists between Quines and Santa Rosa del Conlara. In this area can be found mostly *G. ochoterenae* Backeberg. The eastern limit is given by the Valle del Conlara (Tres Arboles fault zone along the western border of the Sierra de Comechingones).

The type habitat of *G. berchtii* and its surrounding is situated on dark schists and hard gneisses with vertically directed layers (Figs. 22-23). This is the situation at the type habitat near Los Chañares and southwards Los Duraznitos (Fig. 40). Gneissic structure composed of abundant garnet, cordierite, plagioclase and quartz, and depleted in K-feldspar and biotite (Siegesmund *et al*. 2010). Dominant feature of degredated Chaco seco here is *Acacia cave* and co-dominant *Aloysia gratissima*. From accompanying species of *Cactaceae* can be found *Acanthocalycium spiniflorum*, *Echinopsis aurea*, *Echinopsis leucantha*, *Pterocactus kuntzei*, *Opuntia sulphurea and Austrocylindropuntia salmiana*. The climate at type location (average minimum and maximum temperature, rainfall) can be seen on Fig. 74.

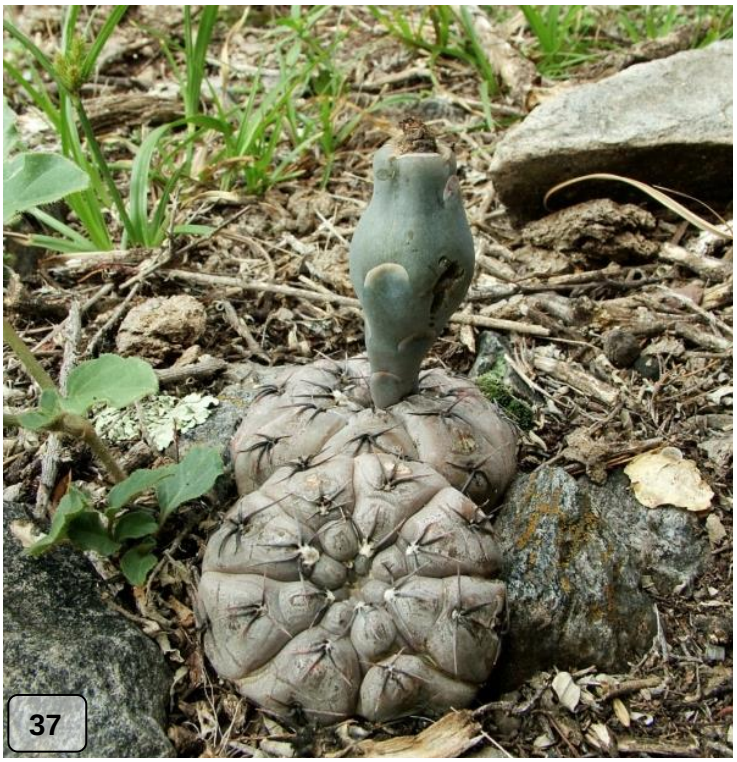
Figs. 22-23: Habitat of *G. berchtii* not so far from the type place, Chaco seco in February

Figs. 24-27: Natural specimen variability in a population south of Los Chañares, N of A° Chañar

Figs. 28-31: Natural specimen variability in a population south of Los Chañares, N of A° Chañar

Figs. 32-33: *G. berchtii* population south of Los Chañares

Figs. 34-35: *G. berchtii* population south of Los Chañares

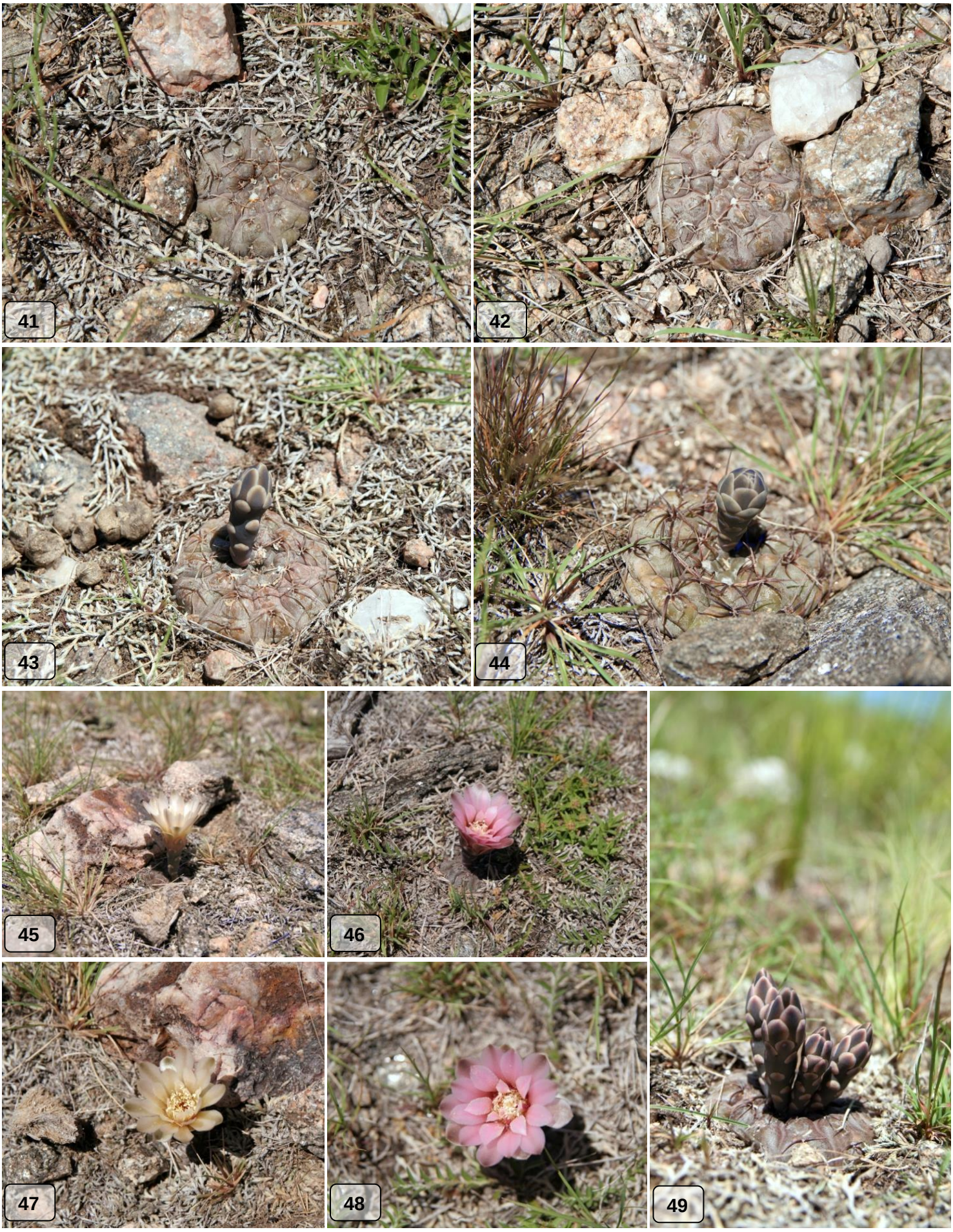


Figs. 36-39: *G. berchtii* population north of A° Chañar at the type place, near A° Chañar

The Figs. 24-39 show variability of specimens of good populations S of Los Chañares. On these habitats could be found specimens of different ages with a large variability of spination. Most of the plants presented have black-brown spines and some of them very light ochraceous with light brown bases (Figs. 26, 29) with number of spines (3)-5-(7), occasionally with one central spine.

Southwards from A° Chañar, the vegetation is more open and Chaco seco is degraded with occasional trees and shrubs with a low habitation rate. Habitat lithology is still presented by metamorphic gneisses and schists with presence of migmatitic melt. This biocoenosis hosts a population of *G. berchtii* near Los Duraznitos (Figs. 40-54). Because the conditions are a little bit different as compared with the type place (low surface moisture, higher light condition, higher air circulation) specimens of this population are mostly smaller and deeply submerged between the stones. Also could be studied the wider variability in the colour of flowers. Flowers grade from off-white to lilac (Figs. 45-48). Plant habit could be related to the appearance of *G. nataliae* as a result of the conditions in the open field. Plants are most often five spined, rarely with one central spine. Variability is presented in Figs. 40-54.

Fig. 40: *G. berchtii* habitat near Los Duraznitos



Figs. 41-49: *G. berchtii* in habitat near Los Duraznitos

Figs. 50-54: *G. berchtii* in habitat near Los Duraznitos

G. borthii shares this habitat on its margin but comes from more sandy-humus soil places. Both species flower at the same time, but hybrids have not been detected.

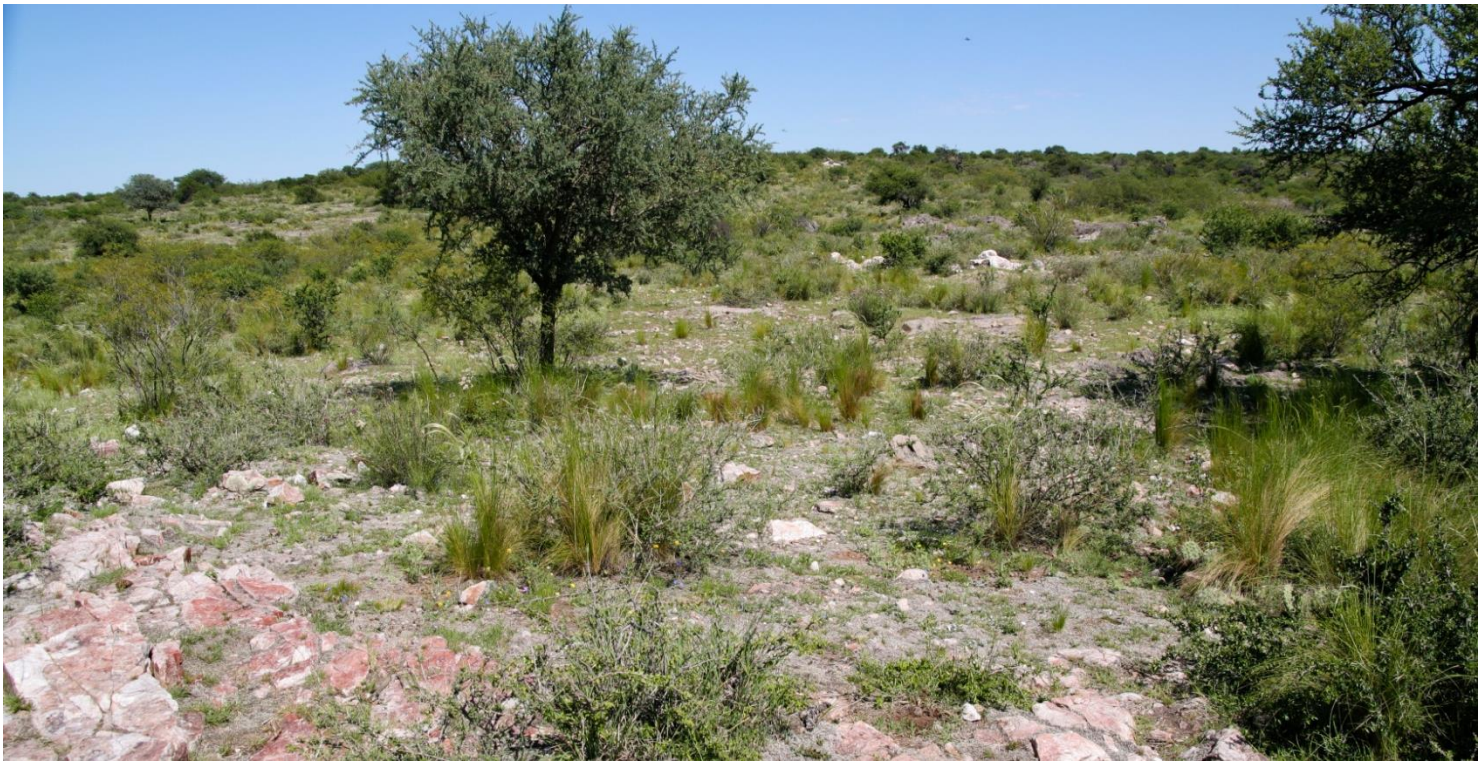
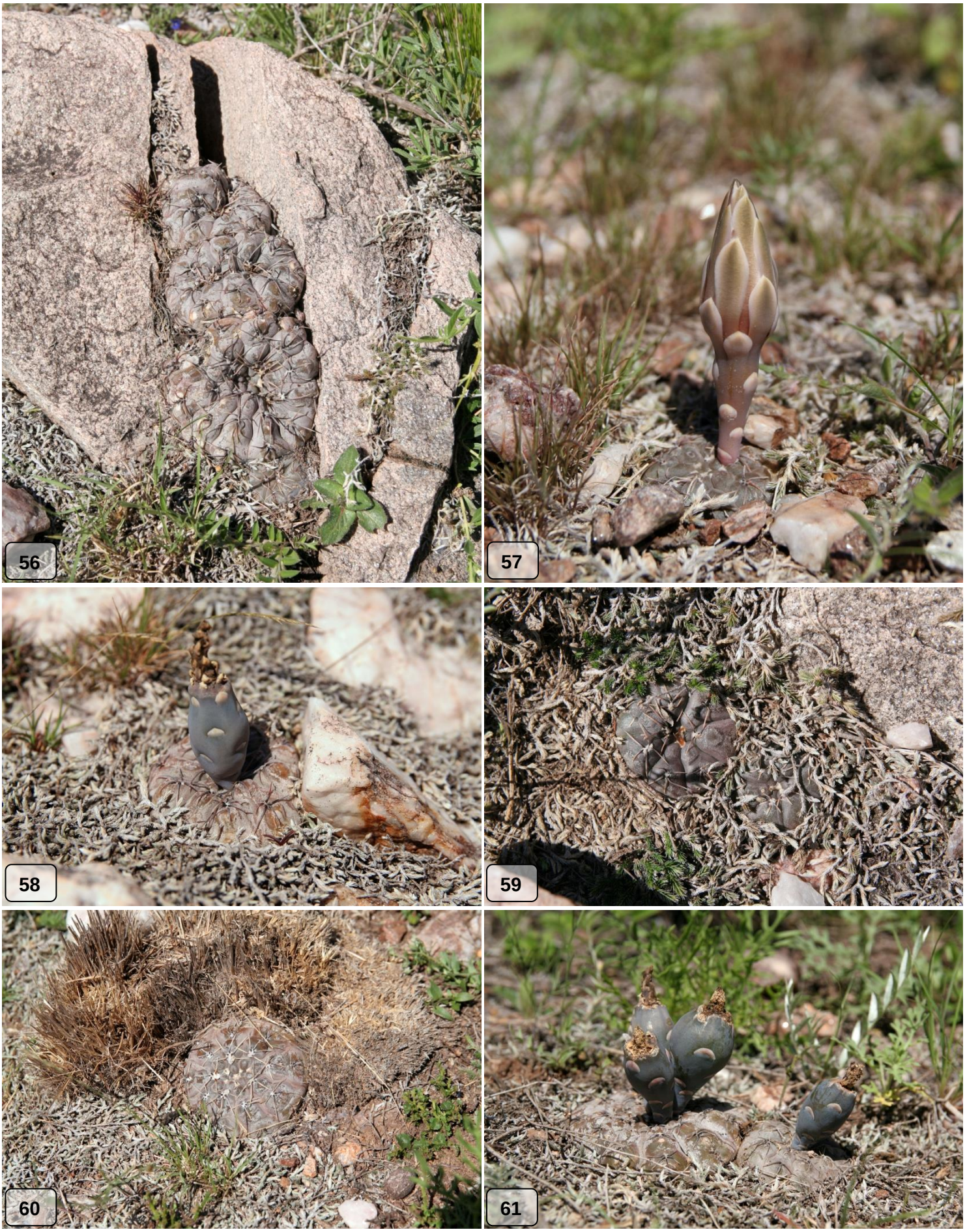
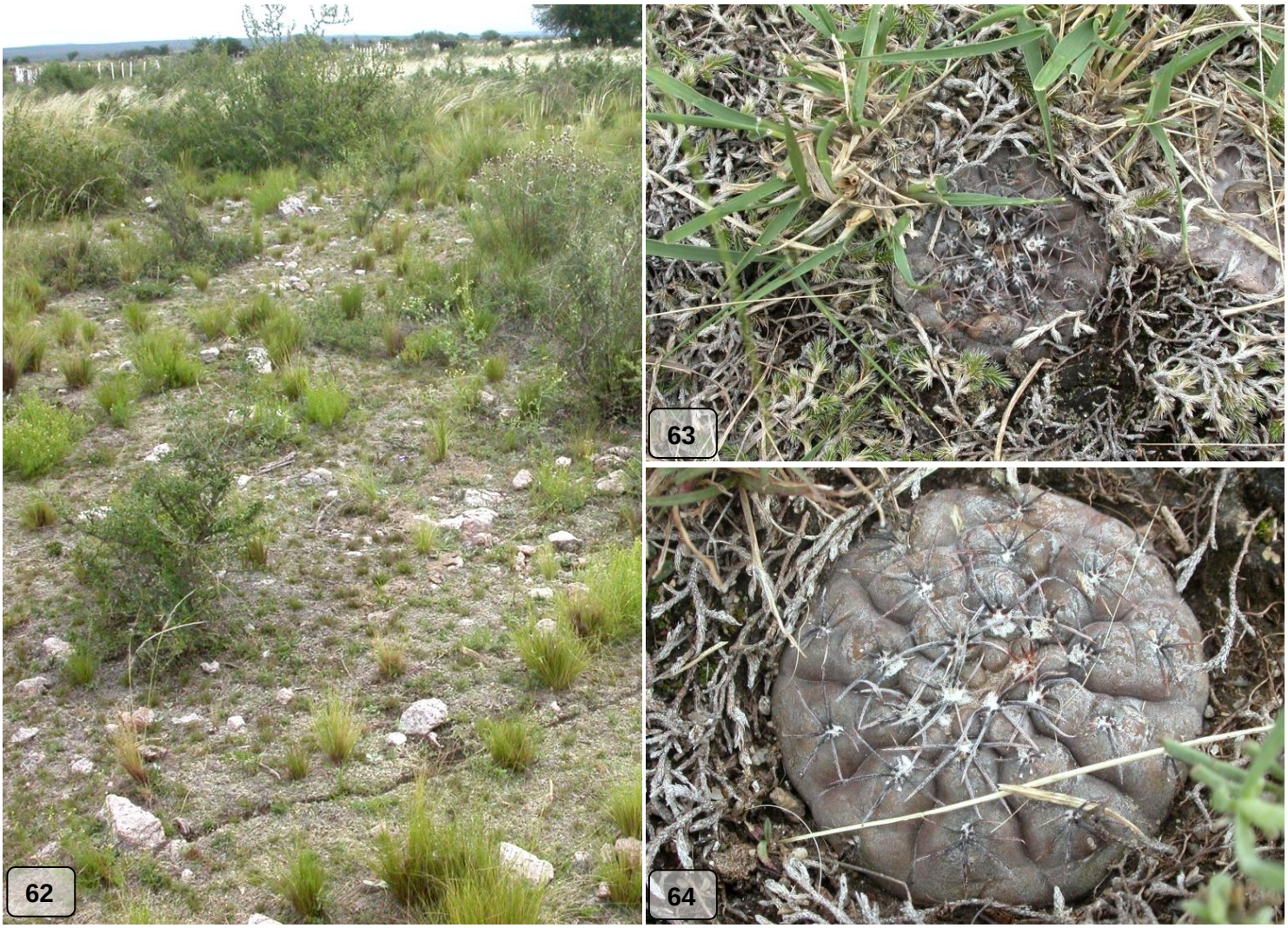


Fig. 55: A habitat on migmatitic rock abundant in quartzites and pegmatites on the eastern side of northern Conlara massive hosts a population of *G. berchtii*, and is situated near to Los Arguellos N of Santa Rosa



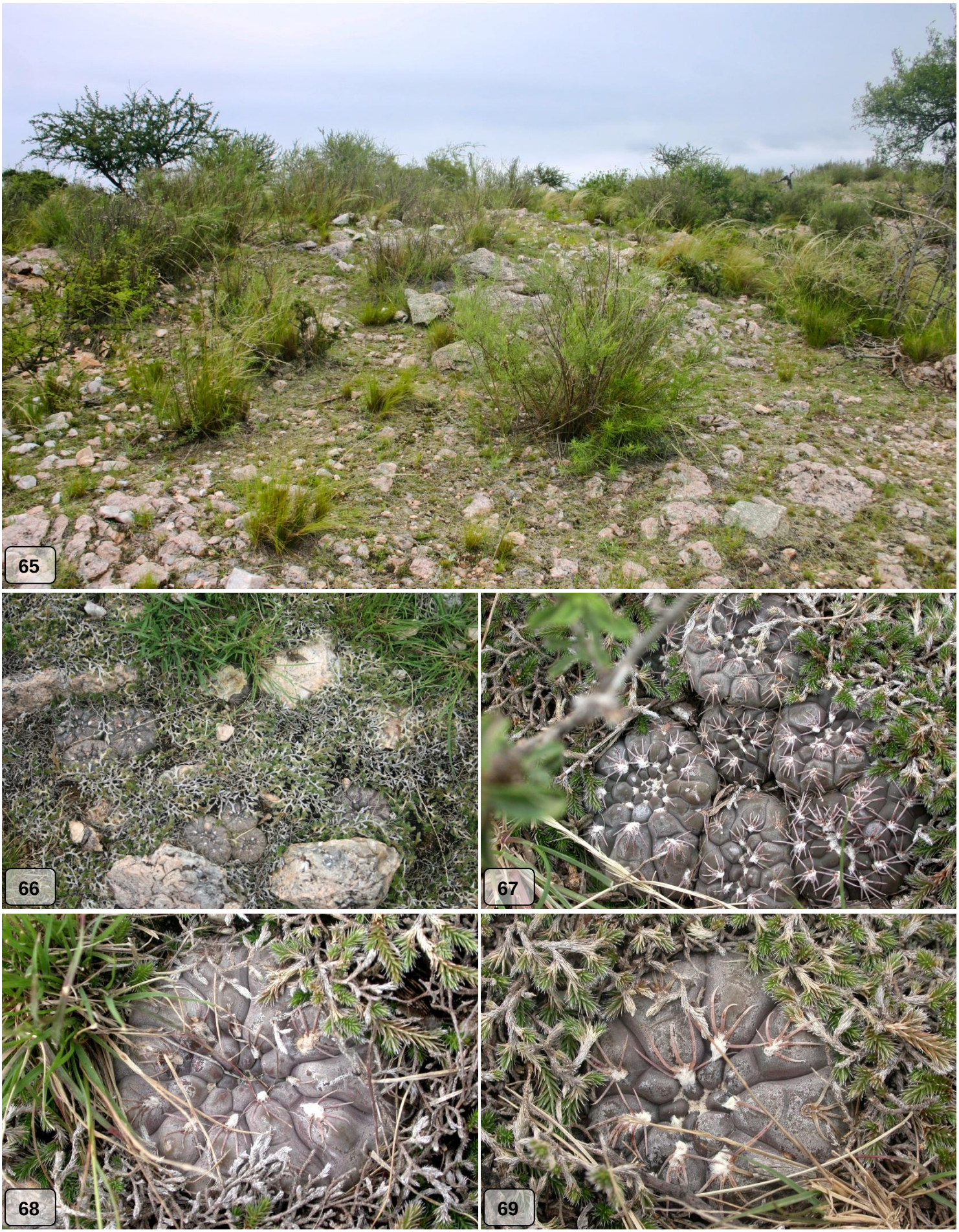
Figs. 56-61: A habitat on migmatitic rock abundant in quartzites and pegmatites on the eastern side of northern Conlara massive hosts a population of *G. berchtii*, and is situated near to Los Arguellos N of Santa Rosa



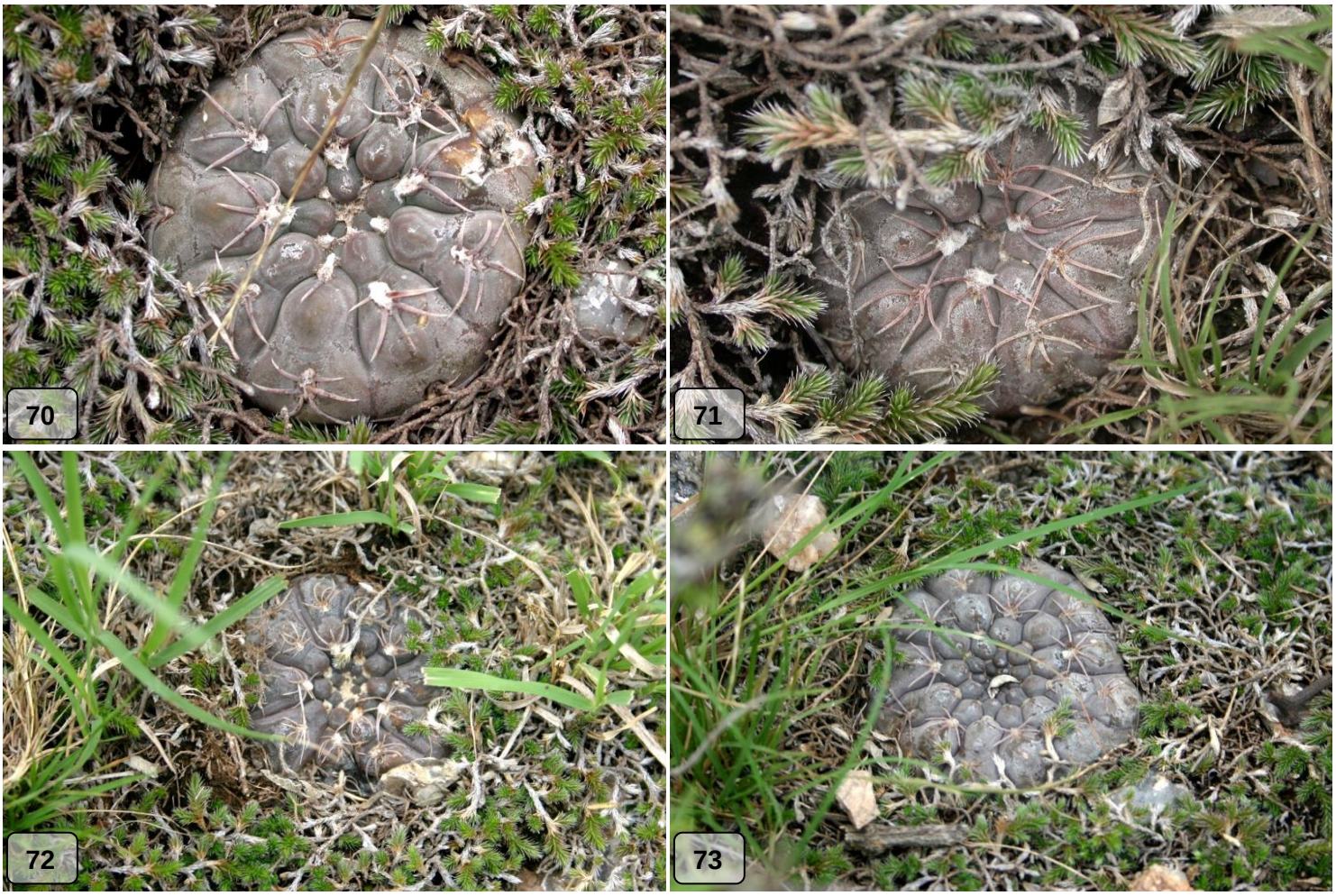
Figs. 62-64: Habitat of *G. berchtii*, 5 km N of Las Chilcas, near to Los Pozos (photos: M. Meregalli)

Population variability of *G. berchtii* is decreasing on the more open fields of the eastern side of the basin. Plant habitation is sparse. This trend has also been observed by Bercht and Meregalli on an open habitat on migmatitic field S of Santa Rosa del Conlara near Los Pozos (Figs. 62-64). Specimens found here have 5 to 7 dark spines and their appearance is similar to the plants from a habitat near Los Arquellos.

A little bit further to the south it was found another population colonizing pegmatite elevations. One such habitat, not so far from Los Lobos, is presented in Figs. 65-73. All specimens here are light spined (5-7 mostly thin spines) and are very similar to the populations located in a more westerly direction towards the Pampa de San Martin. This population seems to be intermediate or closer to the broad type spread more to the west, in my eyes indicative of *G. nataliae*.



Figs. 65-69: Population of *G. berchtii – nataliae*, habitat near Los Lobos (photos: L. Bercht and M. Meregalli)



Figs. 70-73: Population of *G. berchtii – nataliae*, habitat near Los Lobos (photos: L. Bercht and M. Meregalli)

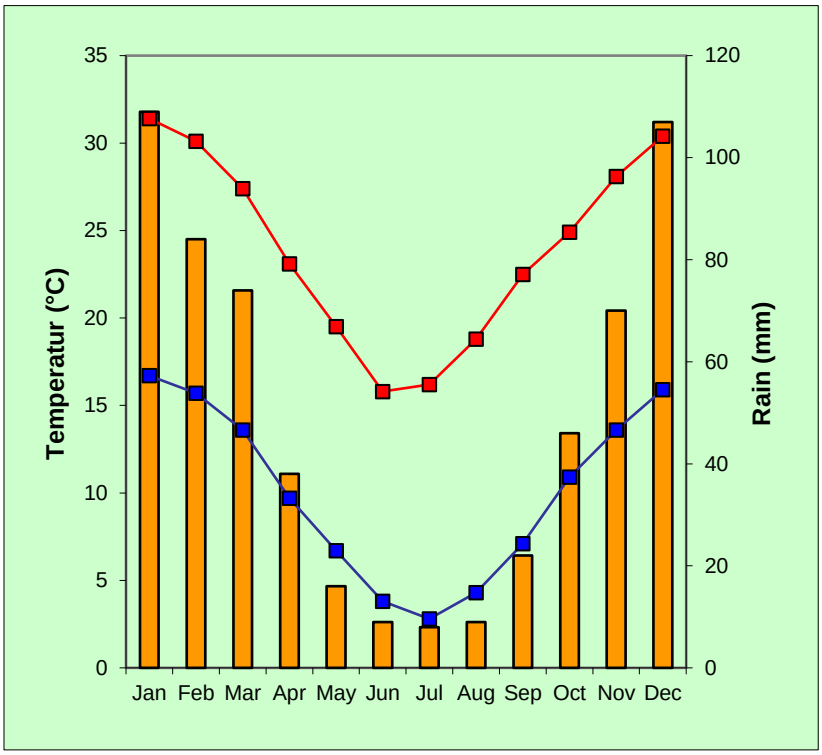


Fig. 74: Climate diagram of type location of *G. berchtii*, Los Chañares (Fig: M. Wick, source of data: DIVA GIS; red: average maximum temperature, blue: average minimum temperature, orange: average rainfall)

Outlook In the following two parts, I would like to continue with habitat variability of *G. nataliae* and *G. morroense*. Subsequently, I will take a look at *G. poeschlii* and *G. sp*. 'Concaran type' and its positioning and relationship to the *G. berchtii* species-group. The last paper on the *G. berchtii* species-group will be focused on characteristics evaluated in greenhouse conditions. These findings, together with remarks from natural habitats, should bring conclusions on taxa relationships and their ranking.

Figs. without statement: T. Kulhánek.

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The *Gymnocalycium* of Uruguay.
2. South-western Uruguay.
G. hyptiacanthum (Lemaire) Britton & Rose.

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ABSTRACT.

In the first part of this series of articles about the *Gymnocalycium* of Uruguay nomenclatural and taxonomic information on *G. hyptiacanthum* was presented and the neotype population was discussed. Remarks on a population from the department of Colonia, very similar to the neotype population, were added.

Several other populations referable to *G. hyptiacanthum* are distributed across the southern part of Uruguay. In this second part, the known populations from the departments of Canelones, Montevideo, San José and Colonia will be discussed.

DEPARTMENT OF CANELONES.

In 1989, the well known cactus collector Hugo Schlosser sent me some plants identified as *Gymnocalycium* sp. "Cerros Mosquitos". No Schlosser's number was assigned to these plants, that undoubtedly belong to what, at the time, was called in Europe *G. leeanum*, and *G. hyptiacanthum* in Uruguay. Many years later, in December 2000, I had the opportunity to visit these hills, where I found a nice population of *Gymnocalycium*; more occurrences of this "Cerros Mosquitos" form of *G. hyptiacanthum* were found when travelling with Ludwig Bercht and Williams Duarte in 2004.

In the southernmost part of Uruguay it is not very easy to come across plants of *Gymnocalycium*. The landscape is level and grassy, and the soil is often deep. Locations with shallow, stony soil, or rocky outcrops, where conditions are suitable for the growth of cacti, are uncommon, scattered in low hills and on the sloping banks of small rivers. Moreover, southern Uruguay is densely populated and cultivated, with extensive crops and plantations of *Eucalyptus* and *Pinus*. These tree plantations are usually located in areas unfit for crops, such as stony slopes, that are the most significant habitats where cacti grow, or grew: in some areas, human activity such as cultivation and settlement expansion has completely wiped out previously known occurrences of *Gymnocalycium* (Williams Duarte, personal communication).

Cerros Mosquitos and surrounding region. On the Cerros Mosquitos hills and in the surrounding lowland areas several populations of *G. hyptiacanthum* live. The spines number 9-11, dense, generally narrow and twisted, of irregular length, but generally rather long, greyish with a distinct reddish colour in the basal third and sometimes at the point. The ribs of the larger plants are numerous, even more than 15, and their shape is very rounded, obtuse, with relatively prominent tubercles, reciprocally isolated by deep transverse furrows. In cultivation, in conditions of good growth, the transverse furrows become shallower, but still visible, and the ribs become more regularly obtuse, with low rounded tubercles. The flower is comparatively deep yellow, small, and the ovary is particularly short.

One population was found near the top of one of the Cerros, by the side of the road. The habitat is relatively dry and stony, and the plants were quite small when they were seen. Considering the general uniformity of the habitat of the hills, it seems likely that *G. hyptiacanthum* is quite widespread on the Cerros Mosquitos (MM 366, Figs 1–3).

Figs. 1-3: *G. hyptiacanthum* (MM 366) from the Cerros Mosquitos

In the plain, as explained above, habitats appropriate to host Cactaceae, and gymnos in particular, are scarce and scattered. However, a few populations were discovered along ruta 8, on the southern sides of the Cerros Mosquitos. One of these was found near the bridge over the Arroyo Mosquitos, a small creek flowing from the hills (MM 450). This habitat has conditions of higher humidity, and some plants were seen to be growing bigger. However, their characters did not vary significantly, compared with those of the top of the hills; a good variation in spination was observed (Figs 4–9).

Figs. 4-7: *G. hyptiacanthum* (MM 450)


Figs. 8-9: *G. hyptiacanthum* (MM 450)

Other very similar plants were localized a few km more west, always along ruta 8, near km 55 (MM 497, WD 6) and again 5 km west of this place, at Paso de los Padres (MM 427). The variation in spine form and length is always consistent, and in some plants the ribs have more prominent and narrowed tubercles below the areoles (Figs 10–15). The flowers are bigger, with a longer ovary and pericarpel. Each of these three populations apparently numbered only a few plants, in some cases less than ten were seen during a long and thorough search. Clearly not all the plants could be spotted, they are usually very difficult to discover, hidden in the grass or buried below the gravel, but nevertheless these populations evidently consist of a very small number of individuals.


Figs. 10-11: G. hyptiacanthum (MM 497)

Fig. 12: *G. hyptiacanthum* (MM 497)

Fig. 13: *G. hyptiacanthum* (MM 427)


Figs. 14-15: *G. hyptiacanthum* (MM 427)

Some plants were also found on the north-western side of the Cerros Mosquitos. One small hill hosting a population of *G. hyptiacanthum* lies at the western side of the Cerros, at the crossing of the roads from Paso de Los Padres to Cerros Mosquitos (MM 496; WD 7). No plants were found near the bigger rocky outcrops, where only *Wigginsia* and *Parodia* (*Notocactus*) live; the gymnos were scattered in the grassy and stony soil. The plants were small and scarcely visible, but relatively abundant (Figs 16–19).

Figs. 16-19: *G. hyptiacanthum* (MM 496)

They are not significantly differentiated from those of the southern slopes of the Cerros, including the usual variation in length and shape of the spines (Figs 20–21).


Figs. 20-21: *G. hyptiacanthum* (MM 496)

Further west, near Pando, a further population was discovered by Ingo Horst (HU 1234). Unfortunately, neither specimens nor habitat photos were available when these notes were compiled.

Cerro Piedras de Afilar. This is a hill about 15 km south-east of the Cerros Mosquitos. On the very stony top of the hills no plants of *Gymnocalycium* were found, but some live in the grassy slopes (MM 367). They are quite similar to those from the Cerros Mosquitos, but the spines are generally straight, slightly thicker and stout; the colour at the base varies, in some specimens being lighter, yellow-orange rather than reddish. The tubercles are a little more compressed and more frequently they form a small chin below the areoles. Some older plants also have a central spine, erect and stiff, slightly longer and stronger than the radial spines (Figs 22–25). This population starts showing some transitional characters to the plants that are distributed in the department of Maldonado.


Figs. 22-23: *G. hyptiacanthum* (MM 367)


Figs. 24-25: *G. hyptiacanthum* (MM 367)

A further population was found very near to the city of Progreso, north of Montevideo (Garabelli, personal communication). I have neither data nor photos, but as soon as these are available I will add them to the journal.

See table 1 for the list of the known populations from Canelones. Georeference data have been omitted.

Table 1: list of known populations of *G. hyptiacanthum* from the department Canelones.

Field number	Locality
Gf 1254	Ruta 8, km 55
HU 1234	Pando
KH 0426	North of Soca, Ruta 8, Arroyo Mosquitos
LB 1721	Arroyo Mosquitos, Bridge over ruta 8
LB 2520	ruta 8 km 50 + 500 m N, Paso de los Padres
LB 2524	Arroyo Mosquitos
LB 2627	crossing camino Pedrera
LB 2632	East of Cerros Mosquitos
LB 2639	ruta 8 km 55.300
LB 2648	Cerro Piedras de Afilar
MM 0366	Cerros Mosquitos
MM 0367	Cerro Piedras de Afilar
MM 0427	ruta 8 km 50 + 500 m N, Paso de los Padres
MM 0450	ruta 8 Arr. Mosquitos
MM 0496	crossing camino Pedrera
MM 0497	ruta 8 km 55.300
Schl 126	Cerro Piedras de Afilar, 90 km east of Montevideo
WD 006	ruta 8 km 50 + 500 m N, Paso de los Padres
WD 007	crossing camino Pedrera

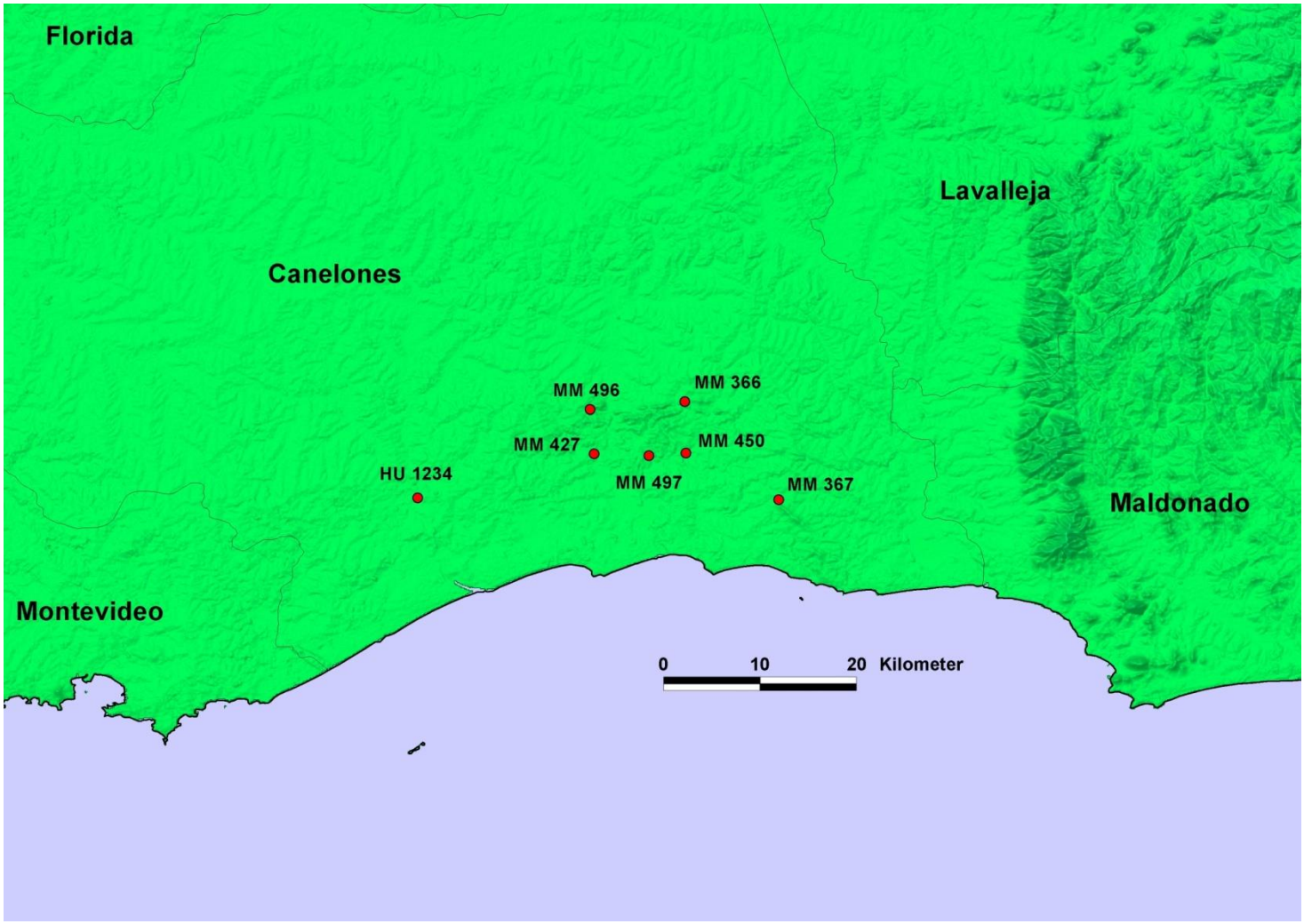


Fig. 26: Map of the known populations of *G. hyptiacanthum* from the department Canelones

DEPARTMENT OF MONTEVIDEO

There is only a single indication for a *Gymnocalycium* in this Department: it was found by Schlosser who gave it the number Schl 141. I have no information of plants with this number presently in cultivation. A recent survey carried out by Gustavo Garabelli did not succeed in finding any specimens, although other Cactaceae are present in the area.

DEPARTMENT OF SAN JOSÉ

I know only one single population of *Gymnocalycium*. It was found on ruta 3 at km 122, north of Arroyo Chamizo (MM 500; probably also JPR 593 and STO 1498, said to be 30 km N of San José). The plants of this population have relatively broad ribs, with flattened tubercles. The spines number 7, and differ significantly from those of the plants from Canelones, being straight, regular and regularly disposed on the areole; they are light greyish and the red colour is limited only to the very

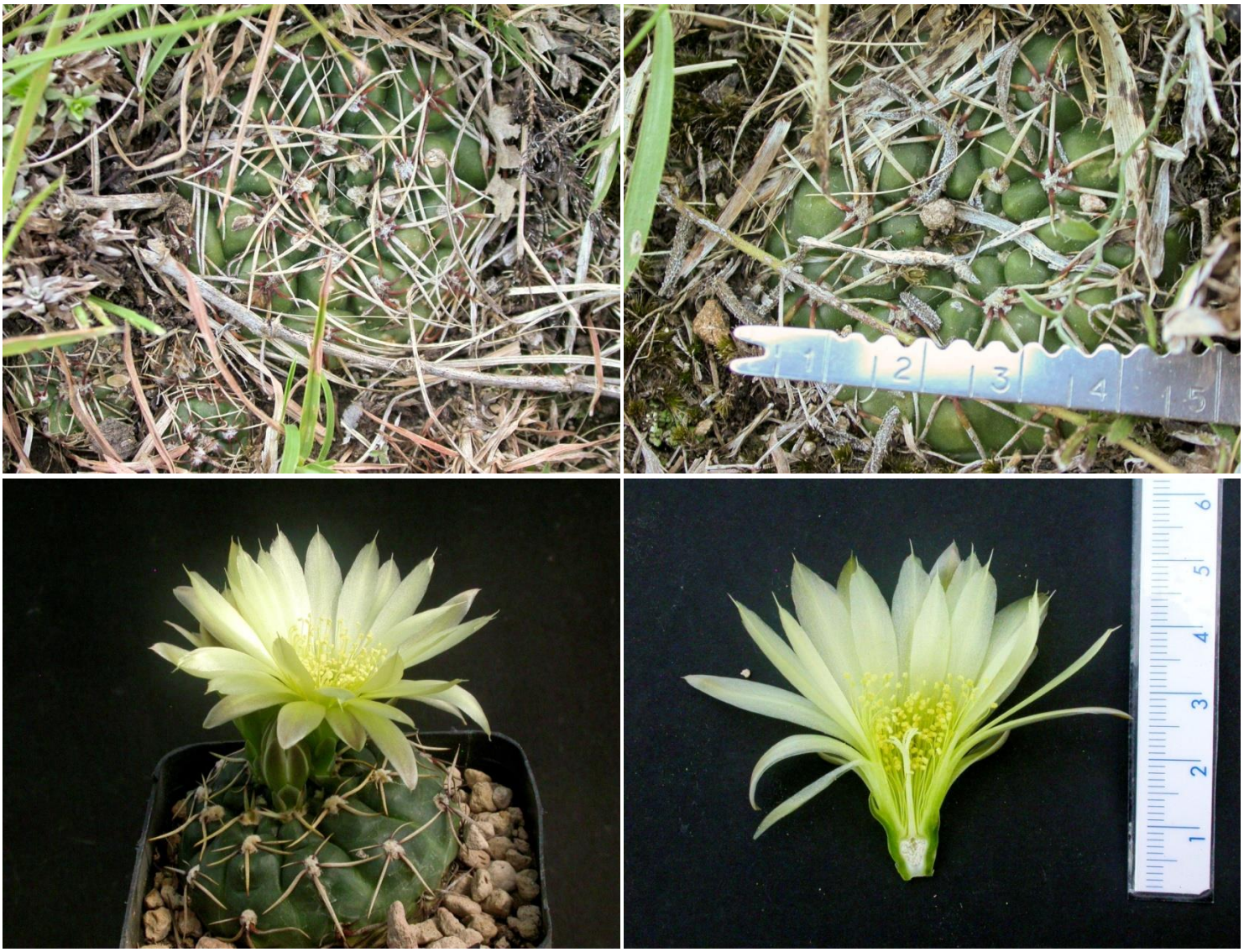
base and point. The flower is slightly bigger, particularly the receptacle, and is very light yellow, with slender, acutely pointed segments of the perianth (Figs 27–28). Another population is known to Gustavo Garabelli, and again I will give further information as soon as it is available.

Figs. 27-28: *G. hyptiacanthum* (MM 500)

DEPARTMENT OF COLONIA

In the first part of this series of articles the population from the Cerro Campana, nearly identical to the neotype of *G. hyptiacanthum*, was described and illustrated (WD 1; Schl 136). Several other populations, amazingly different from those from the Cerro Campana, were found in this department.

In the northern part of the department, near the village of Miguelete, a nice population was found (MM 504). Not surprisingly, it is similar to those from the southern part of the Dept. Soriano. The spines number 5 or 7, and are a little stouter compared with those from Canelones and WD 1, with the lower spine being the longest and the strongest, and the two upper spines are very short; the base of the spines is distinctly reddish, as is the apex. The ribs are more distinctly convex, sometimes divided into globose tubercles, reciprocally isolated by deep transversal clefts; the flower is rather large, light yellow, and the segments of the perianth have the median vein acutely prominent at the apex (Figs 29–32).



Figs. 29-32: *G. hyptiacanthum* (MM 504)

Several other populations were found along ruta 22, in the surroundings of the Cerro San Juan (MM 139, MM 429, MM 431, MM 505). The plants of this region are very variable, possibly indicating intergradation with - or between - the northern and the eastern populations. Some of them have the usual 7–9 twisted spines, with a red base, as in the more eastern forms, but other, usually larger, plants have 5–7 stronger and stiffer, straight spines, resembling the more northern populations from Soriano. It seems that the former plants are juvenile specimens, and indeed in cultivation the spines tend to become bigger and straight. However, differences in spine strength persist. The longitudinal furrows between the ribs are generally deep, sinuate, and deeper than on the plants from Canelones (Figs 33–48).

Figs. 33-38: *G. hyptiacanthum* (MM 429)


Figs. 39-40: *G. hyptiacanthum* (MM 429)

Fig. 41: *G. hyptiacanthum* (MM 429)

Fig. 42: *G. hyptiacanthum* (MM 139)

Fig. 43: *G. hyptiacanthum* (MM 139)

Fig. 44: *G. hyptiacanthum* (MM 431)

Figs. 45-46: *G. hyptiacanthum* (MM 431)

Figs. 47-48: *G. hyptiacanthum* (MM 505)

Fig. 49: Map of known populations of *G. hyptiacanthum* from the departments Colonia, Montevideo, San José.

See table 2 for the list of the known populations from Montevideo, San José and Colonia. Georeference data have been omitted.

Table 2: list of known populations of *G. hyptiacanthum* from Montevideo, San José and Colonia.

Field number	Locality	Department
Gf 1259	Cerro Campana	Colonia
JPR 99-204/609	Km 63, Ruta 54, Est. La Lucha	Colonia
KH 0662	NW of Terariras, Ruta 22	Colonia
LB 2130	NW of Terariras, Ruta 22	Colonia
LB 2660	Cerro Campana	Colonia
LB 2664	East of Miguelete	Colonia
LB 2666	Terariras, nordwestlich, Ruta 22	Colonia
LB 2670	Cerro S. Juan	Colonia
MM 0139	ruta 22, km 7.8, crossing with ruta 81	Colonia
MM 0429	r. 22, 3 km E Arr. S. Juan	Colonia
MM 0431	r. 22, Cerro S. Juan, East slope	Colonia
MM 0502	N Rosario, Cerro Campana	Colonia
MM 0504	ruta 54, E Miguelete	Colonia
MM 0505	Cerro S. Juan	Colonia
Schl 136	between Rosario and Cardona, Ruta 2	Colonia
STO 99-1502/1	Ruta 54, East of Miguelete	Colonia
WD 01	Cerro Campana	Colonia
JPR 99-196/593	Ruta 3, 30 km from San Jose	San José
LB 2655	ruta 3 km 122, 10 km N Arr. Chamizo	San José
STO 99-1498/1	Ruta 3, 30 km N of San José	San José
MM 0500	ruta 3 km 122, 10 km N Arr. Chamizo	San José
Schl 141	Punta del Espinillo	Montevideo

All Figs. by Massimo Meregalli, maps (Figs. 29 and 49) by Mario Wick.

To be continued

Gymnocalycium fischeri Halda et al. in nature.

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ABSTRACT.

The author gives a short historical overview on *Gymnocalycium fischeri* and demonstrates the habit of this species at its locations in nature.

Gymnocalycium fischeri Halda *et al.* is a well known species in our collections for more than 20 years. Halda *et al.* (2002) described this species from the province San Luis in Argentina in 2002. This, by contemporary standards was much too short and only with one very small picture to illustrate the description. He places the type location at El Volcán, near the private property and holiday resort "Campo La Sierra".

Simultaneously to this, without knowledge of the first, Franz Berger (2003) prepared his detailed first description of the same plants – yet too late. So, he published his article to amend the first description of Halda *et al.* and to give additional information on this species. Furthermore, he described the subspecies *G. fischeri subsp. suyuquense* in the same article with a type location near Suyuque Nuevo (Fig. 1).

In the same issue of Acta Mus. Richnov. Halda *et al.* (2002) described a Gymnocalycium population from the Cebrado de los Condores (correct: Quebrada de los Cóndores, 5.4 km straight-line distance from El Volcán), again with only one small picture of a plant in culture. My investigations have shown that *G. miltii* is synonymous with *G. fischeri* (Figs. 2-13).

G. fischeri looks quite homogenous in nature and can easily be determined at almost all locations. Around El Volcán, in the Quebrada de los Cóndores and south of the city of San Luis no major differences between the populations can be found. At the latter location we can find brownish and yellowish-spined plants too (Figs. 17-22). At Daniel Donovan younger plants appear to be more rounded with sometimes a more bluish body but adult plants are typical *G. fischeri* (Figs. 23-28). The same is valid for the plants around El Trapiche (Figs. 29-34). Also the thicker spined population south of San Francisco del Monte del Oro is very similar to the plants from El Volcán, whereas there single plants become almost twice as large in comparison to those from El Volcán (Figs. 35-40).

We have a more difficult situation around Saladillo. Growing on low, stony waves of the terrain, we can probably find *G. fischeri* and *G. poeschlii* (Neuhuber 1999) together under the same little bushes. There, it is hard to decide if we have *G. poeschlii,* more tending to *G. fischeri* or vice versa. Thus, I don't want to name these plants at the moment (Figs. 41-54).

Plants from Hipólito Yrigoyen (old name: Nogolí) have longer spines. Mature plants are exceptionally beautiful, in particular in exposed locations (Figs. 55-60).

The plants of *G. fischeri subsp. suyuquense* from Suyuque Nuevo have a different appearance. On average, the plants are smaller with thinner ribs and most often have 2 (-4) central spines which are straight and seem to cover the smaller bodies of the plant (Figs. 61-66).

The location near Los Mimbres was not visited, but plants in culture seem to be typical *G. fischeri*.

It is expected that on the eastern side of the main ridge of the Sierra de San Luis, between San Francisco del Monte del Oro and El Trapiche, further populations of *G. fischeri* grow. (Fig. 1).

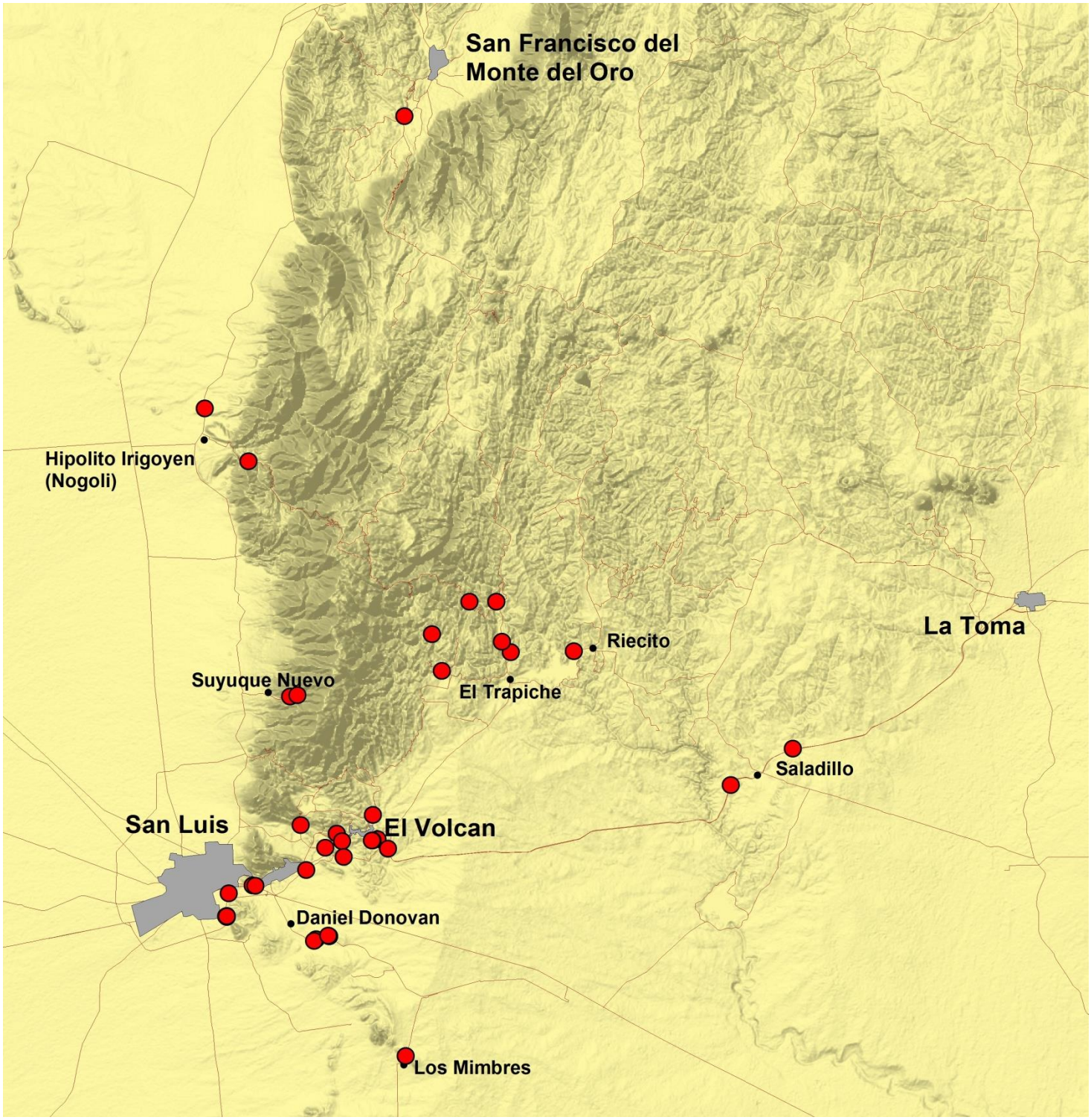
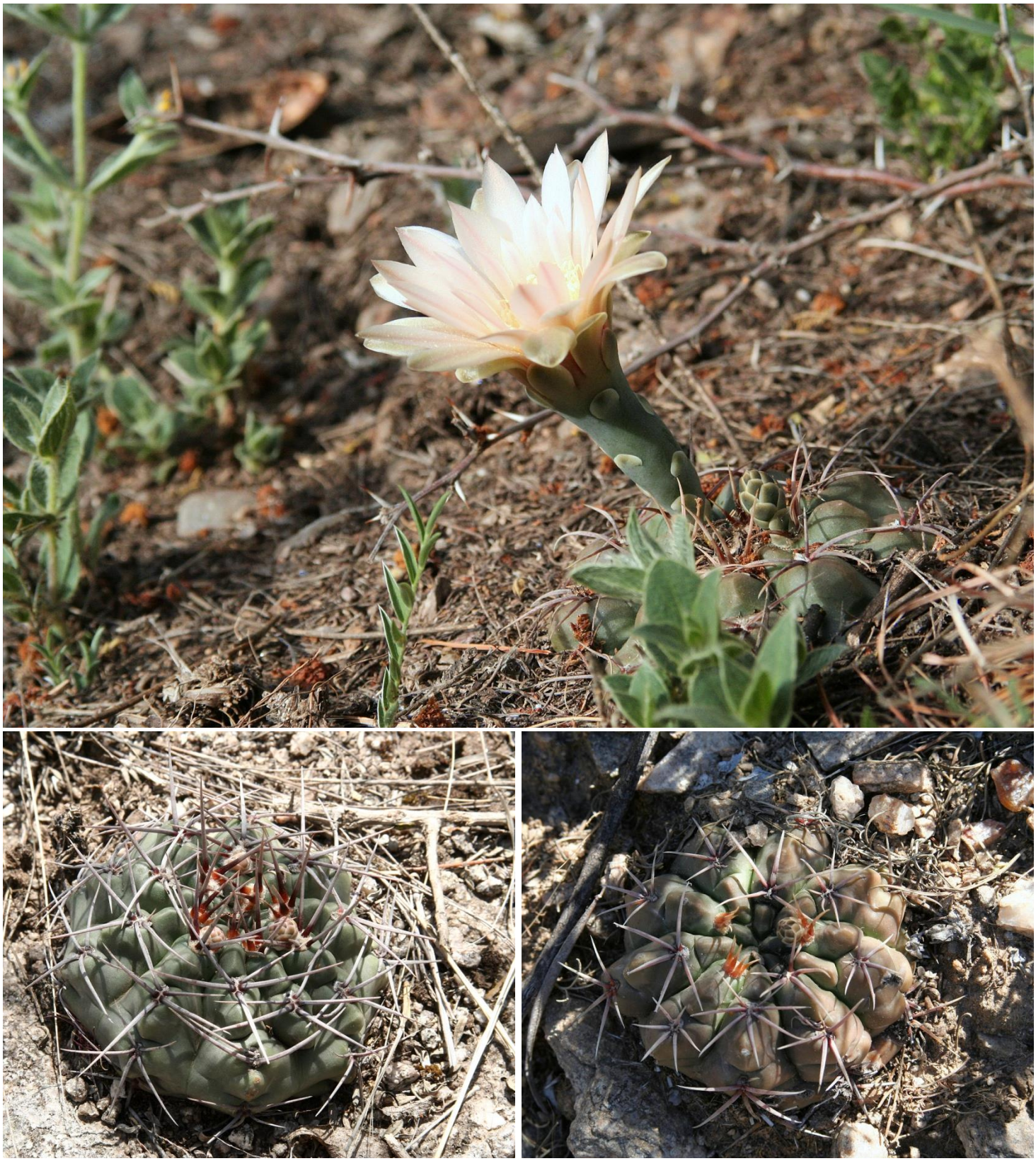
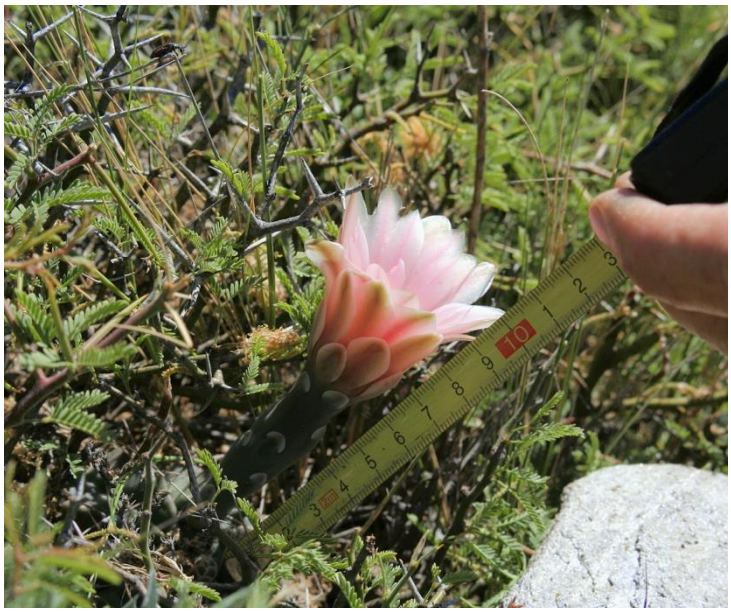


Fig. 1: *G. fischeri* and *subsp. suyuquense*, map of distribution, province San Luis, Argentina

1. El Volcán



Figs. 2-4: *G. fischeri*, El Volcán, type location

Figs. 5-8: *G. fischeri*, around El Volcán

Fig. 9: *G. fischeri*, Quebrada de los Cóndores

Fig. 10: *G. fischeri*, El Volcán, susceptible to fungi in shade under trees

Figs. 11-12: *G. fischeri*, around El Volcán

Fig. 13: *G. fischeri*, around El Volcán

Fig. 14: *G. fischeri* habitat few km east of El Volcán

Fig. 15: *G. fischeri* habitat few km west of El Volcán

Fig. 16: *G. fischeri* habitat “Campo La Sierra”

2. South of City San Luis

Figs. 17-22: *G. fischeri*, south of City San Luis

3. Daniel Donovan

Figs. 23-28: *G. fischeri*, Daniel Donovan

4. El Trapiche

Figs. 29-34: *G. fischeri*, around El Trapiche

5. San Francisco del Monte de Oro

Figs. 35-40: *G. fischeri*, south of San Francisco del Monte de Oro (photos: T. Kulhánek)

6. Saladillo

Figs. 41-46: plants around Saladillo

Figs. 47-50: plants around Saladillo

Fig. 51: MaW 104, few km east of Saladillo

Fig. 52: MaW 105, few km west of Saladillo

The plants from the same location never produced seeds the last five years. All flowers in the pictures are open the second day. This year I try to cross short flowering and long flowering respectively.


Figs. 53-54: habitat few km west of Saladillo

7. Hipólito Irigoyen (old name Nogolí)




Figs. 55-58: *G. fischeri*, Hipólito Irigoyen (photos: T. Kulhánek)


Figs. 59-60: *G. fischeri*, Hipólito Irigoyen (photos: T. Kulhánek)

8. Suyuque Nuevo




Figs. 61-64: *G. fischeri subsp. suyuquense*, above Suyuque Nuevo

Fig. 65: *G. neuhuberi*, above Suyuque Nuevo

Fig. 66: Cloister Suyuque Nuevo

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