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Cover picture: *Gymnocalycium hyptiacanthum* subsp. *uruguayense*, rose-coloured flower, locality VoS 2974, Cañada Zana de Los Novos, province Artigas, Uruguay, altitude of finding: 141 m a.s.l. (Picture: V. Schädlich).

Editorial

Dear *Gymnocalycium* friends

Mario Wick



On looking at the *Schütziana* Internet homepage, you will probably have noticed that a young Chinese student of agricultural sciences from Ningbo, China, has agreed to translate *Schütziana* into Chinese. The editorial staff is very grateful for that, as we thus add 1.4 billion new readers to our audience – even if there might not be quite as many in the end.

This issue is going to complete the series “The seeds of the genus *Gymnocalycium* Pfeiffer ex Mittler”, presenting the fourth part about the subgenus *Macrosemineum*. The four parts would certainly have offered enough information for a book; therefore, we have decided to publish all four parts in a special edition of *Schütziana*. As all the editorial staff are volunteers, this will not be possible right away.

New information as to the *Gymnos* can be reported constantly. This is why we had to revise the distribution maps of the subgenus *Macrosemineum* shortly before the completion of the first issue 2020. Ludwig Bercht, together with his travel companions, found *Gymnocalycium hyptiacanthum* subsp. *uruguayense* in Argentina as well, south of the town Concepción del Uruguay.

In the second contribution to this issue, our editorial member Thomas Strub gives us an understanding of *Gymnocalycium meregallii*, first described by Ludwig Bercht in *Schütziana* in 2012. This plant was the topic of the International *Gymnocalycium* Meeting in September 2019. This species has certainly not been distributed widely in collections so far, so that the paper presented here is a valuable contribution to the knowledge of this species as well as *Gymnocalycium andreae* and *Gymnocalycium bruchii*, which also occur in the distribution area.

As usual, enjoy yourselves reading!

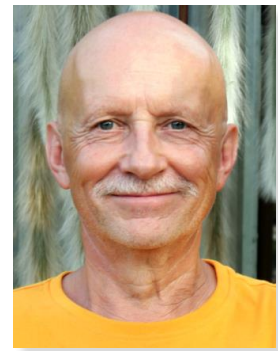
We would like to express our warmest thanks to Mrs Iris Blanz (Fernitz, Austria), to Mr Brian Bates (Bolivia) and to Mr Graham Charles (United Kingdom), who support us with the translation into English, to Mrs Larisa Zaitseva for the translation into Russian (Tscheljabinsk, Russia), to Mr Takashi Shimada (Japan) for the translation into Japanese, to Mr Jiahui Lin (China) for the translation into Chinese and to Mr Daniel Schweich (France), who has mirrored our publications under <http://www.cactuspro.com/biblio/>.

The Seeds of the Genus *Gymnocalycium* Pfeiffer ex Mittler Part 4: Subgenus *Macrosemineum*

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ABSTRACT

The authors present a paper about the seeds of the genus *Gymnocalycium*. The species are introduced with a picture at their locality, of their habitat and their seeds. A map of the localities of the individual plants completes the publication. Part 4 deals with the subgenus *Macrosemineum*.

KEYWORDS: *Cactaceae*, *Gymnocalycium*, *Macrosemineum*, *angelae*, *buenekeri*, *denudatum*, *fleischerianum*, *horstii*, *hyptiacanthum*, *mesopotamicum*, *netrelianum*, *paraguayense*.

INTRODUCTION

The fourth part of our paper about the seeds of the genus *Gymnocalycium* deals with the taxa of the subgenus *Macrosemineum*.

To establish the maps the GIS software QGIS, which is free of charge, was used (<https://www.qgis.org/de/site/forusers/download.html>). The background of the maps is formed by Google Inc. maps.

Gymnocalycium denudatum (Link & Otto) Pfeiffer ex Mittler (1844) is the type species of the subgenus *Macrosemineum*.

Genus *Gymnocalycium* Pfeiffer ex Mittler (1844)

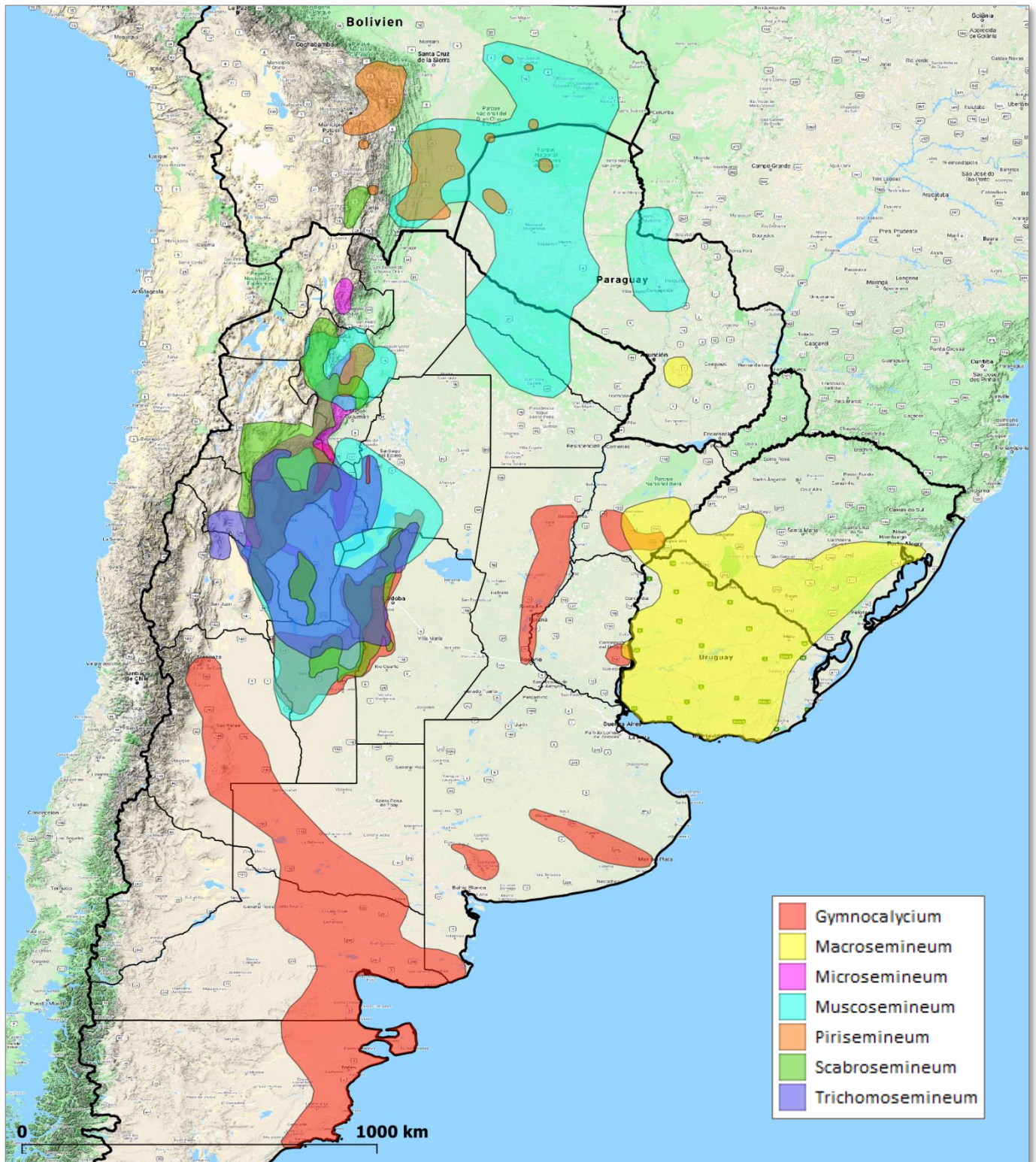


Fig. 1: General map showing the distribution areas of the subgenera of the genus *Gymnocalycium*.

Subgenus *Macrosemineum*

Body flat spherical to spherical, also short, column-shaped at older age, often with shoots, **fibre roots**. **Spines** ± straight or bent, **flowers** sprouting from the apex, funnel- or bell-shaped, often determined either male or female (dioecious). **Fruits** spherical or spindle-shaped, green when ripe, lacerating vertically or becoming soft. **Seeds** 1.0-2.0 mm in size, helmet-shaped, testa black, large hilum-micropylar area. **Occurrence**: Uruguay, Brazil (Rio Grande do Sul), southern Paraguay and north-eastern Argentina.

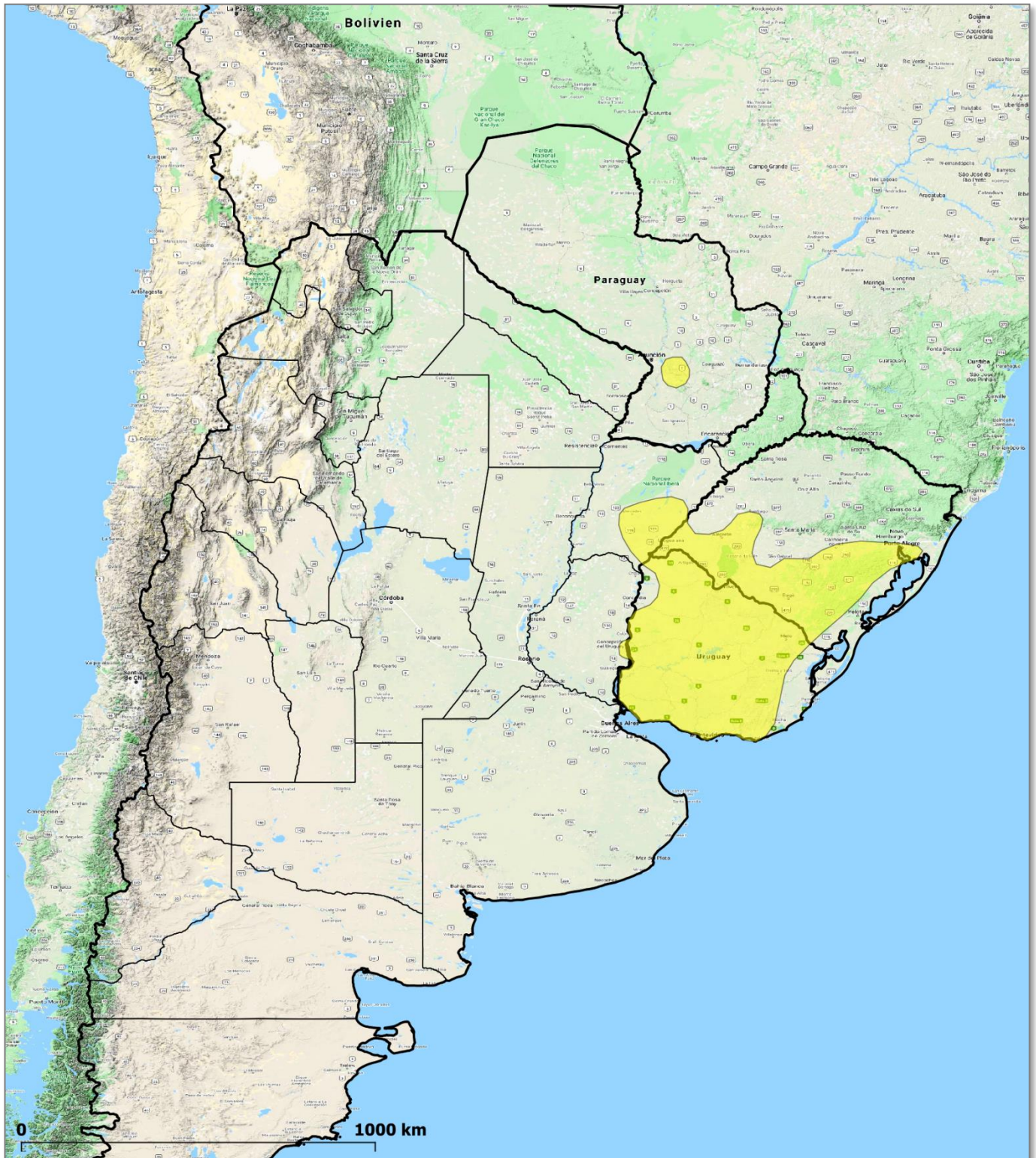


Fig. 2: Map of the distribution area of the subgenus *Macrosemineum*.

***Gymnocalycium angelae* Meregalli (1998)**



Fig. 3: *Gymnocalycium angelae* VoS 2919, Cerro de Susini, Province Corrientes, Argentina, 128 m.



Fig. 4: Habitat of *Gymnocalycium angelae* VoS 2919.

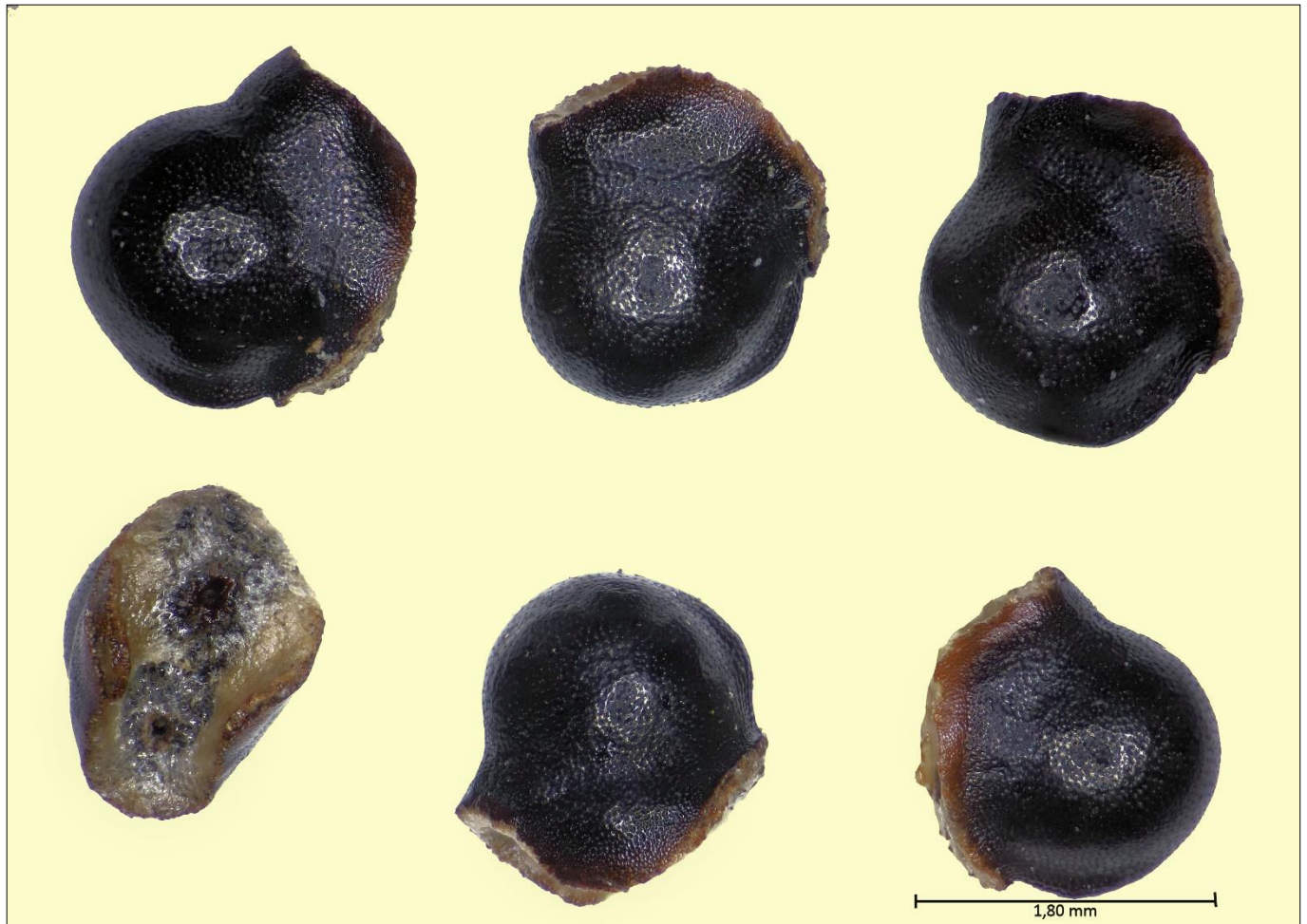


Fig. 5: Seeds of *Gymnocalycium angelae* Gf 1300.

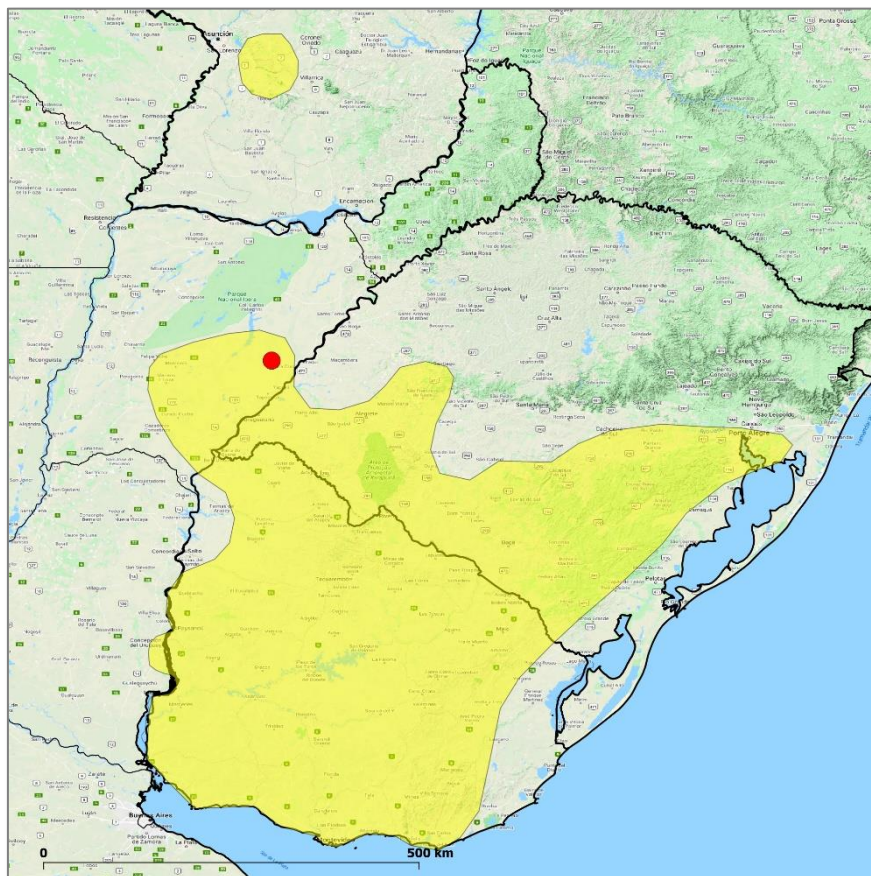


Fig. 6: Locality of *Gymnocalycium angelae* Gf 1300 and VoS 2919.

***Gymnocalycium buenekeri* Swales (1978)**



Fig. 7: *Gymnocalycium buenekeri* VoS 2899, Sao Francisco de Assis, Province Rio Grande do Sul, Brazil, 191 m.



Fig. 8: Habitat of *Gymnocalycium buenekeri* VoS 2899.

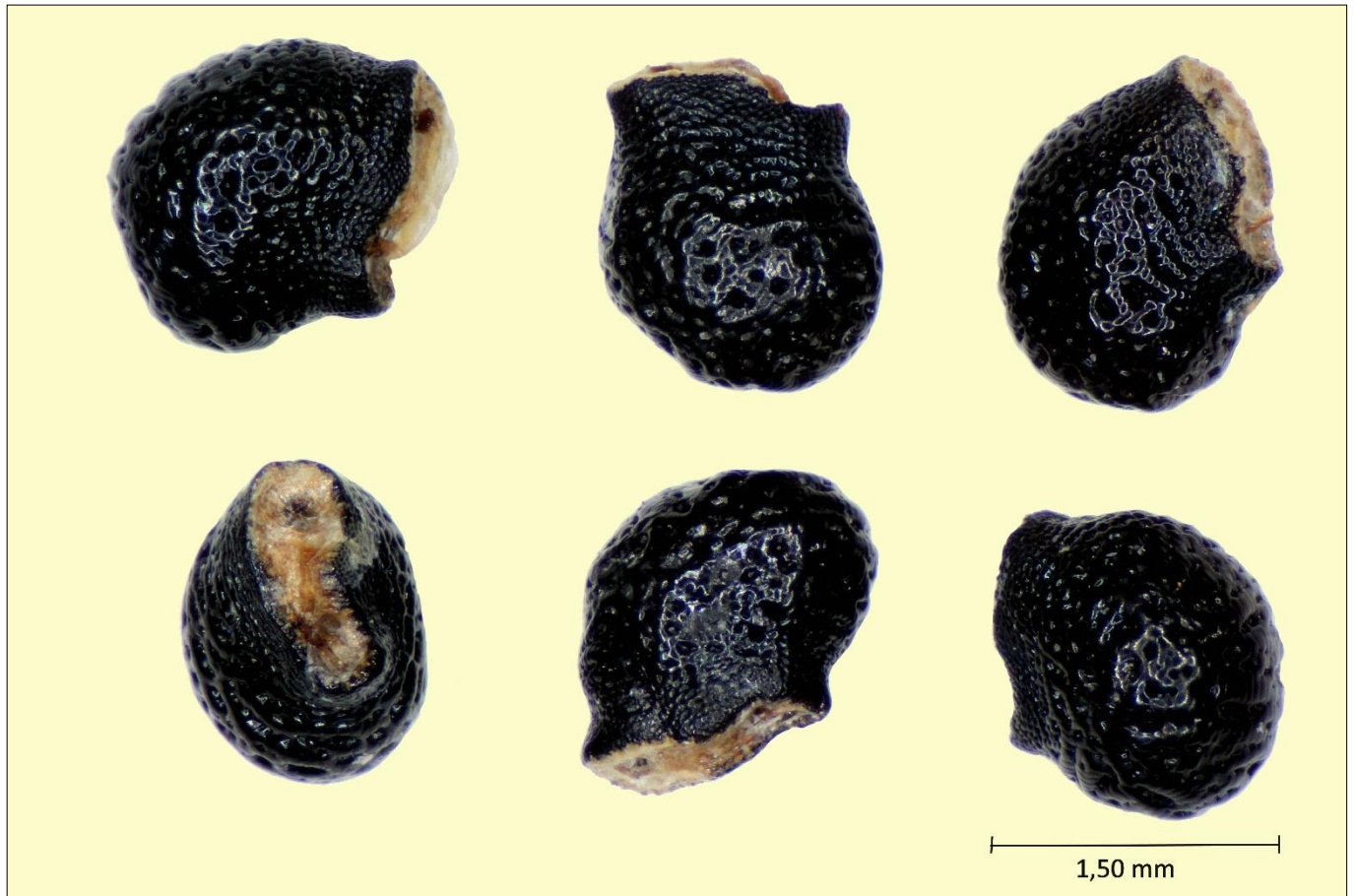


Fig. 9: Seeds of *Gymnocalycium buenekeri* LB 586.

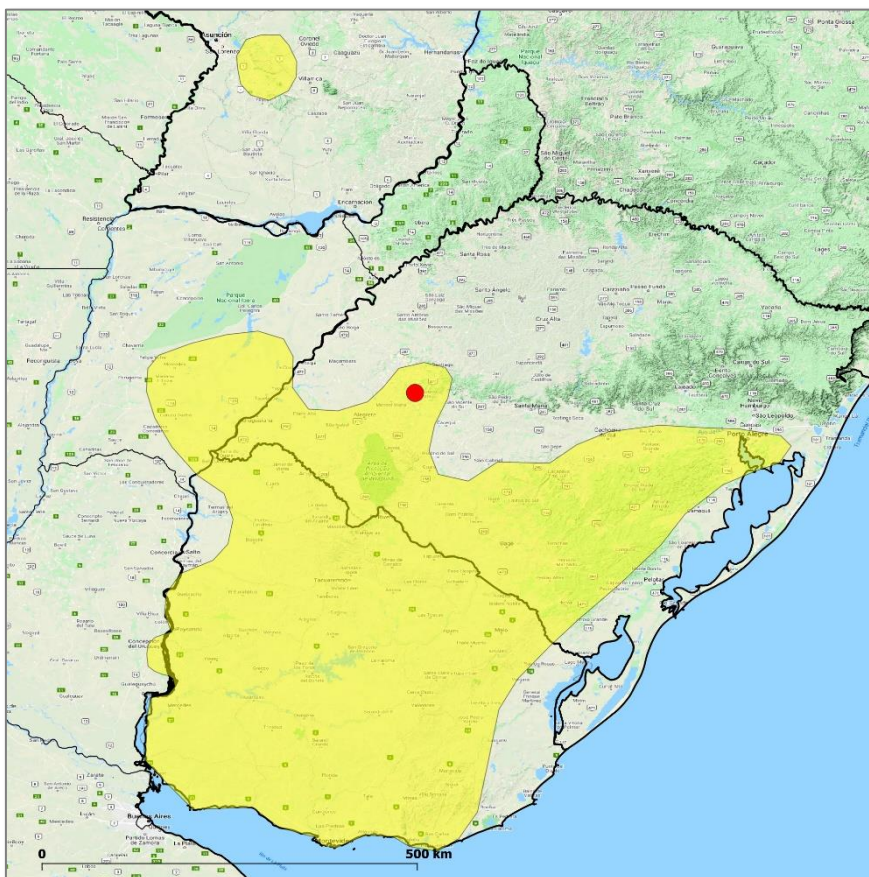


Fig. 10: Locality of *Gymnocalycium buenekeri* LB 586 and VoS 2899.

***Gymnocalycium denudatum* (Link & Otto) Pfeiffer ex Mittler (1844)**



Fig. 11: *Gymnocalycium denudatum* VoS 3012, northeast from Dom Pedrito, province Rio Grande do Sul, Brazil, 257 m.



Fig. 12: Habitat of *Gymnocalycium denudatum* VoS 3012.

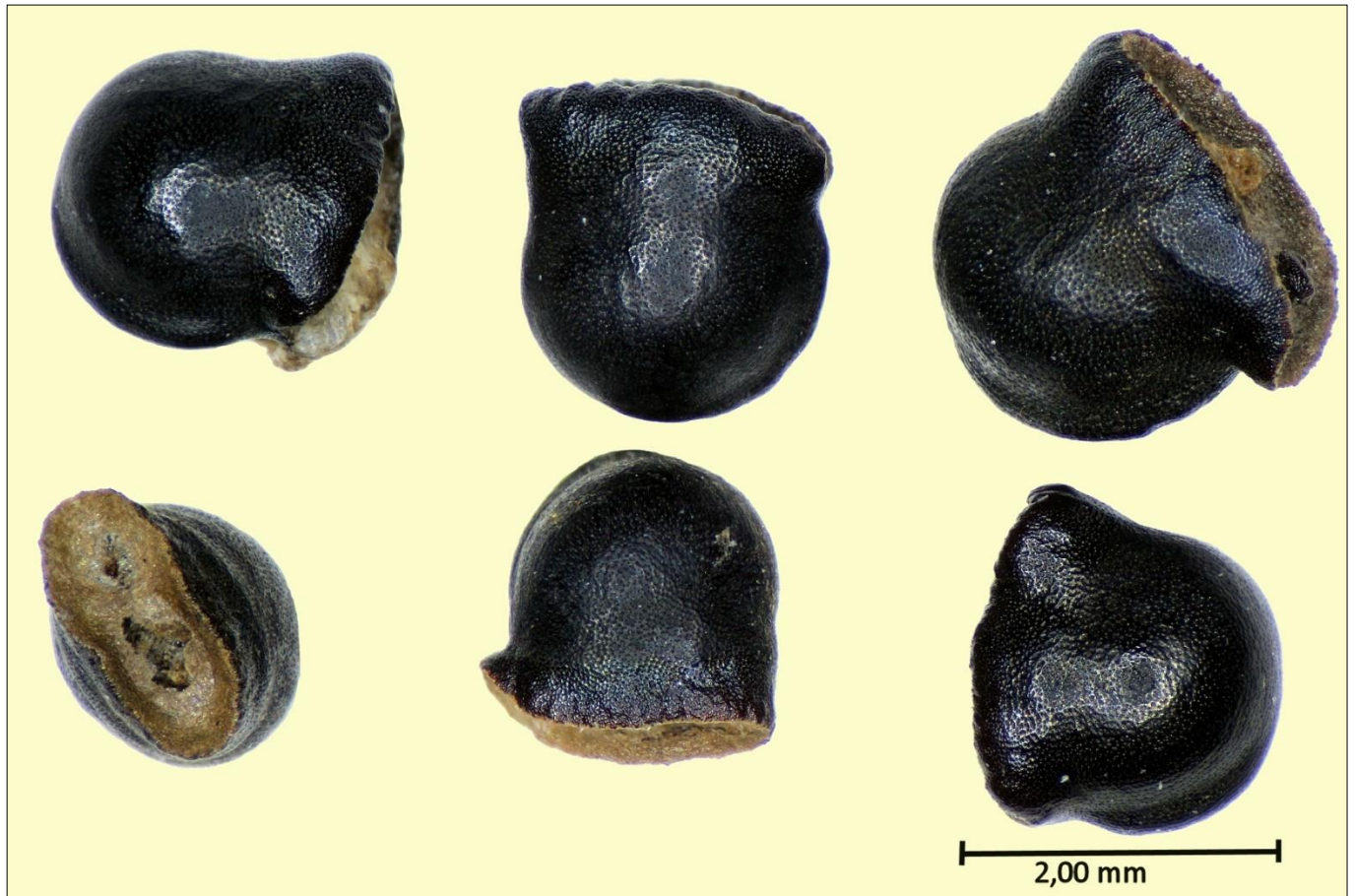


Fig. 13: Seeds of *Gymnocalycium denudatum* Gf 18, Minas do Camaqua, Kreuzberg, Province Rio Grande do Sul, Brazil.

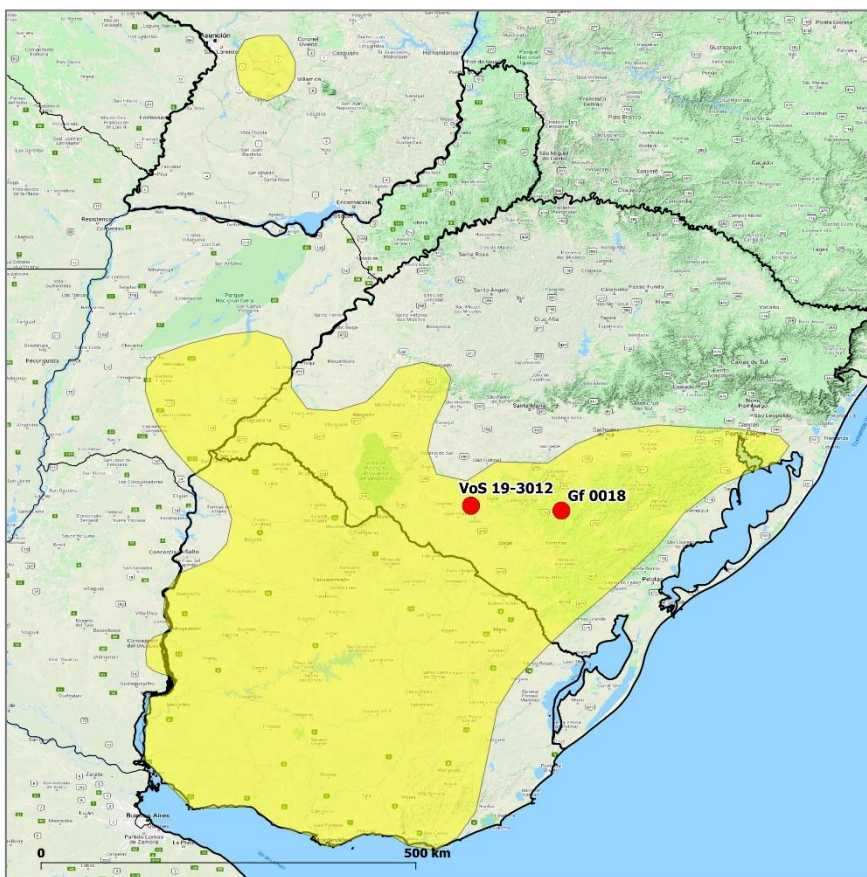


Fig. 14: Localities of *Gymnocalycium denudatum* Gf 18 and VoS 3012.

***Gymnocalycium fleischerianum* (Meregalli, Metzging & Kiesling) Vala (2003)**



Fig. 15: *Gymnocalycium fleischerianum* VoS 2150, west of Itacurubi, Province Cordillera, Paraguay, 205 m.



Fig. 16: Habitat of *Gymnocalycium fleischerianum* VoS 2150.



Fig. 17: Seeds of *Gymnocalycium fleischerianum* VoS 2150.

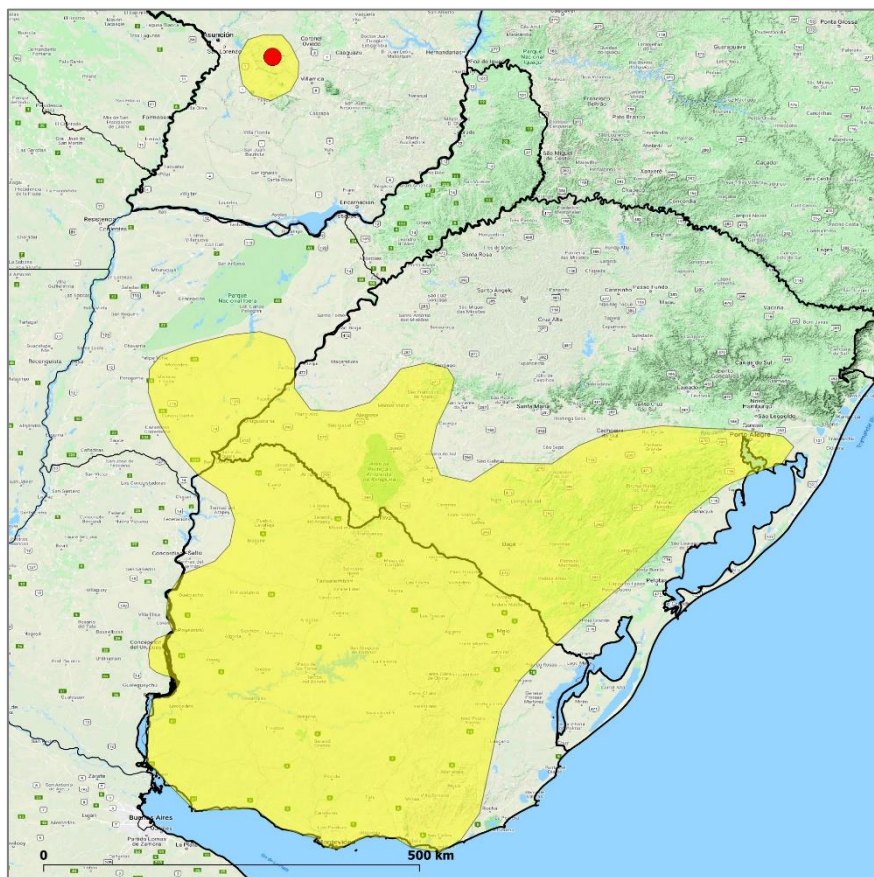


Fig. 18: Locality of *Gymnocalycium fleischerianum* VoS 2150.

***Gymnocalycium horstii* Buining (1970)**



Fig. 19: *Gymnocalycium horstii* VoS 3026, Santana da Boa Vista, Province Rio Grande do Sul, Brazil, 279 m.



Fig. 20: Habitat of *Gymnocalycium horstii* VoS 3026.



Fig. 21: Seeds of *Gymnocalycium horstii* Gf 105.

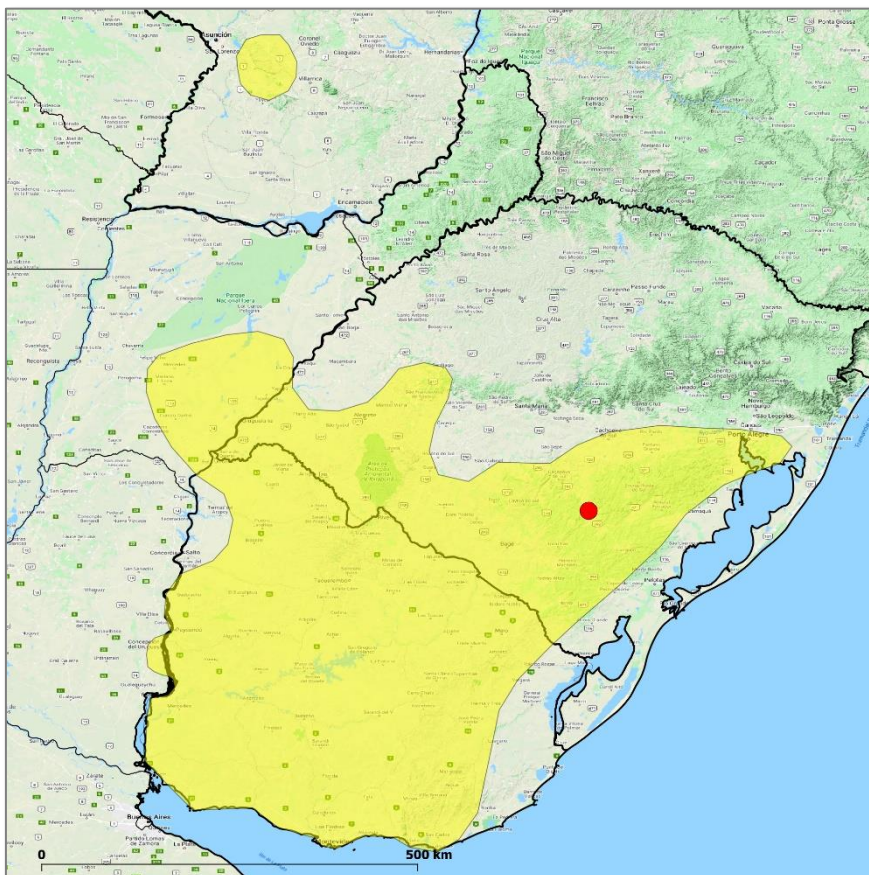


Fig. 22: Locality of *Gymnocalycium horstii* Gf 105 and VoS 3026.

***Gymnocalycium hyptiacanthum* (Lemaire) Britton & Rose (1922)**



Fig. 23: *Gymnocalycium hyptiacanthum* subsp. *uruguayense* VoS 2952, east of Quaraí, Province Rio Grande do Sul, Brazil, 198 m.



Fig. 24: Habitat of *Gymnocalycium hyptiacanthum* subsp. *uruguayense* VoS 2952.



Fig. 25: Seeds of *Gymnocalycium hyptiakanthum* subsp. *uruguayense* VoS 2952.

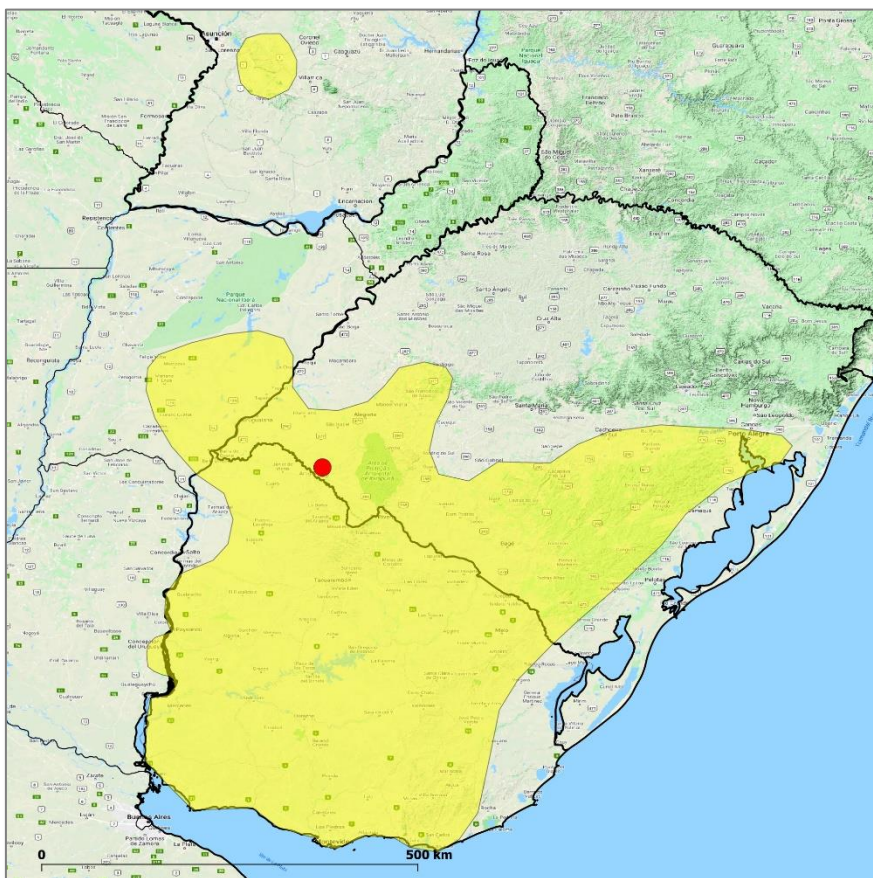


Fig. 26: Locality of *Gymnocalycium hyptiakanthum* subsp. *uruguayense* VoS 2952.

***Gymnocalycium mesopotamicum* Kiesling (1980)**



Fig. 27: *Gymnocalycium mesopotamicum* VoS 1544, west of Mercedes, Province Corrientes, Argentina, 110 m.



Fig. 28: Habitat of *Gymnocalycium mesopotamicum* VoS 1544.

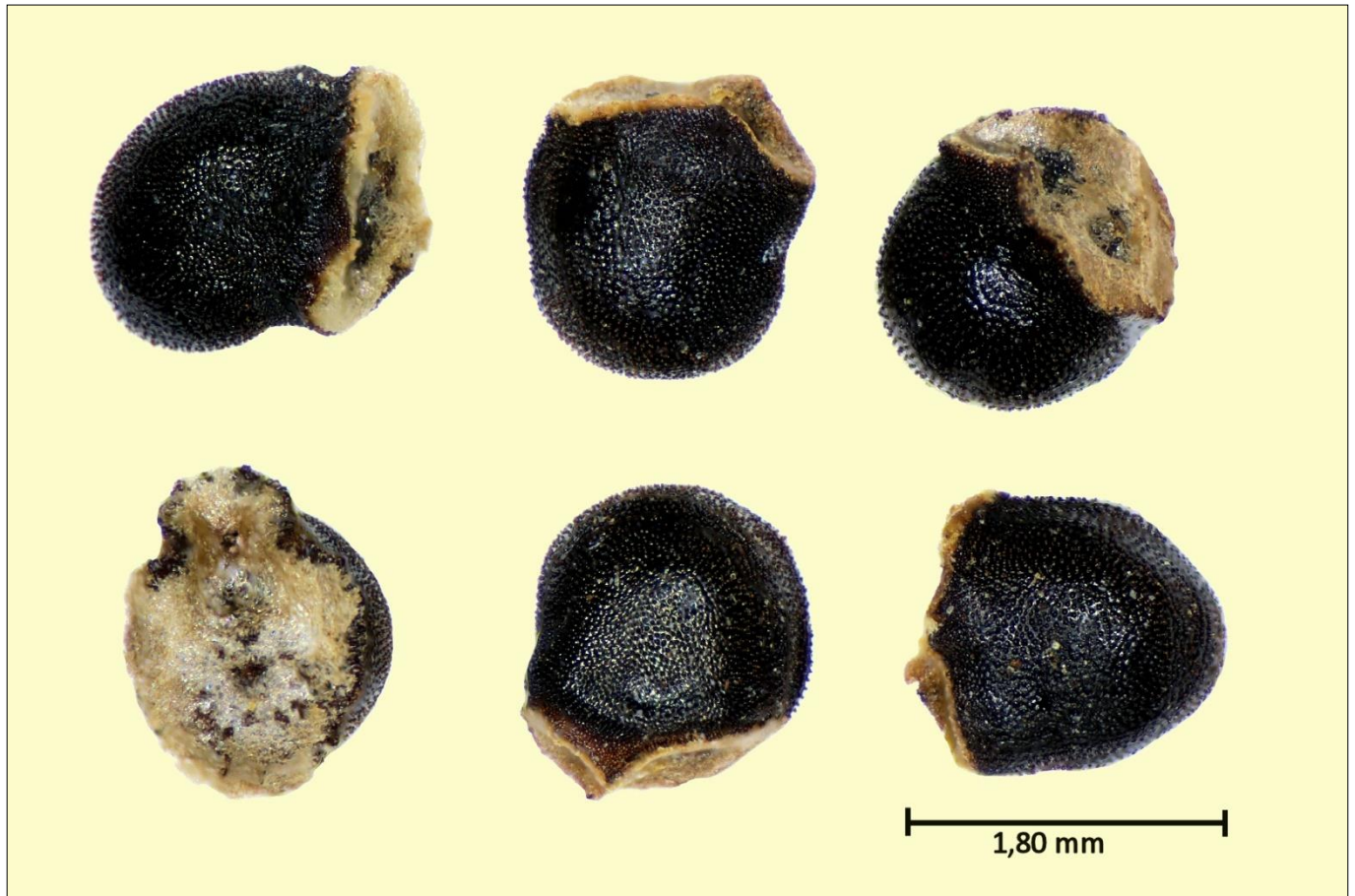


Fig. 29: Seeds of *Gymnocalycium mesopotamicum* VoS 1544.

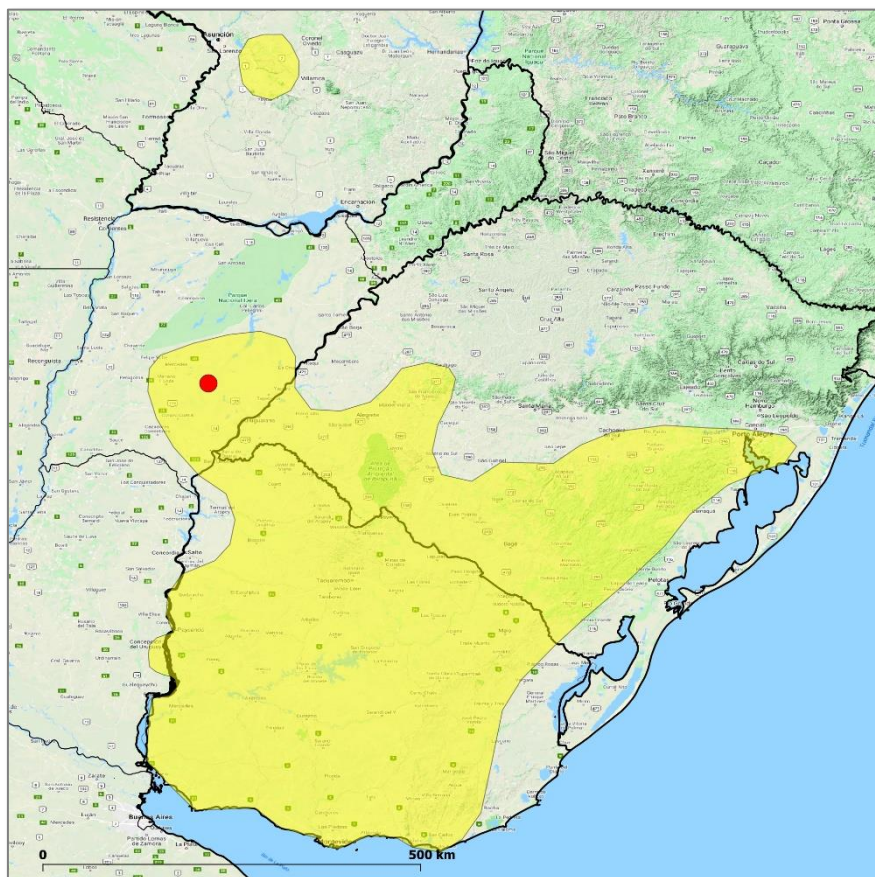


Fig. 30: Locality of *Gymnocalycium mesopotamicum* VoS 1544.

***Gymnocalycium paraguayense* (K. Schumann) Hosseus (1939)**



Fig. 31: *Gymnocalycium paraguayense* VoS 1253, Ita Moroti, Province Paraguari, Paraguay, 213 m.



Fig. 32: Habitat of *Gymnocalycium paraguayense* VoS 1253.

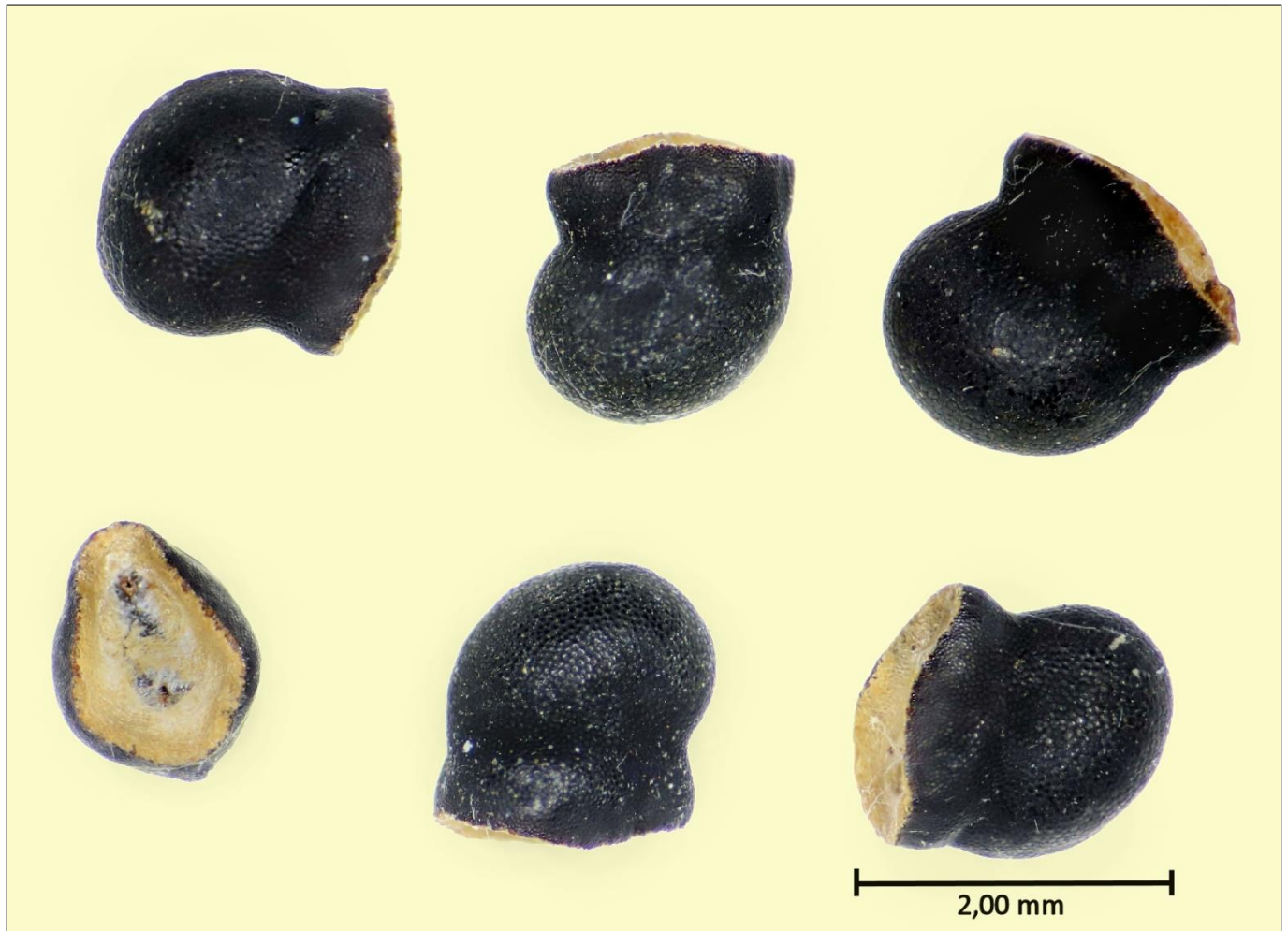


Fig. 33: Seeds of *Gymnocalycium paraguayense* VoS 33.

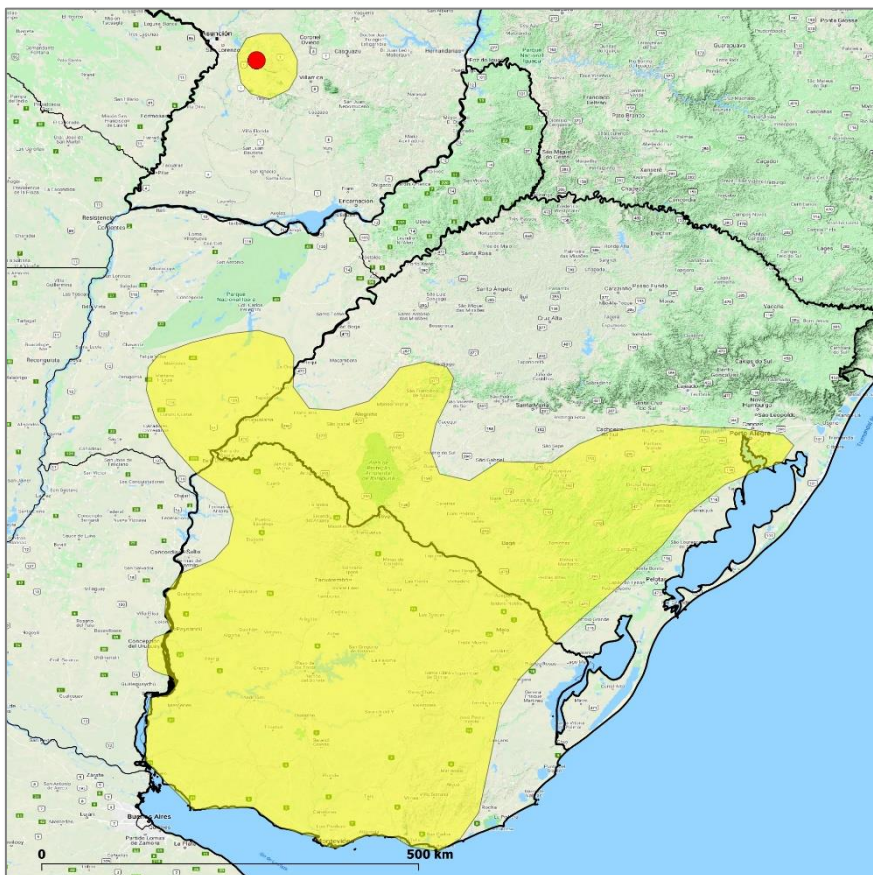


Fig. 34: Locality of *Gymnocalycium paraguayense* VoS 33 and VoS 1253.

All pictures by the authors.

LITERATURE

Schütz, B. (1969): Rod *Gymnocalycium*. – Fričiana: 46(7): 3-23.

***Gymnocalycium meregallii* Bercht 2012**

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ABSTRACT

Plants of the genus *Gymnocalycium* are presented, which are native to the Sierra de Comechingones between the city of Merlo and the village Lutti. The focus is on *Gymnocalycium meregallii*. The habitus of the plant in nature and cultivation as well as the flowers and the seeds are delineated.

KEYWORDS

***Cactaceae, Gymnocalycium, andreae, bruchii, meregallii, monvillei, orientale* var. *vikulovii*.**

Gymnocalycium meregallii was presented at the 35th International Gymnocalycium Meeting in Radebeul in Germany (13th to 15th September 2019). This species is only rarely present in collections and hardly anyone apart from committed *Gymnocalycium* collectors knows this plant. The topic of this article is the presentation of *Gymnocalycium meregallii* as well as of those *Gymnocalycium* species which occur within the narrow or wide distribution area of the species.

The first description of *Gymnocalycium meregallii* was established by Ludwig Bercht in 2012 and published in the *Gymnocalycium Online Journal Schütziana*, Volume 3, Issue 1, 2012. *Gymnocalycium meregallii* belongs to the subgenus *Gymnocalycium* (subgenus *Ovatisemineum* Schütz). The species was described in honour of Massimo Meregalli (fig. 1). The holotype was deposited by Massimo Meregalli with the field number MM 1200 in Turin (Italy).



Fig. 1: Massimo Meregalli (photograph: Ludwig Bercht).

G. meregallii grows in the western part of the Argentinian Province Córdoba (Fig. 2). The Sierras de Córdoba and the Sierra de Comechingones are the highest mountain ranges of the Province Córdoba. The Sierra de Comechingones declines abruptly to the west in the direction of the Province San Luis. The area is less steep to the east, sloping downward gradually. There are only few roads which cross these mountains. The mountains can be circumnavigated by a tarmac road south of the mountains near Achiras. There is a second well-developed road across the pass between Mina Clavero and Villa Carlos Paz. A relatively well-developed dirt road connects the village Taminga in the west with Tanti in the east. The dirt road between Merlo and La Cruz, where the type locality of *Gymnocalycium meregallii* is situated, is not really suitable for traffic and is not very much frequented. The road is used by few local people and by motorcyclists and quad riders at the weekend.

Merlo, located at the western foot of the Sierra de Comechingones, is a tourist point of attraction. The majority of tourists comes from the large Argentinian cities Buenos Aires, Rosario and Córdoba. They spend their summer holidays in the cooler climate of Merlo, which is situated at an altitude of about 1.000 m. There is a wide choice of culinary highlights as well as a large range of accommodation and cultural events.

The road from Merlo up to the Sierra de Comechingones is tarmacked and well accessible. It leads up to a viewing platform with restaurants and a lot of travelling hawkers. After that point, the road ends in a hardly passable dirt road. As soon as the dirt road gets moist and rain-sodden, its flat, not rocky parts are difficult to pass. There is often a jungle of road signs at crossroads,

however, not all of them are necessarily up-to-date. The advertised campgrounds or restaurants ceased to exist a long time ago, although the road signs remain until they are decayed (fig. 4).

Of the *Gymnocalycium* species which can be found here *Gymnocalycium andreae* grows at higher altitudes, *Gymnocalycium meregallii* at medium altitudes and *Gymnocalycium bruchii* in low areas. All the localities described are situated along the few dirt roads. The predominant part of the region has not been made accessible and thus can hardly be reached (fig. 3).

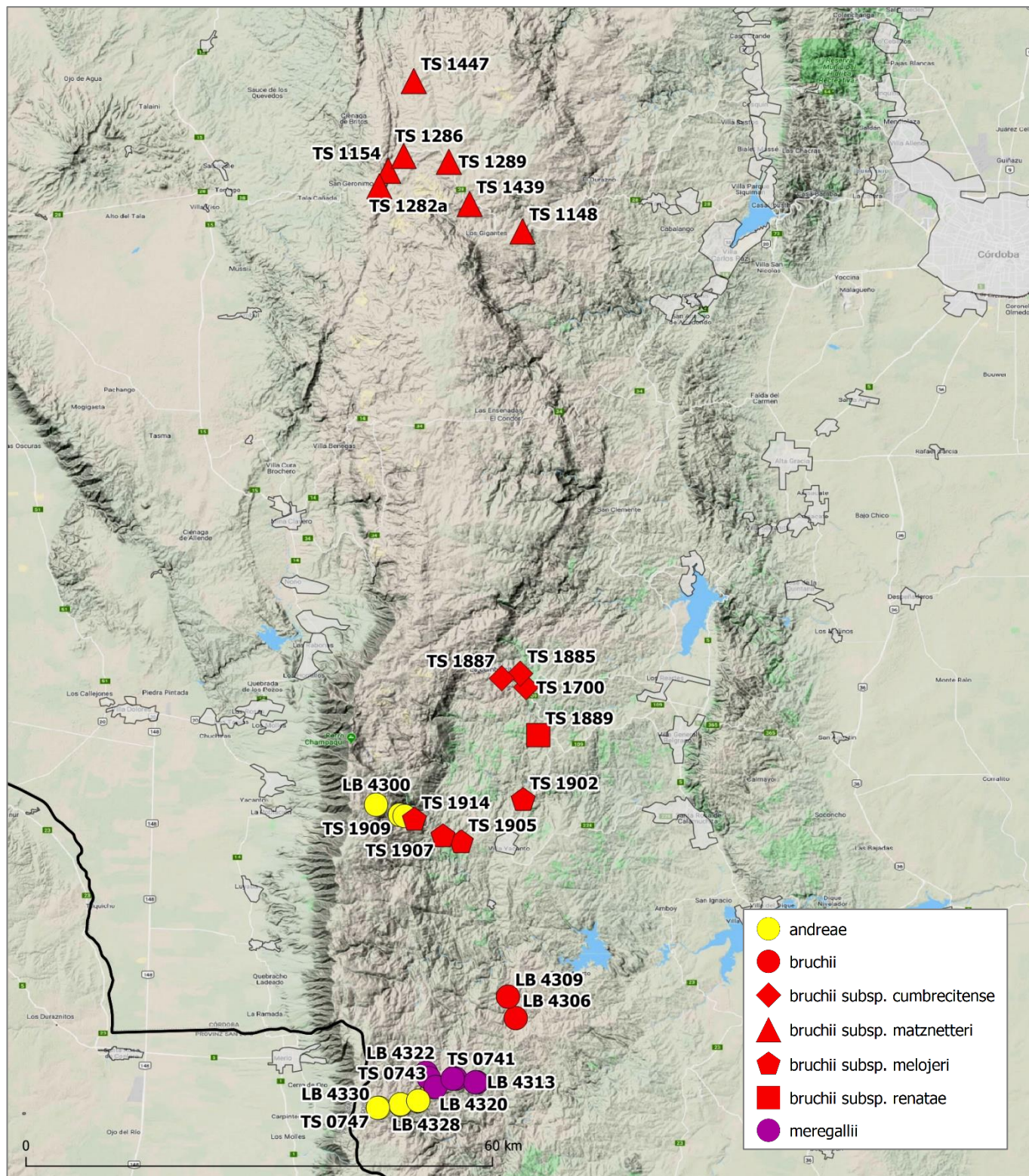


Fig. 2: Western part of the Argentinian Province Córdoba. The localities of *G. meregallii* are situated at the bottom of the map.

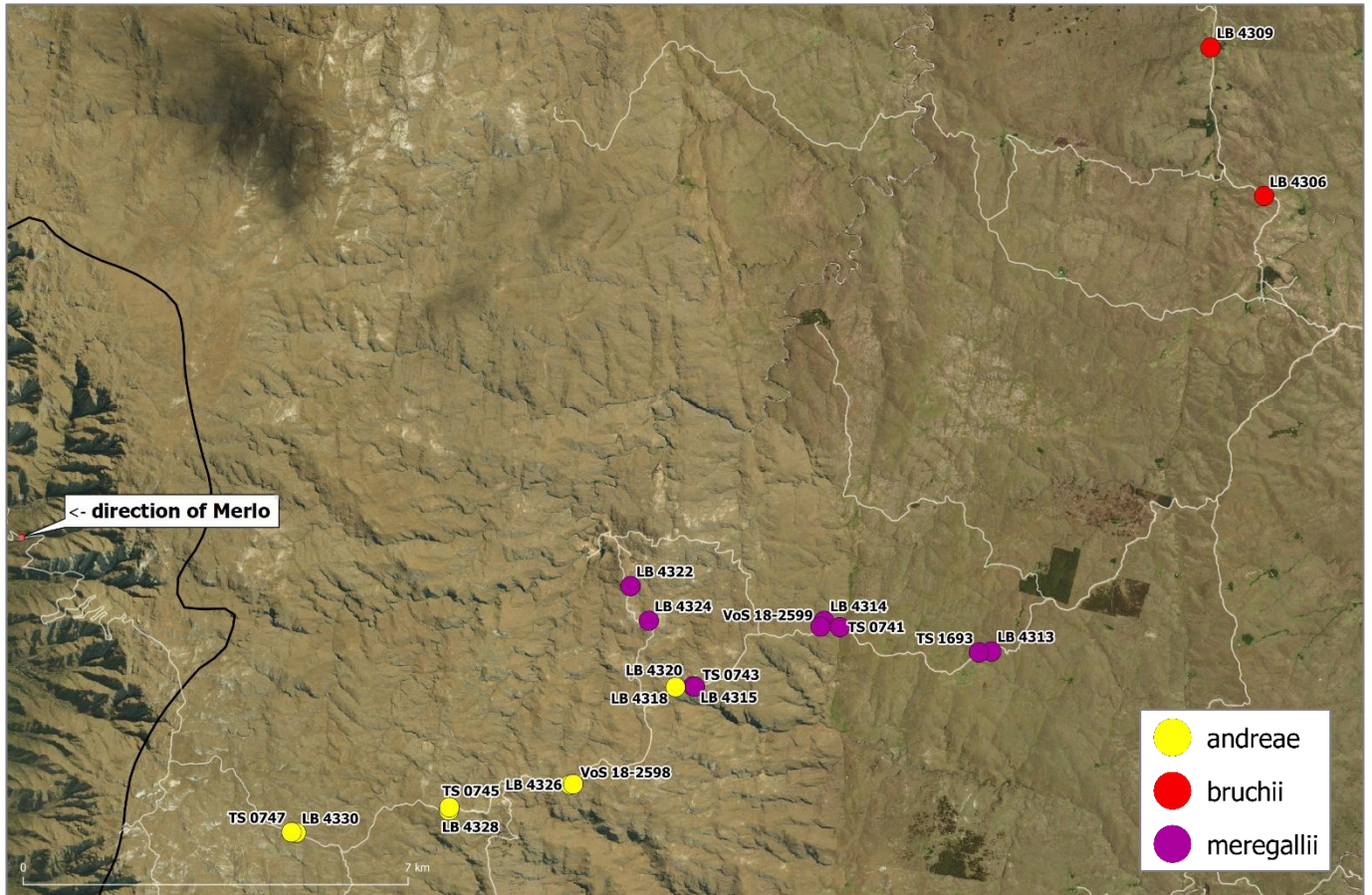


Fig. 3: Sierra de Comechingones with localities of *G. meregallii*, *G. andreae* and *G. bruchii*.

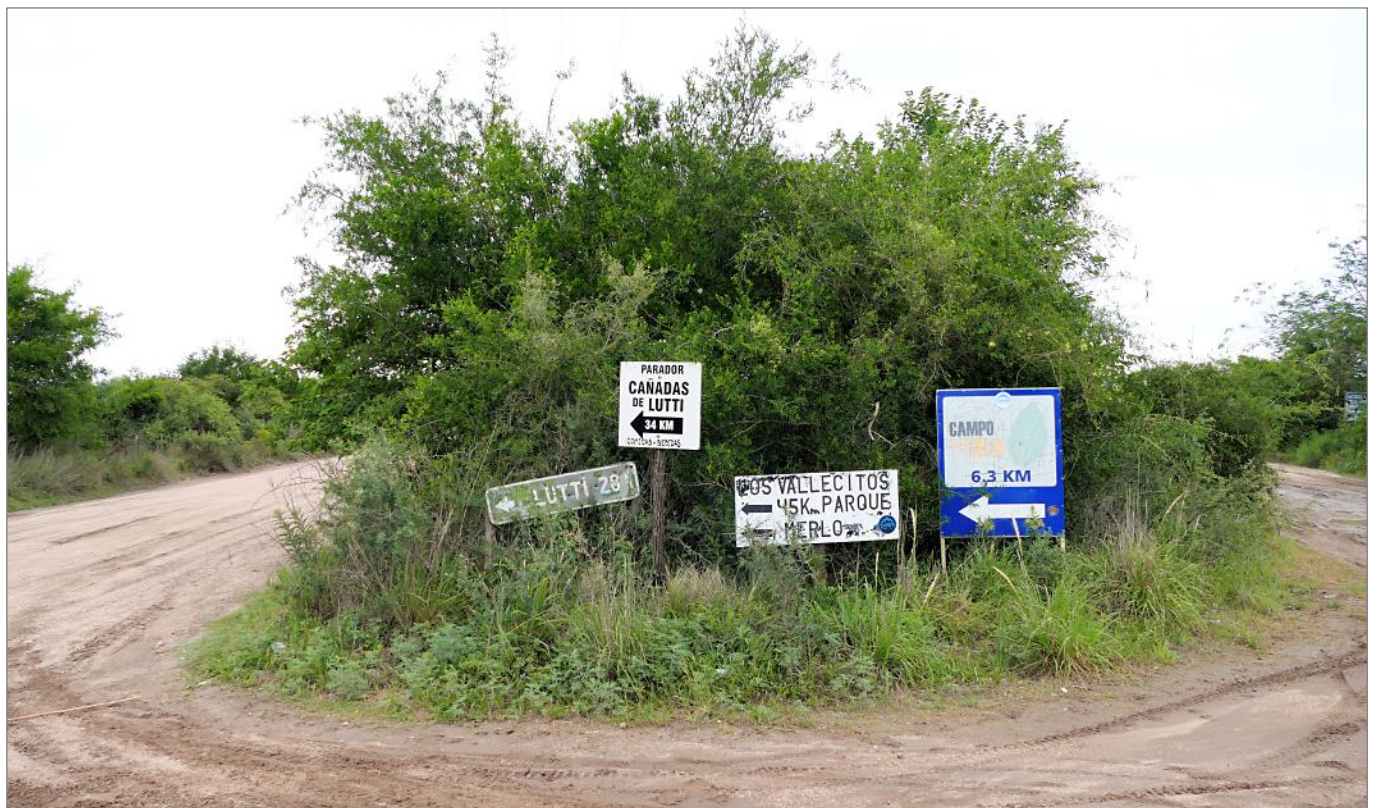


Fig. 4: "Road sign jungle" at the entrance ramp to the road leading from La Cruz to Lutti. The dirt road is rain-sodden.

Gymnocalycium meregallii

Localities of *Gymnocalycium meregallii*

The localities of *Gymnocalycium meregallii* are located in the Sierra de Comechingones between Lutti and Merlo, at an altitude between around 1,400 to 1,700 m.

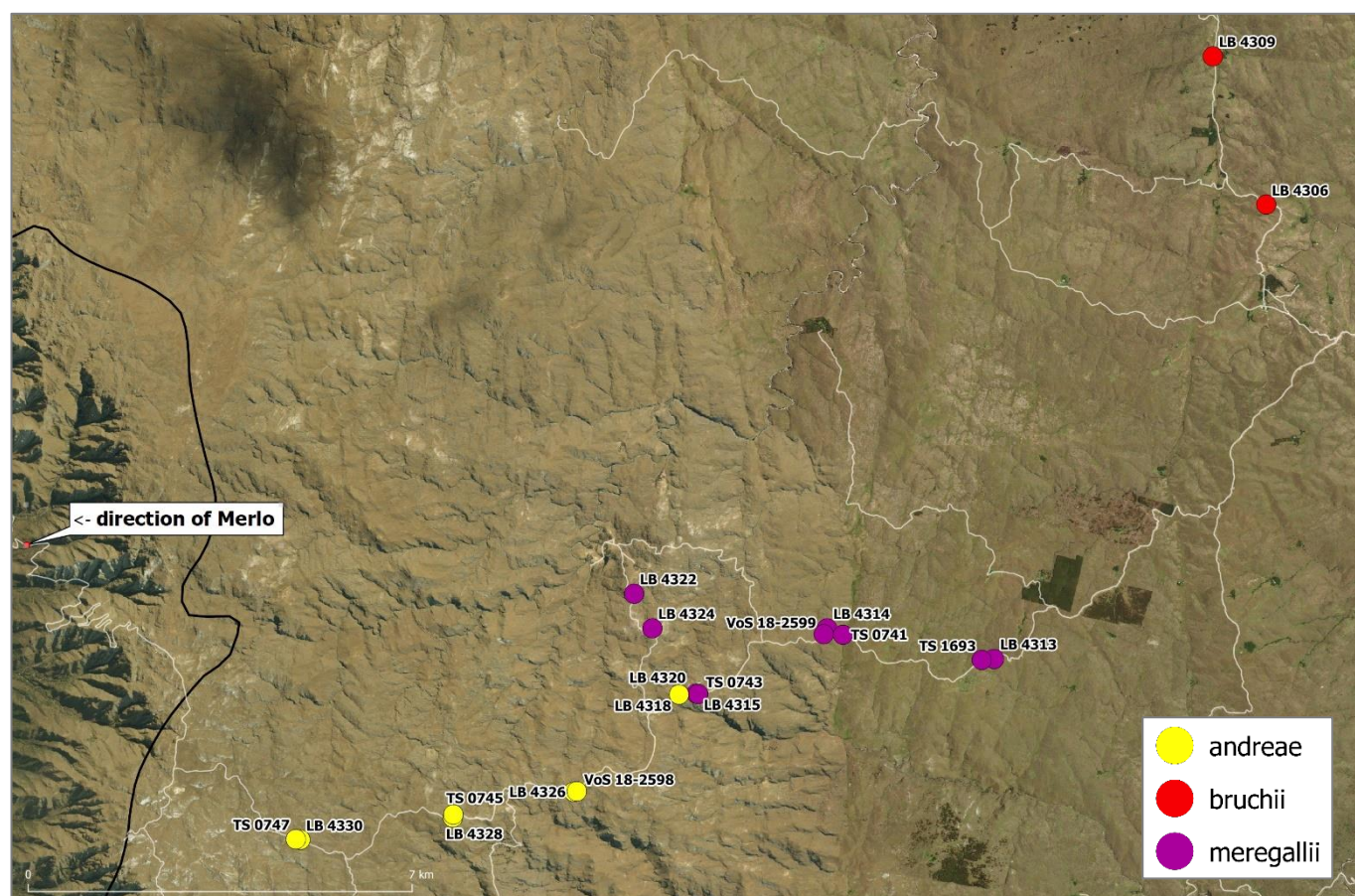


Fig. 5: *G. meregallii* localities along the dirt road from Merlo to Lutti.

Table 1: Field numbers and altitudes of the *Gymnocalycium meregallii* localities.

Field number	Altitude of finding [m]
LB 4322	1,625
LB 4324	1,663
TS 0743	1,654
LB 4315	1,672
VoS 2599	1,539
LB 4314	1,535
TS 0741	1,483
TS 1693	1,431
LB 4313	1,430

Habitats of *Gymnocalycium meregallii*

The habitats of *G. meregallii* in the Sierra de Comechingones, the Sierras de Córdoba and the Sierra Chica on the opposite side are quite similar. The typical features of the landscape are granite rocks and high grass. The climate and plant communities have an “alpine” appearance. There are only few isolated trees which were planted to protect the driveways to the farms or as forests (fig. 6-8).

Rain showers are frequent in the Sierra de Comechingones. The weather can change abruptly, as it is often the case in the mountains. In summer the temperatures are pleasant when the sun shines. When bad weather rolls in it becomes foggy and hazy and temperatures drop dramatically.



Fig. 6: View to the east from the type locality of *G. meregallii* (photograph: Massimo Meregalli).

Plants at the Habitat

Gymnocalycium meregallii grows on depressions which are located on low hills. The depressions are filled with granite gravel interspersed with humus.

Adult *G. meregallii* form 1-2(-3) central spines and shoots originate from old areoles. The body colour varies from light to dark green (fig. 9-14, fig. 19-20). Younger plants do not yet show the typical features of *G. meregallii* and have no central spine (fig. 15-16). The juvenile plants are more openly spined and their habitus reminds of *G. bruchii* or *G. andreae* (fig. 11 left front, fig. 17-18). *G. meregallii* already flowers and forms fruits at a juvenile stage. They are typical early bloomers, the flowering period during the year corresponds to that of *G. bruchii* (fig. 67).



Fig. 7: Habitat of *G. meregallii* locality TS 741. Pasture fences are common in the Sierra de Comechingones.



Fig. 8: Habitat of *G. meregallii* locality TS 743.

The “Working Group *Gymnocalycium*” has investigated ploidy levels of *Gymnocalycium meregallii*, apart from many other species. As opposed to *Gymnocalycium andreae* and the typical *Gymnocalycium bruchii*, which have a diploid set of chromosomes, *Gymnocalycium meregallii* has a tetraploid chromosome set.

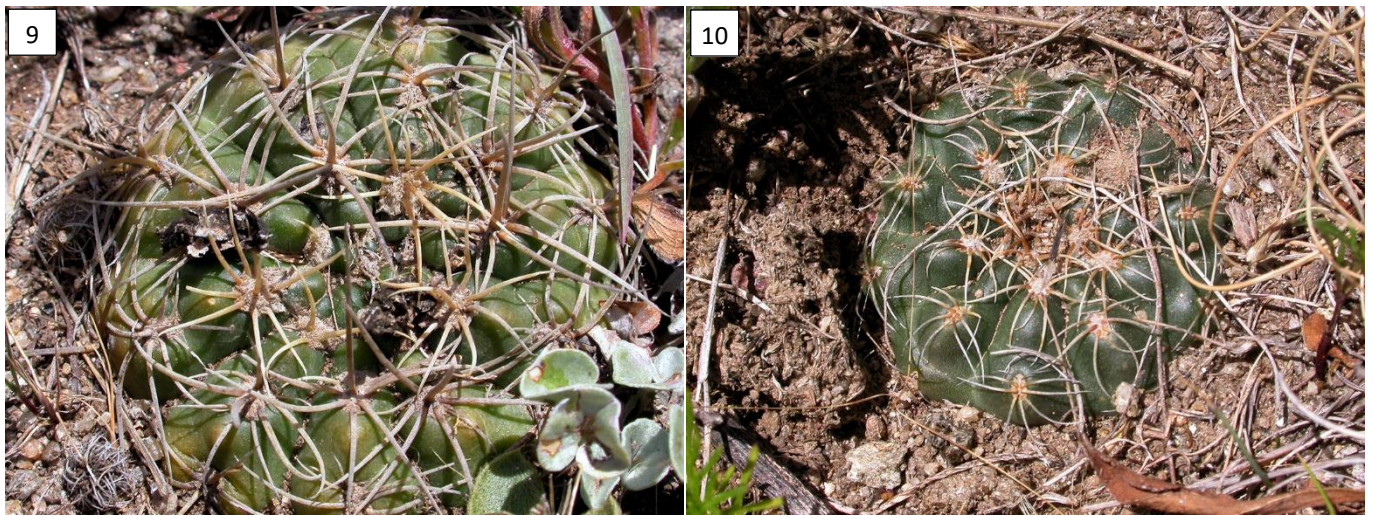


Fig. 9-10: *G. meregallii* LB 4313, adult plants with typical spine pattern (photographs: Massimo Meregalli).



Fig. 11-12: *G. meregallii* LB 4313, fig. 11 front left = plant at juvenile stage (photographs: Ludwig Bercht).



Fig 13-14: *G. meregallii* TS 741, adult plants.



Fig. 15-16: *G. meregallii* TS 741, juvenile plants have no central spines.



Fig 17-18: *G. meregallii* TS 741, plants in juvenile stage remind of *G. bruchii* or *G. andreae*.



Fig. 19-20: *G. meregallii* TS 743, adult plants.



Fig. 21: *G. meregallii* TS 743.

Plants in cultivation

Seedlings

Young seedlings can hardly be distinguished from *Gymnocalycium bruchii*. The body is covered in fine spines, the colour of the epidermis can therefore hardly be recognized, which has often led to confusion. The question was whether we really found *Gymnocalycium meregallii* or rather *Gymnocalycium bruchii* at the locality (fig. 22-24). Not only the seedlings of *G. andreae* and *G. bruchii* but also those of *G. meregallii* are cylindrical at first.

Older seedlings change in outward appearance, getting a more open spination, which makes them look darker green (fig. 25).

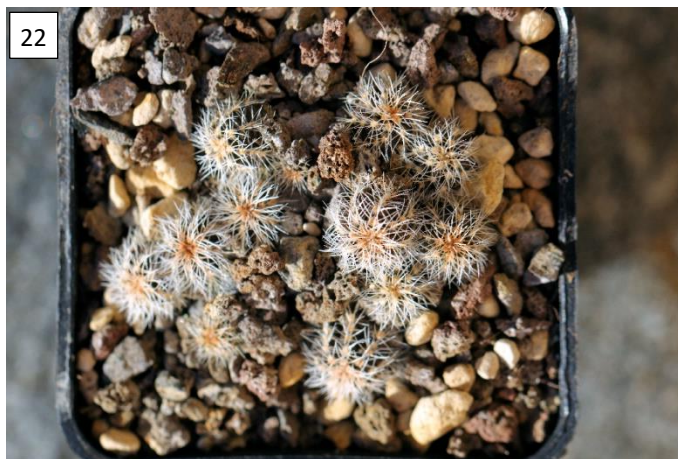


Fig. 22: *G. meregallii* TS 1693, 6 months old seedlings remind of *G. bruchii*.



Fig. 23: *G. meregallii* TS 741, 1-year-old seedlings do not yet show the typical appearance of adult *G. meregallii*.



Fig. 24: *G. meregallii* TS 743, 1-year-old seedlings. Fig. 25: *G. meregallii* TS 741, 1 ½-year-old seedlings start to change their appearance.

Juvenile plants

The juvenile form of *Gymnocalycium meregallii* reminds of *Gymnocalycium capillense* or the not far away occurring *Gymnocalycium sutterianum* subsp. *tetraploideum*. The face becomes more open, the spines longer, central spines are still missing and the plants do not yet form any offsprings (fig. 26-32). The plants are already capable of flowering in their juvenile stage (fig. 30-32).



Fig. 26-27: *G. meregallii* TS 1693, juvenile form without central spine, not sprouting.

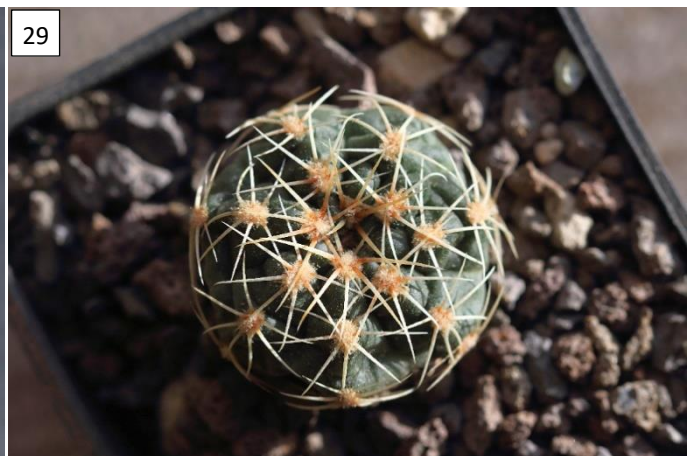


Fig. 28: *G. meregallii* TS 741, juvenile form.

Fig. 29: *G. meregallii* TS 743, juvenile form.



Fig. 30: *G. meregallii* MM 1200, type locality.



Fig. 31: *G. meregallii* TS 1693, 3-year-old seedling.



Fig. 32: *G. meregallii* TS 743, 3-year-old seedling starting to form central spines.

Adult plants

Adult plants show the typical features of the species with central spines as well as the tendency to sprout from older areoles (fig. 33-40). The epidermis colour varies between light and dark green, the spine colour is extremely variable (fig. 38).

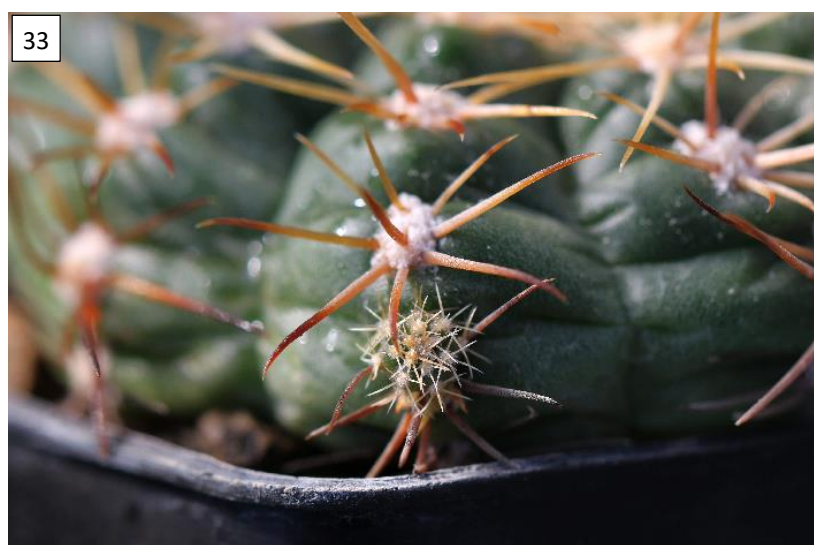


Fig. 33: *G. meregallii* TS 741, shoots originating from old areoles.



Fig. 34: *G. meregallii* FTA 335, with light green epidermis (collection Andrea Funetta).



Fig. 35: *G. meregallii* FTA 373, plant with slightly darker epidermis (collection Andrea Funetta).



Fig. 36: *G. meregallii* VoS 1483, purely white flower (photograph: Volker Schädlich).



Fig. 37: *G. meregallii* MaW 439/697 (collection and photograph: Mario Wick).



Fig. 38: *G. meregallii* MaW 440/699, arrangement of spines and body colour show a wide range (collection and photograph: Mario Wick).



Fig. 39: *G. meregallii* TS 741, adult plant with buds in early spring.



Fig. 40: *G. meregallii* TS 741, 5-year-old plant already forming several flowers.

Flowers

The flowers of *Gymnocalycium meregallii* are purely white and sexually determined. Male flowers possess a rudimentary style and fertile anthers. Female flowers have a fertile style and rudimentary anthers (fig. 41-43).



Fig. 41: *G. meregallii* TS 741, flower section, male determined flower with rudimentary style and fertile anthers.



Fig. 42: *G. meregallii* TS 1693, flower section, male determined flower with rudimentary style and fertile anthers.



Fig. 43: *G. meregallii* TS 743, flower section, female determined flower with fertile style and rudimentary anthers.

Seeds

Due to their seeds the subgenus *Gymnocalycium* (subgenus *Ovatisemineum* Schütz) can easily be recognized. The seeds are relatively large and have a cuticle that comes partly off (arillus skin) and a narrow hilum (fig. 44-46).



Fig. 44: *G. meregallii* TS 1693, seeds. The seeds are over 1 mm long and have a narrow hilum. The cuticle comes off partly (photograph: Volker Schädlich).

Fig. 45: *G. meregallii* TS 741, seeds (photograph: Volker Schädlich).



Fig. 46: *G. meregallii* TS 743, seeds (photograph: Volker Schädlich).

Further representatives of the genus *Gymnocalycium* with their distribution area in the surroundings of *Gymnocalycium meregallii*

Plants coming along with *Gymnocalycium meregallii* are *Gymnocalycium orientale* var. *vikulovii* as well as at higher altitudes *Gymnocalycium andreae* and *Gymnocalycium monvillei*. *Gymnocalycium bruchii* grows at considerably lower altitudes.

Gymnocalycium andreae

Gymnocalycium andreae grows in higher areas of the Sierra de Comechingones between 1,600 and 2,200 m a.s.l. At lower sites (around 1,600 m a.s.l.) *Gymnocalycium andreae* grows together with *Gymnocalycium meregallii*.

Plants from the locality TS 474 are shown representing *Gymnocalycium andreae* from the Sierra de Comechingones. The locality is close to the western edge of the Sierra de Comechingones in direction of Merlo (fig. 47-48).

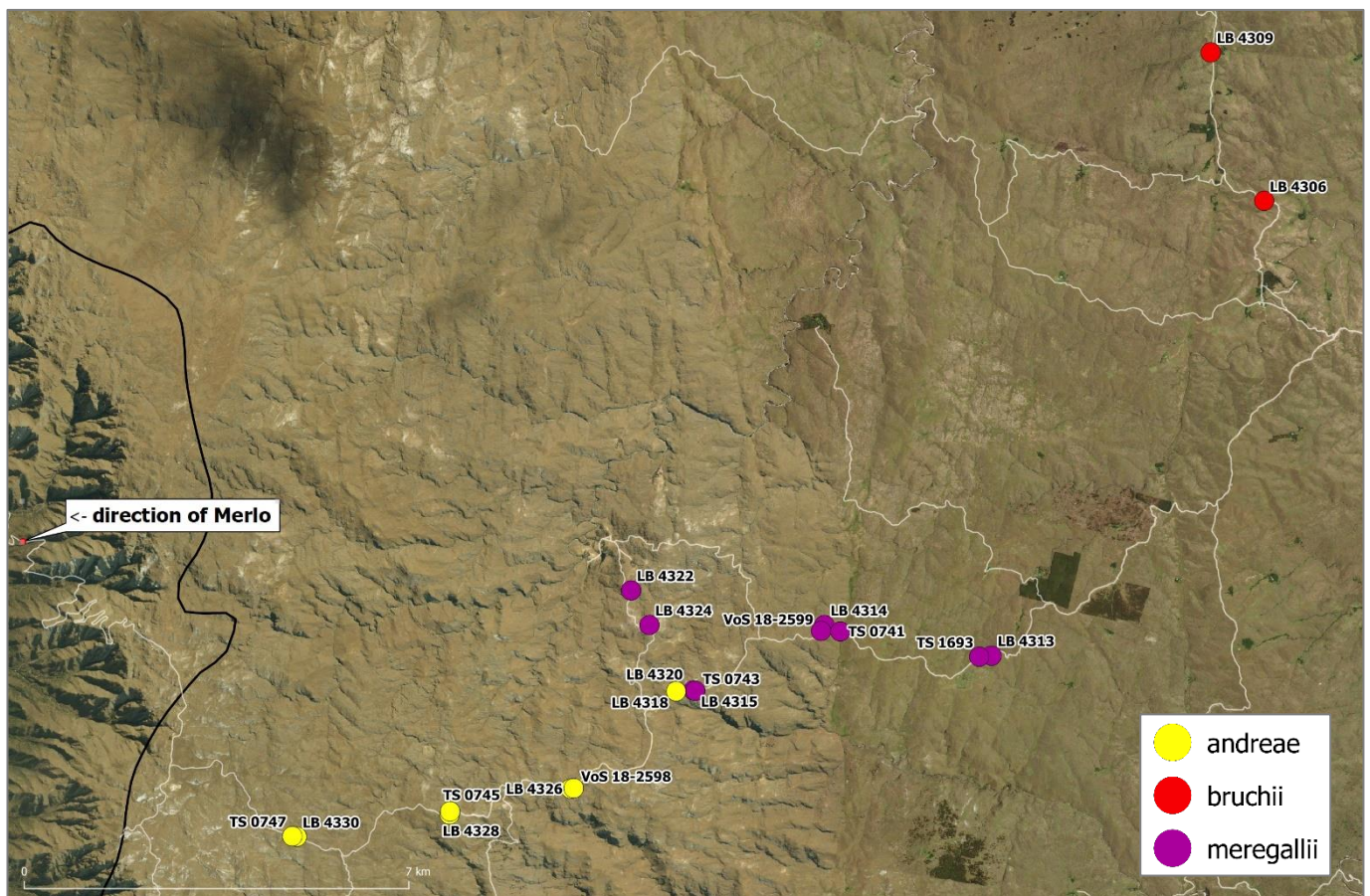


Fig. 47: *G. andreae* TS 747, road from Merlo to Lutti, 2,106 m, westernmost position on the map.



Fig. 48: Habitat TS 747 is situated near the edge of the Sierra de Comechingones in western direction.

The plants populate grassland interspersed with rocks (fig. 49-50).

Adult plants in cultivation form long spines and have the tendency to sprout from old areoles (fig. 51-52). Even three-years-old seedlings are capable of flowering. The flower is purely yellow and shows female as well as male features (fig. 53-54). The seeds are also relatively large and have a cuticle which encloses the seed. They also possess a very narrow hilum (fig. 55). It is not difficult to recognize that *Gymnocalycium andreae* belongs to the subgenus *Gymnocalycium*.



Fig. 49: *G. andreae* TS 747.



Fig. 50: *G. andreae* VoS 2595, growing between rocks in humus (photograph: Volker Schädlich).



Fig. 51: *G. andreae* TS 747, forms long spines at old age.



Fig. 52: *G. andreae* TS 747, sprouts originating from old areoles.



Fig. 53: *G. andreae* TS 747, flowering plant.



Fig. 54: *G. andreae* TS 747, flower section, hermaphroditic flower, male and female characteristics are present.



Fig. 55: *G. andreae* TS 747, seeds (photograph: Volker Schädlich).

Gymnocalycium monvillei

Gymnocalycium monvillei is very common in all higher areas of the Province Córdoba. It also grows at the localities of *G. andreae*. Plants which occur at the locality of *G. andreae* TS 747 are shown as representatives. In nature, the plants grow on rocky ground (fig. 56), in contrast to *G. meregallii* and *G. andreae*, which both prefer microhabitats in depressions where the soil contains humus. In cultivation seedlings of *G. monvillei* grow slowly, although they are capable of flowering even as small plants (fig. 57). At an older age they become remarkably large. *G. monvillei* belongs to the subgenus *Scabrosemineum*, which becomes clear when regarding the form of the seed (fig. 59-60).



Fig. 56: *G. monvillei* TS 748, grows at an altitude of 2,106 m a.s.l.



Fig. 57: *G. monvillei* TS 748, seedling already capable of flowering.

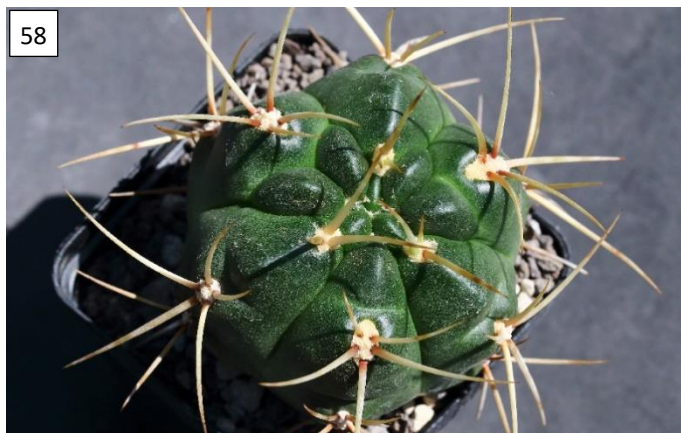


Fig. 58: *G. monvillei* TS 748, seedling.



Fig. 59: *G. monvillei* TS 748, flower section.



Fig. 60: *G. monvillei* TS 748, seeds (photograph: Volker Schädlich).

Gymnocalycium orientale* var. *vikulovii

In the area investigated another representative of the subgenus *Scabrosemineum* grows together with *Gymnocalycium meregallii*. Victor Gapon and Gert Neuhuber have recombined this member of the subgenus *Scabrosemineum* as *Gymnocalycium orientale* var. *vikulovii*, which was formerly described as *Gymnocalycium achirasense* var. *orientale*. *Gymnocalycium orientale* var. *vikulovii* possesses a beautiful spination and the typical seed of the subgenus *Scabrosemineum* (fig. 61-62).



Fig. 61: *G. orientale* var. *vikulovii* TS 742, road Merlo – Lutti, growing at 1,483 m a.s.l.



Fig. 62: *G. orientale* var. *vikulovii* TS 742, seeds (photograph: Volker Schädlich).

Gymnocalycium bruchii

Ludwig Bercht and Massimo Meregalli found *Gymnocalycium bruchii* at lower altitudes around 1,000 to 1,100 m a.s.l. The plants show the typical features of *G. bruchii* and do not correspond in habitus with *Gymnocalycium bruchii* subsp. *melojeri*, which grows roughly 10 km to the north. *G. bruchii* grows solitary in its juvenile stage (fig. 63) and forms clumps by sprouting at older age (fig. 64).



Fig. 63: *G. bruchii* LB 4306, near Lutti, 1,085 m.



Fig. 64: *G. bruchii* LB 4309, near Lutti, 1,010 m (photographs: Ludwig Bercht).

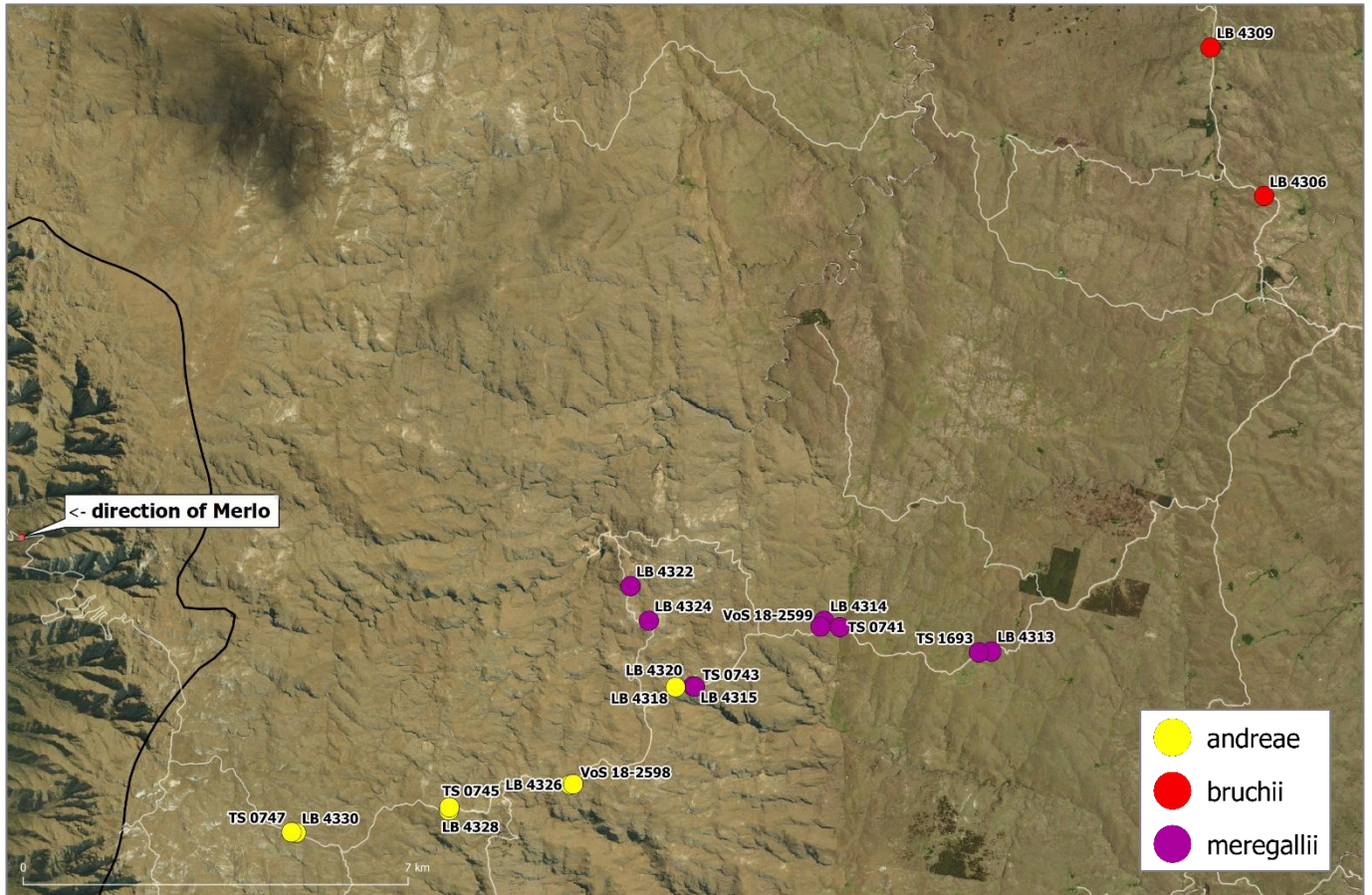


Fig. 65: *G. bruchii*, localities LB 4306 and LB 4309, map top right.

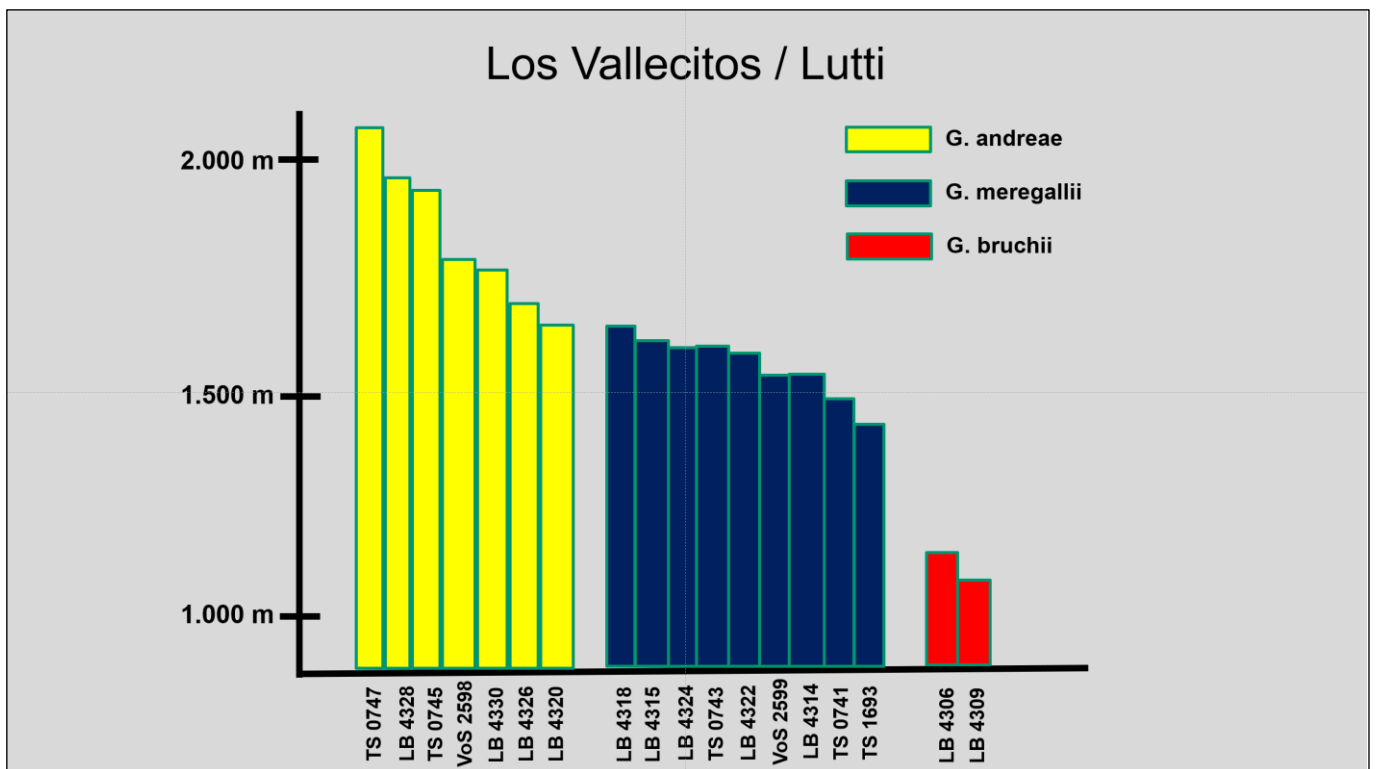


Fig. 66: Comparison of habitat altitudes of *G. andreae*, *G. meregallii* and *G. bruchii*.

Flowering period at Basel

Gymnocalycium meregallii flowers at the same time as the members of the *Gymnocalycium bruchii* group (*Gymnocalycium bruchii* subsp. *melojeri* is shown as an example). The flowering period of *Gymnocalycium andreae* starts later. This sequence of flowering exists in nature as well.

Field number	Species	Locality	m a.s.l.	March	April	Mai	June	July
TS 0741	<i>meregallii</i>	Los Vallecitos - Lutti	1483					
TS 0743	<i>meregallii</i>	Los Vallecitos - Lutti	1654					
TS 1693	<i>meregallii</i>	Los Vallecitos - Lutti	1430					
<i>Gymnocalycium bruchii</i> subsp. <i>melojeri</i>								
Field number	Species	Locality	m a.s.l.	March	April	Mai	June	July
TS 1707	<i>bruchii</i> subsp. <i>melojeri</i>	Yacanto - Cerro Linderos	1236					
TS 1708	<i>bruchii</i> subsp. <i>melojeri</i>	Yacanto - Cerro Linderos	1347					
<i>Gymnocalycium andreae</i>								
Field number	Species	Locality	m a.s.l.	March	April	Mai	June	July
TS 0747	<i>andreae</i>	Los Vallecitos - Lutti	2106					

Fig. 67: Comparison of flowering period of *G. andreae*, *G. meregallii* and *G. bruchii*.

Table 2: Field numbers and identical field numbers of *Gymnocalycium meregallii*.

Field numbers	Identical field numbers
TS 1693	LB 4313, MM 1200, FTA 335.
TS 741	LB 4314, LB 5770, MaW 439/697, SPE 261-116-13, SPE 636-116-18, TS 1692, VoS 1483, VoS 2599, FTA 373, MM 1241.
TS 743	LB 4320, MaW 440/700, MM 1243, SPE 263-117-13, TS 1690, VoS 1485.

SUMMARY

At the natural locality *Gymnocalycium meregallii* can hardly be distinguished from *Gymnocalycium andreae* or *Gymnocalycium bruchii*. However, the latter grows in markedly lower regions, *Gymnocalycium meregallii* grows in medium and *Gymnocalycium andreae* in higher areas of the Sierra de Comechingones.

Gymnocalycium meregallii can hardly be told apart from *Gymnocalycium bruchii* as a seedling. Both have column-shaped seedlings, just like *Gymnocalycium bruchii*. In its juvenile stage *Gymnocalycium meregallii* reminds of *Gymnocalycium capillense*. Only at an older age does *Gymnocalycium meregallii* achieve its typical appearance (with central spine, relatively large body, sprouting from old areoles).

The flowering period starts in early spring at the same time as that of *Gymnocalycium bruchii*, but earlier than that of *Gymnocalycium andreae*.

The flowers of *Gymnocalycium meregallii* are either male or female determined. This is a difference to *Gymnocalycium andreae* or *Gymnocalycium bruchii*, whose flowers possess male as well as female features. The male flowers of *Gymnocalycium meregallii* have fertile anthers and a rudimentary style. The style is developed and the anthers are rudimentary in the female flowers.

The chromosome set of *Gymnocalycium meregallii* is tetraploid, that of *Gymnocalycium andreae* and *Gymnocalycium bruchii* is diploid.

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All photographs, if not mentioned otherwise, are by the author.

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