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## Content

Meregalli, Massimo	<b>Editorial</b>	p. 2-3
Papsch, Wolfgang	<b>Consequences of the Neotypification of <i>Echinocactus platensis</i> Spegazzini.</b>	p. 4-10
Meregalli, Massimo & Kulhánek, Tomáš	<b><i>Gymnocalycium pugionacanthum</i> Backeberg ex Till, 1987. Designation of an epitype.</b>	p. 11-24

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**Cover picture: *Gymnocalycium pugionacanthum* WP 95-213/448, Argentina, Prov. Catamarca, 20 km east Belén, (photo: Wolfgang Papsch)**

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## Editorial

### Dear *Gymnocalycium* enthusiasts

#### 9<sup>th</sup> Gymno-day, Carmagnola, July 24-26, 2015



During the Gymno-day that was held in Carmagnola a very useful discussion of the plants belonging to the complex *G. calochlorum* - *G. parvulum* - *G. leptanthum* was held.

Wolfgang Papsch and Ludwig Bercht prepared an accurate analysis of the literature, with particular regard to the two latter names, that were proposed by Spegazzini at the beginning of the 20<sup>th</sup> century. Based on his research, Papsch suggested that with the highest probability the species originally described as *Echinocactus platensis* var. "*leptantha*" was found on January 18, 1899, during a trip that Spegazzini did together with Stuckert in 1898 and 1899. In these days the two botanists visited localities south of Cosquin, and it seems thus that this was the area from which the types of this taxon came from. Bercht, regarding *E. platensis* var. "*parvula*", a taxon described from "the hills more stony and dry of the sierra de San Luis", remarked that there is a place known as Pampa de San Luis, not far from Tanti, a locality where plants that can be referred to the description are very common. These studies offer thus a possible place of origin for these two taxa. These names, or one of the two, could be the first name that was used for the plants now known as *G. calochlorum*. Since type material of both of the two Spegazzini's names exist in Buenos Aires, a more complete analysis will be delayed until photographs of these types are seen.

Considering the known distribution of the plants of the group under investigation during the meeting, it was noticed that they have well delimited ranges. Massimo Meregalli and Ludwig Bercht showed a large number of photographs of plants in habitat as well as in cultivation. One group of populations is in the surroundings of Villa Carlos Paz, on the eastern side of the Sierra Grande. These are the plants that are currently known as *G. calochlorum*, and it was noticed that, even though the description does not indicate any precise locality of origin, the plants are perfectly referable to the description, also because of the nice green colour of their epidermis. Another taxon, clearly distinct, lives on the western side of the Sierra Grande, and the name *G. parvulum* var. *amoenum*, from Las Palmas, is available for these plants. It appears anyway that this taxon shows two differentiated forms, the second one distributed between South of Salsacate and Nono. A third taxon was described as *G. parvulum* subsp. *agnesiae*, from the surroundings of Ischilin, towards the northern part of the province of Córdoba. All these taxa share the slightly smaller seed, compared to the normal seeds of the subgenus *Gymnocalycium*, and without any trace of a cuticle coating, as shown by Meregalli. The last taxon in the group is *G. parvulum* subsp. *huettneri*, from the surroundings of San Pedro Norte. This is of more complex definition, since the plants cannot always be clearly differentiated from other species living in that area, and also the specimens examined have a larger seed, with a greyish-yellowish cuticle.

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After a long discussion among all the participants, it was decided to proceed with more research on the subject, trying to analyze as much material as possible, including also material of the plants currently identified as *G. parvulum huettneri*, so to complete the study during the next Carmagnola meeting in 2016, when a definitive interpretation of the various names and their application to the natural populations will be hopefully reached. The complete meeting was extremely pleasant, with an excellent feeling among all participants and a great spirit of cooperation was shared among everybody.



Participants of the meeting during a break: Lorenzini, A., Papsch. W., Gallina, F., Meregalli, M., Bercht, L. (from left).

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 Mr Takashi Shimada for the translation into Japanese and to Mr Daniel Schweich (France), who has mirrored our publications under <http://www.cactuspro.com/biblio/>.

## Consequences of the Neotypification of *Echinocactus platensis* Spegazzini.

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### ABSTRACT

The neotypification of *Echinocactus platensis* Spegazzini by the author (*Schütziana* 6(2): 12) necessitates nomenclature adjustments. This affects the plants known so far as *G. schroederianum* Osten and their described subspecies. *G. schroederianum* subsp. *bayense* Kiesling must be assigned to synonymy in the group of *G. platense* (Spegazzini) Britton & Rose. *G. schroederianum* subsp. *schroederianum* and *G. schroederianum* subsp. *paucicostatum* Kiesling are combined as subspecies of *G. platense*.

**Keywords:** Cactaceae, *Gymnocalycium*, *Gymnocalycium platense*, Nomenclature

### INTRODUCTION

Spegazzini's name *Echinocactus platensis* is neotypified with a plant from the Sierras Bayas (Province of Buenos Aires, Argentina) in *Schütziana* 6(2): 2015 (Papsch 2015). Various people have objected that the name *E. platensis* was already typified with a plant from the Sierra de la Ventana (Province of Buenos Aires) by Roberto Kiesling (Kiesling, 1982). However, Kiesling based his typification on a plant which differs in vital aspects from the first description of *E. platensis*. The differences are especially significant for the arrangement of spines, but also for the form of buds and flowers when compared with the photograph taken by Spegazzini. *G. platense* sensu Kiesling from the hills behind the Estancia Las Vertientes must be regarded as *G. reductum* (Link) Pfeiffer ex Mittler judging from all its features and thus must be considered as *G. reductum*.

### DISCUSSION

*E. platensis* was transferred to the genus *Gymnocalycium* by Britton and Rose in 1922. Therefore the *Gymnocalycium* plants from the Sierra Bayas must be correctly called *Gymnocalycium platense* (Spegazzini) Britton & Rose.

*G. schroederianum* Osten was described with the following type: J. Schröder, 4.1922 (Herbarium C. Osten 16-873) from Uruguay, Distr. Rio Negro, Nueva Mehlen (Osten 1941). Its differences in morphology compared with *G. platense* are slight, despite the fact that their localities are far away from each other and despite their ecologically highly dissimilar soils and vegetations.

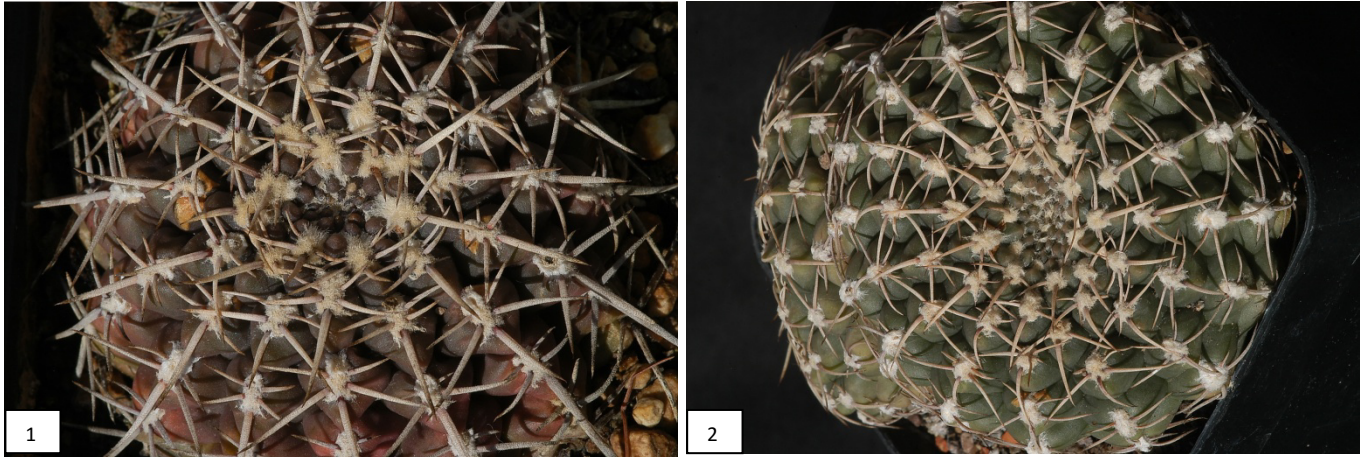


Fig. 1-2 *Gymnocalycium platense* subspec. *schoederianum* SNE 04-2, north of Gualeguaychú

In 1987 Kiesling described two new subspecies of *G. schroederianum* (Kiesling 1987). According to his information one of these can be found in the Sierra Bayas and is called *G. schroederianum* subspec. *bayense* Kiesling. Spination and flower features as well as locality are completely identical with the characteristics of *G. platense*. During a thorough investigation of the surroundings of Olavarria (Sierras Bayas, Cerros Dos Hermanas, Cerro La China, Sierra Chica, Loma Negra) only one *Gymnocalycium* species, *G. platense*, could be discovered. Thus *G. schroederianum* subspec. *bayense* must be regarded as a more recent synonym of *G. platense*.



Fig. 3 *Gymnocalycium platense* subspec. *platense* GN 289-969, Sierras Bayas  
Fig. 4 *Gymnocalycium platense* subspec. *platense* WP 112/149, Sierras Bayas

The second subspecies described in this publications is *G. schroederianum* subsp. *paucicostatum* Kiesling from the northern distribution area of the species. The type deposited by Kiesling (A. Schinini & all. 21678) was collected on the banks of the river Arroyo Mocoletá (Prov. Corrientes, Dept. Curuzú Cuatiá) in 1981. This subspecies differs notably from the normal form in its very long radial spines pointing upwards.



Fig. 5-6 *G. platense* subsp. *paucicostatum* (origin: seed R. Kiesling)

Together with the subspecies *paucicostatum* and *bayense* the subspecies *schroederianum* forms a very close and undisputed unit, although their habitats are disjunct. As to their morphological features, only marginal differences can be noticed. Variability within the individual subspecies is also very small.



Fig. 7-9 Flower sections: subsp. *platense* (l), subsp. *schroederianum* (m), subsp. *paucicostatum* (r)

As already elaborated in the preliminary studies (Papsch 2015) the localities of the subspecies *bayense* are situated around Olavarria, where they grow on low, isolated and stony hills.

The localities of the subspecies *schroederianum* stretch in north western direction along the Rio Uruguay for some kilometres, beginning on the Argentine side of Gualeguaychú and on the facing Uruguayan side of the river as far as the area around Nuevo Berlin.

The distribution area of the subspecies *paucicostatum* seems to be enclosed by the line Rio Mocoletá, Paso Yunque, Perugorria, Rio Mirinay. Just like the subspecies *schroederianum*, this subspecies also grows on flat alluvial banks of fine sand along rivers.

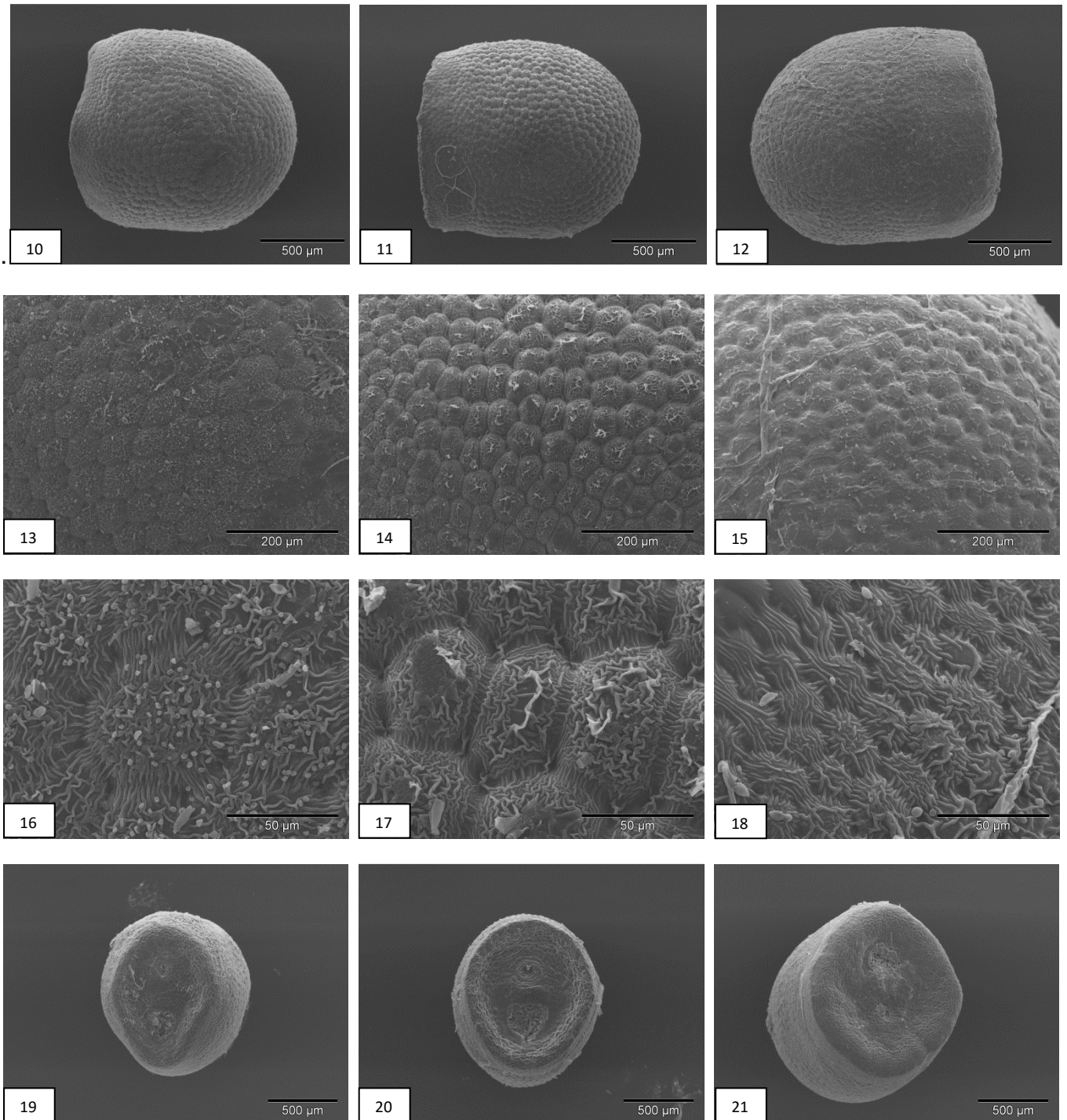


Fig. 10-21 Seed from subspec. *platense* WP 112/149 (l), subspec. *schroederianum* HU 89 (m), and subspec. *paucicostatum* LB 960 (r): total view X30; Testa X200, Testa X800, Hilum X80 (top to down) (SEM's Mag. Michael Pinter).



The areals of the individual subspecies are, according to present knowledge, distinctly separate units, each of which is coherent. The distance between the habitats of *G. platense* subsp. *platense* and those of the subspecies *schroederianum* amounts to almost 500 km. Further north a distance of about 300 km separates the closest localities of the subspecies *paucicostatum*, Paso Yunque, from those of the subspecies *schroederianum*. So far there is no knowledge as to the existence of possible subspecies-connecting populations in the areas in between.

## CONCLUSION

The awareness that *G. schroederianum* subsp. *bayense* is a synonym of *G. platense* and thus the oldest name in this group requires adjustments of nomenclature. Following the rules of ICBN the subspecies *paucicostatum* and *schroederianum* must be placed close to *G. platense* as subspecies.

### ***Gymnocalycium platense*** (Spegazzini) Britton & Rose subsp. ***platense***

Basionym: *Echinocactus platensis* Spegazzini, Contribucion al Estudio de la flora de la Sierra de la Ventana: 28-29 (1896).

Neotype: Argentinien, Prov. Buenos Aires, Pdo. Olavarria, Sierras Bayas, leg. W. Papsch WP 112/149 (BA, neo).

Synonyms:

*Gymnocalycium schroederianum* subsp. *bayense* Kiesling; Two new subspecies of *Gymnocalycium schroederianum*. - Cactus and Succulent Journal (US) 59(1): 48-49 (1987). Type: R. Kiesling & A. G. Lopez 4323, 07.1981, Argentinien, Prov. Buenos Aires, Dept. Olavarria, Sierras Bayas (SI, holo).

*Gymnocalycium hyptiacanthum* sensu Papsch nom. illeg., Die pampinen *Gymnocalycien* 3: *Gymnocalycium hyptiacanthum* (Lemaire) Britton & Rose. - *Gymnocalycium* 14(1). 385ff (2001).

### ***Gymnocalycium platense*** subsp. ***schroederianum*** (Osten) Papsch comb. et stat. nov.

Basionym: *Gymnocalycium schroederianum* Osten, Notas sobre Cactaceas. - Anales del Museo de Historia Natural de Montevideo, 2.Ser. 5(1): 60, pl. XLIX-L (1941).

Type: J. Schröder, 4.1922, Uruguay, Distr. Rio Negro, Nueva Mehlen, Herbarium C. Osten 16-873.

Synonyms:

*Gymnocalycium hyptiacanthum* subsp. *schroederianum* Papsch nom. illeg. Die pampinen *Gymnocalycien* 3: *Gymnocalycium hyptiacanthum* (Lemaire) Britton & Rose. - *Gymnocalycium* 14(1). 385ff (2001).

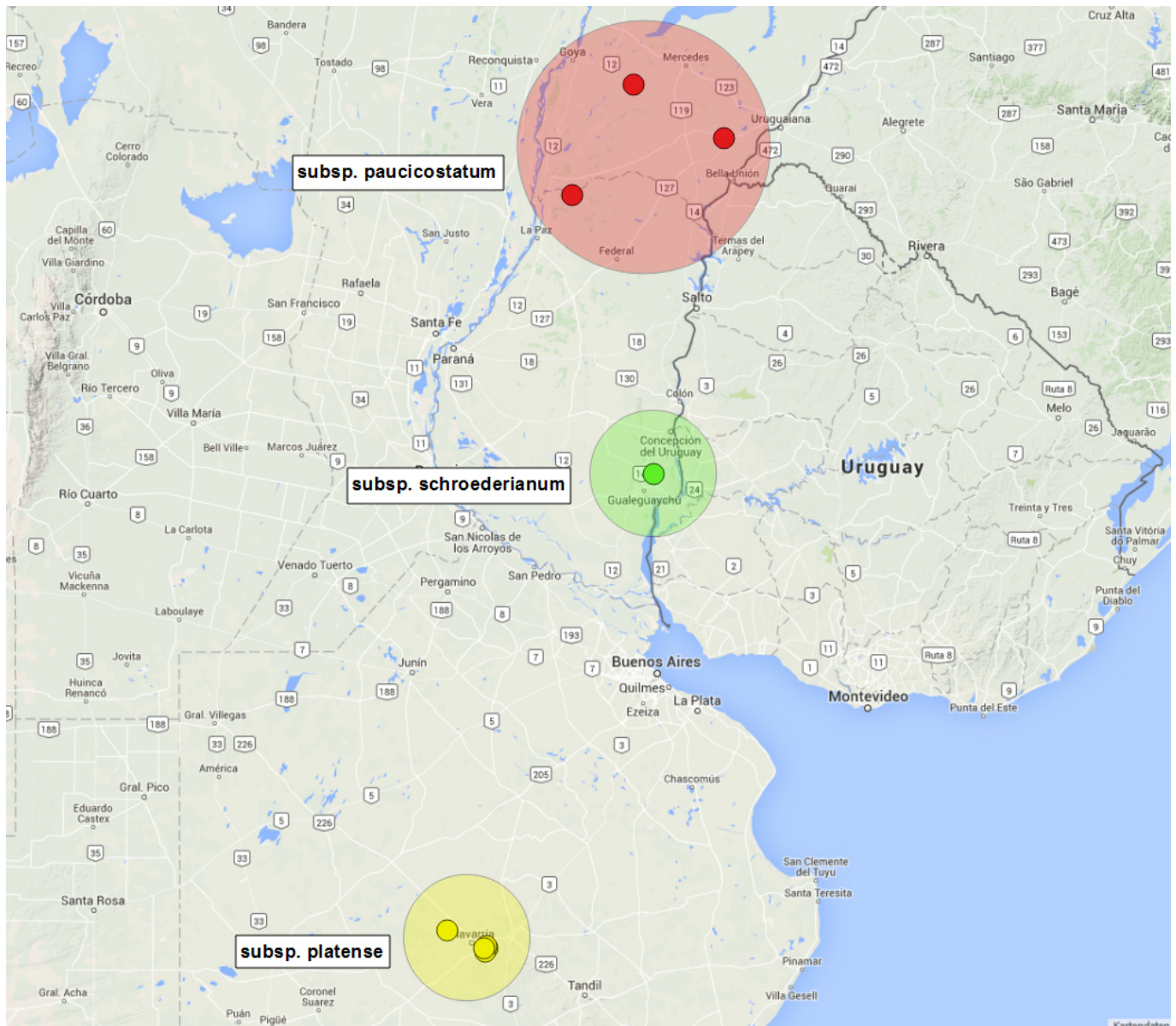
### ***Gymnocalycium platense*** subsp. ***paucicostatum*** (Kiesling) Papsch comb. nov.

Basionym: *Gymnocalycium schroederianum* subsp. *paucicostatum* Kiesling; Two new subspecies of *Gymnocalycium schroederianum*. - Cactus and Succulent Journal (US) 59(1): 49 (1987).

Type: A. Schinini & all. 21678, 12.11.1981, Argentinien, Prov. Corrientes, Dept. Curuzu Cuatia, Arroyo Mocreto (SI, holo). Prov. Corrientes, Dept. Paso de los Libres, Rio Mirinay, 16.11.1979, A. Schinini 17.288 (SI, para), Prov. Entre Rios, Dept. Federacion, Ea. Buena Esperanza, 25.10.1961, T. M. Pedersen 6274 (SI, para).

Synonyms:

*Gymnocalycium hyptiakanthum* subsp. *paucicostatum* Papsch nom. illeg. Die pampinen Gymnocalycien 3: *Gymnocalycium hyptiakanthum* (Lemaire) Britton & Rose. - *Gymnocalycium* 14(1). 385ff (2001).



Map 1 Distribution of *G. platense* and its subspecies (map: Mario Wick)

## ACKNOWLEDGEMENT

I am grateful to M.A. Michael Pinter, Graz, for providing the scanning electron microscope pictures of the seeds.

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Fig. 22 *G. platense* subsp. *schroederianum* WP 249/528, north of Gualaguaychú

## ***Gymnocalycium pugionacanthum* Backeberg ex H. Till, 1987. Designation of an epitype.**

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### **ABSTRACT**

**The identity of *Gymnocalycium pugionacanthum* was discussed. Based on an accurate analysis of the photograph that accompanied the first (invalid) description, the holotype of uncertain geographical origin deposited by H. Till, and living plants belonging to the original shipment by Fehser from Argentina, it is demonstrated that the name must be applied to the *Gymnocalycium* species that grows on the Cuesta de Belén and surrounding hills. An epitype from that locality is therefore deposited to support the holotype. The species is emended and remarks on its distribution, ecology and variability of the natural populations are added.**

### **INTRODUCTION**

During meetings of the Gymno-group held in Carmagnola (Italy) in July 2013 and Eugendorf (Austria) in March 2015, the taxonomic and nomenclatural status of *Gymnocalycium pugionacanthum* Backeberg ex H. Till, 1987, was discussed.

The name *G. pugionacanthum* was introduced by Backeberg (1966) for living plants in coll. Uhlig and Backeberg under number U 2148, that had been sent from Argentina by Fehser. No information about the collecting place was available to Backeberg, who hypothesized that the province of Cordoba was their place of origin. Backeberg added a photograph of a plant with two flowers (Backeberg, 1966: 570, Fig. 144, here reproduced, see Fig. 1). The name was invalid under art. 8 ICBN, since the cited type was a living plant. H. Till (1987) provided a validation of the name and, as the holotype, deposited a plant originating from the same collection that was used by Backeberg for his description. The holotype was digitized and we could examine a detailed photograph (Figs 5-7).

Comparing the photograph in Backeberg (1966) and the holotype, it is evident that the two plants are extremely similar, so we can confirm that the holotype is corresponding to the original invalid description and that it matches Backeberg's concept of the species.

A plant that was part of the same original shipment from Fechsler to Uhlig is still in cultivation. It was grown by B. Schweitzer and is presently in coll. Meregalli. During its long permanence in European cultivation this specimen has slightly lost its original characters, however the peculiar shape of the spines can still be observed (Figs 2-4).

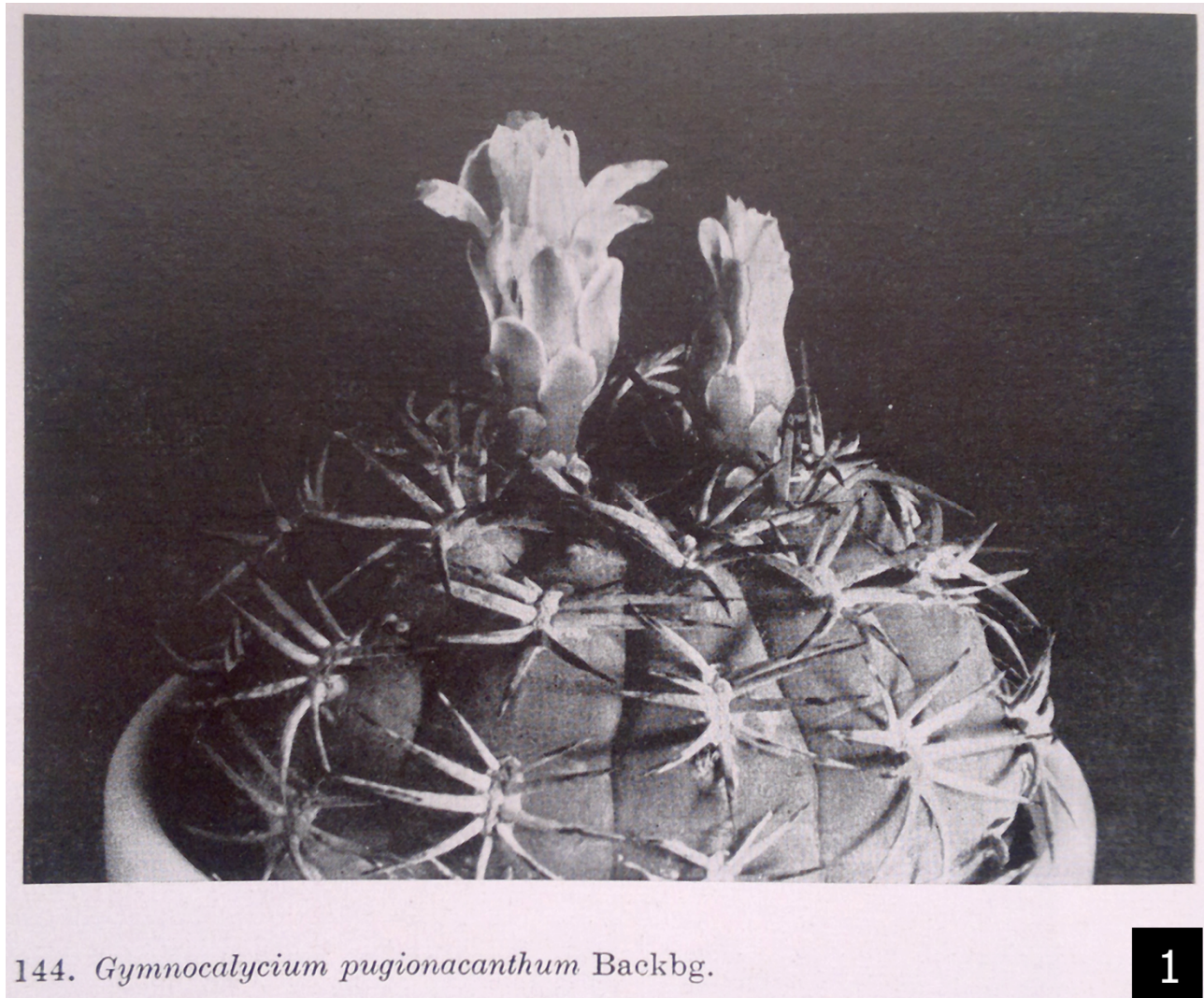


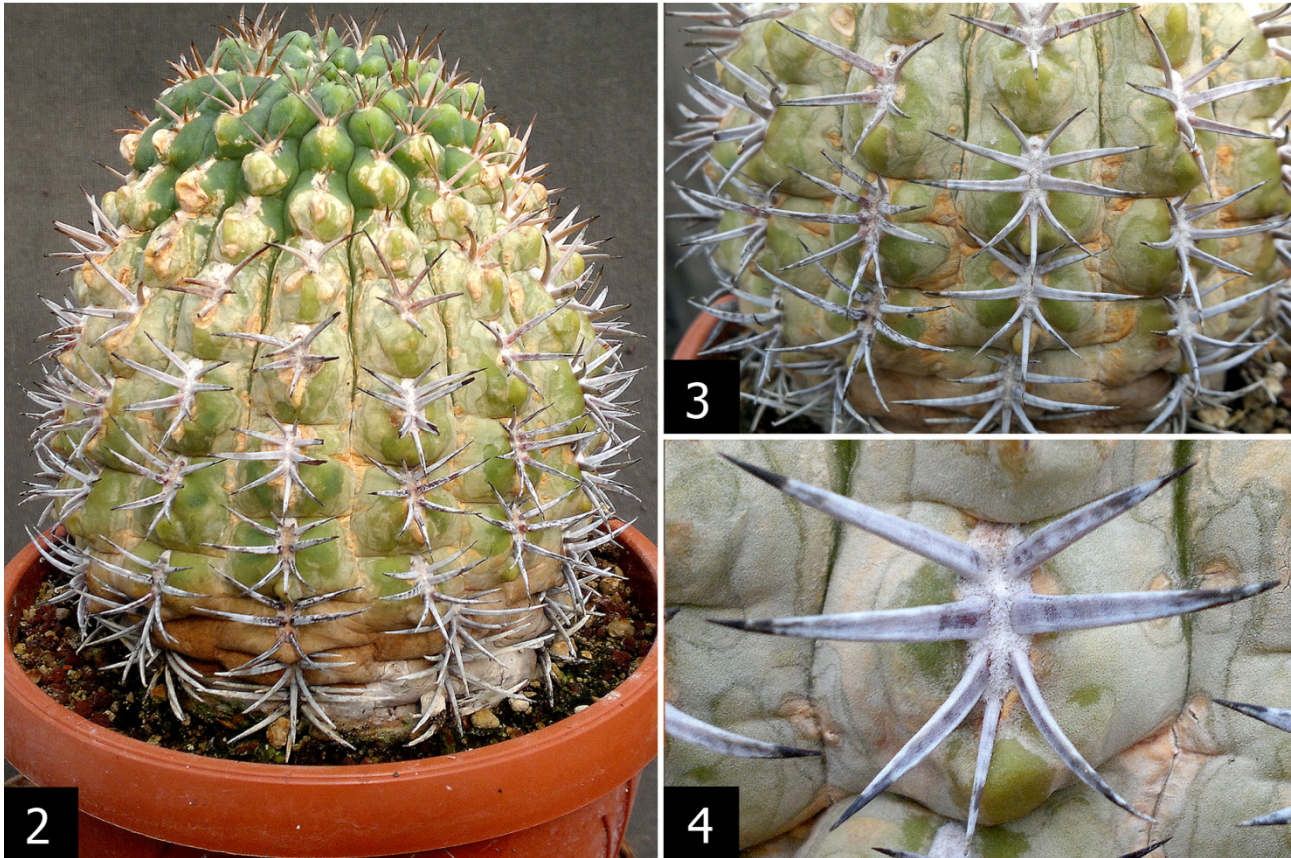
Fig. 1. The illustration of *G. pugionacanthum* originally published by Backeberg (1966).

**ORIGINAL DESCRIPTION** (Backeberg, 1966)

***Gymnocalycium pugionacanthum* Backbg. n. sp.**

Simplex, hemisphaericum, ad ca. 10 cm Ø; costis ca. 10, transverse sulcatis, ad ca. 2,5 cm latis, 8 mm altis; aculeis radialibus crassis, 9, fere adpressis, 10-20 mm longis, aliquid complanatis, primo nigris, postea cinereis vel in apice atratis; aculeis centralibus 0; areolis ca. 11 mm longis, 16 mm distantibus, sordide albidis; flore 4 cm longo, 4,5 cm lato; foliis perigonii exterioribus olivaceis, margine claro, interioribus albidis, in basi interiore fuscato roseis. exterioribus roseis; tubo 1,5 cm longo, glauco-olivaceo.

K. einzeln, halbrund, bis 10 cm Ø gesehen, kräftig blaugrün; Ri. ca. 10, mit dünner Querfurche, bis 2,5 cm br., 8 mm h.; Rst. sehr derb, fast anliegend, 4 Paare, rechts und links gerichtet, ein St. abwärts, alle 10-20 mm lg., etwas zusammengedrückt, zuerst schwarz, dann aschgrau oder oben noch geschwärzt; Mst. 0; Bl. 4 cm lg., 4,6 cm Ø; R. nur 1,5 cm lg.; Sep. olivgrün, weißrandig mit roter Spitze; Pet. hell grautonig-kremweiß, innere Basis bräunlichrosa, äußere mehr rosa; Stbl. krem; Stbb. mit oder ohne Pollen rosa. Blühte hier Ende April. - Nordargentinien (Córdoba?) (Koll. UHLIG und BACKEBERG, U 2148; von FECHSER gesammelt, ohne genauere Standortsangabe). (Abb. 144.)



Figs 2-4. *Gymnocalycium pugionacanthum*, original plant sent from Argentina by Fechser to Uhlig. Body (Fig. 2), detail of the ribs (Fig. 3), old areole with spines (Fig. 4).

### **English translations**

#### *Latin description:*

Body simple, hemispherical to ca. Ø 10 cm; ribs ca. 10, transversely furrowed, to ca. 2,5 cm broad, 8 mm high; lateral spines thick, 9, almost appressed, 10-20 mm long, somewhat flattened, at first black, then grey or black at the apex; Central spines: 0; areoles ca. 11 mm long, 16 mm apart, dull whitish; flowers 4 cm long, 4,5 cm wide; perianth segments olive green outside, with bright edge, whitish inside, the inside base dark rose. outside rose; the pericarpel 1,5 cm long, grey-olive.

#### *German description:*

Body single, semi-circular, to 10 cm Ø seen, strong blue-green; ribs approximately 10, with a thin cross-furrow, to 2.5 cm broad, 8 mm high; lateral spines very rough, almost appressed, 4 pairs, directed right and left, one spine downward, each 10-20 mm long, somewhat

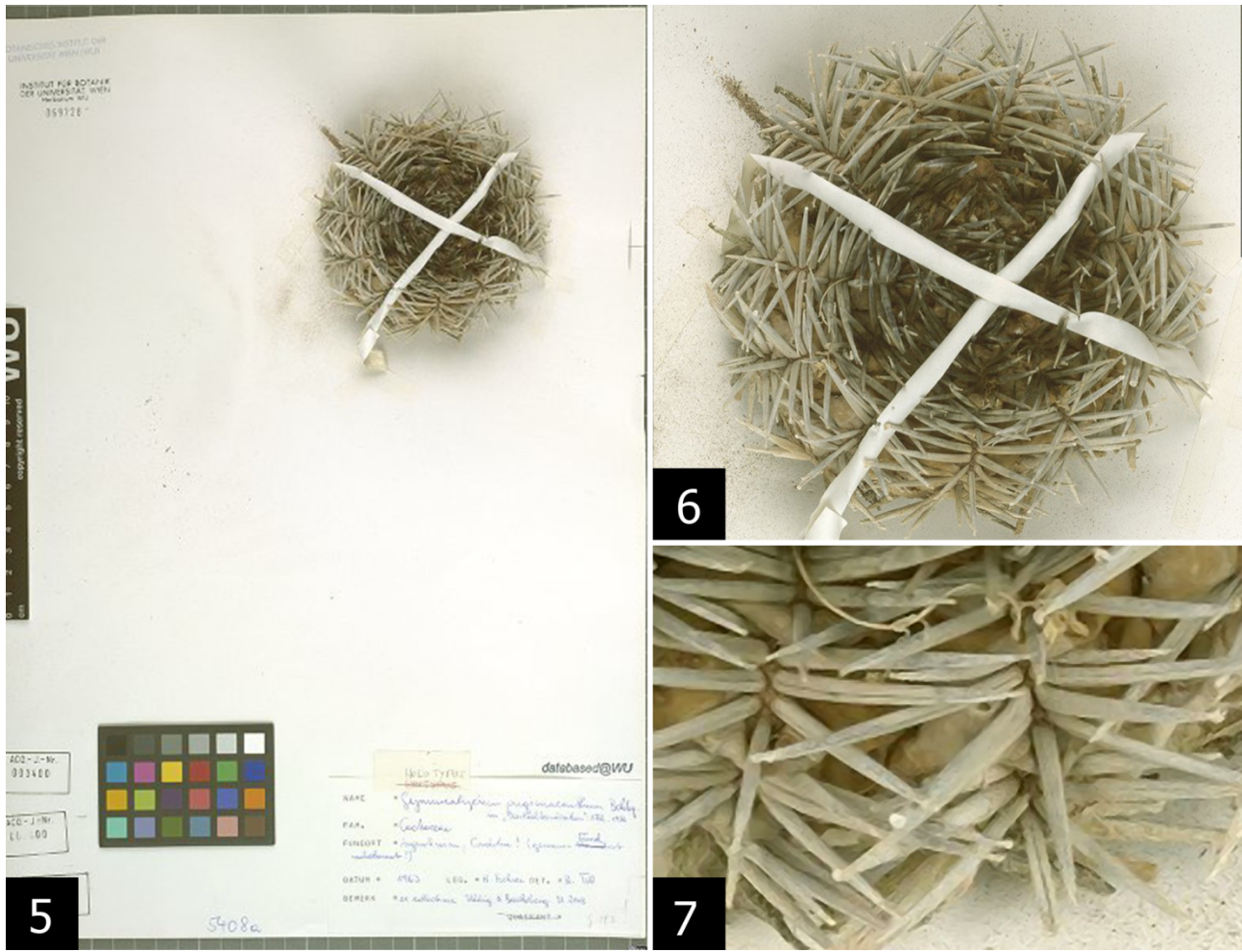
compressed, at first black, then ash or even blackened towards the top. Central spines 0. Flower 4 cm long, 4.6 cm Ø; pericarpel 1.5 cm long; sepals olive green, white margins with red tip; petals bright grey shade - cream white, inner base brownish pink, outer longer pink; filaments cream; anthers pink with or without pollen. Flowering late April here. - Northern Argentina (? Córdoba) (Coll. UHLIG and BACKEBERG, U 2148; collected by FECHSER, without exact location specified) (Fig. 144.)

**Typification by H. Till (Till, 1987)**

***Gymnocalycium pugionacanthum*** Backeberg ex H. Till spec. nov.

Kakteenlexikon: 172, Abb. 144 (1966); nom. non valid. publ.

Holotypus: H. FECHSER s. n., Argentinien, Prov. de Córdoba (?), 1963, cult. in coll. H. TILL sub U 2148 ex coll. K.-H. UHLIG & C. BACKEBERG (WU), Isotypi: I. c., cult. HT 622 (WU) und HT 623 (WU). - Holotypus als Herbar, Isotypi als Alkoholpräparate.



Figs 5-7. The holotype deposited by H. Till and conserved at WU. The original sheet (Fig. 5), the plant deposited as the holotype (Fig. 6) and detail of the spines (Fig. 7).

**Application of the name to a natural population.**

In absence of any geographical indication, including the holotype, the question of the application of the name *pugionacanthum* to a natural population remained unsolved even after the formal validation of the epithet.

Two years after the validation of the name, Till (1989) examined and described plants more recently collected and referred them to *G. pugionacanthum*. Again he did not explicitly give a precise locality, saying only "Northern part of La Rioja province", but he added a photograph of the habitat. The photograph depicts the rocky hill that is found when the road going westwards from Anjullón crosses the Rio de la Punta (exactly at 28°44.438'S 66°47.459'W). Following this indication, some of the plants from this area, south-west of Udpinango, started being identified as *G. pugionacanthum*.

However, at a close analysis, these plants do not match either Backeberg's description and the few original Fehser's imports still in cultivation, or the holotype of *G. pugionacanthum*. They are indeed part of the *G. hossei* complex.

However, already since Backeberg's times, other plants were usually identified as *G. pugionacanthum* in collections and seed lists. More recently, plants from Cuesta de Belén, a series of granite hills that are on the road between Andalgalá and Belén, in Catamarca province, became well known among collectors. Described as *G. catamarcense* forma *belense* H. Till & W. Till, 1995, these plants match to the highest detail Fehser's collections and the holotype of *G. pugionacanthum*.

The hills in the southern part of Cuesta Belén, where they are crossed by ruta 46, were extensively explored. They belong to the extreme southern part of the Cumbre del Venado. Specimens of *Gymnocalycium* are very common in this area. The typical characters of the plants are the strong, straight, rigid pectinate spines, often relatively short, light greyish on the proximal part and much darker on the distal half. A central spine is almost always absent. The body is strong and hard, with low ribs, and its colour is matt, dark greenish-grey, sometimes even with a purplish shade. The fruit is globose-rounded, and is covered with blue wax. Many of the plants seen in several localities along the Cuesta match quite well the holotype and Fehser's original imports. However, the variation is relatively conspicuous, and many plants were seen that have somewhat thinner and longer spines, slightly curved, with a lighter colour also towards the point. It seems thus that Fehser operated a selection on the plants that he sent to Backeberg and Uhlig, choosing the more extreme and peculiar ones regarding the spination. This was not unusual at the time, and it should be added that the form with extreme spination is also relatively common in this area, at least in part of it. Moreover, this is the most striking and peculiar type of spination in the whole genus *Gymnocalycium*, strongly different from all other species of the genus, thus it is not surprising that these were the plants more interesting for the European collectors. Also the plants that had longer, lighter and thinner spines, collected in the same localities, may have been sent to Europe, but they were probably referred to *G. hybopleurum* and sold as such by the European nurseries.

Considering the equivocal application of this name, the absence of any geographical indication of the plant chosen as the holotype, the complete concordance of the plants from Cuesta de



Belén with the original description and the holotype, we fix here the usage of the name by selecting a plant from Cuesta de Belén to be used as the epitype of *Gymnocalycium pugionacanthum* Backeberg ex H. Till, 1987, according to art. 9.7 ICBN. This plant supports the holotype deposited at WU.

***G. pugionacanthum*** Backeberg ex H. Till, *Kakteen and Sukk.* 38(8): 191. 1987

Typus: H. FECHSER, 1963, cult. in coll. H. TILL sub U 2148 ex coll. K.-H. UHLIG & C. BACKEBERG (WU).

Isotypi: l. c., cult. HT 622 (WU) und HT 623 (WU).

**Epitypus** (here selected): Argentina, Catamarca, Cuesta de Belén, 1100 m a.s.l., 27°46.107'S 66°46.241'W. Field number Tom 2007-290, adult plant grown from habitat-collected seeds (WU) (Fig. 8).

Synonym: *G. catamarcense* H. Till et W. Till ssp. *catamarcense* f. *belense* H. Till et W. Till, *Gymnocalycium* 8(1): 144. 1995.



Fig. 8. The plant selected as the epitype, before its preparation at the WU herbarium.

**Redescription** (adult plants in habitat).

Stem simple, globose, very old plants taller than broad, (80-)100-180(-200) mm in diameter; epidermis dull, dark green-brownish, matt; root showing a taproot, single or branched, deepened into the soil or strongly fixed in between stones; ribs in adult plants usually 10-15, up to more than 20 (23 ribs were counted on a large specimen); longitudinal furrows broad and moderately deepened, linear or weakly sinuated, transverse clefts moderately deepened, often scarcely distinct, tubercles usually moderately developed, low, occasionally with a scarcely prominent chin below the areoles, in a few plants (and in the dry season) ribs more compressed, with deeper longitudinal furrow and chins more developed and prominent, sub-acute; areoles broadly oval elongated, not embedded, with white or greyish wool, (12-)15-29(-35) mm apart; spines strong, (15-)20-30(-45) mm long, broadly flattened in section; lateral spines 3-4(-5) pairs, pectinate, straight or slightly bent or curved, often the upper pairs horizontally disposed, the lower pair generally oriented downwards oriented, sometimes spines more radially placed; spines sometimes barely crossing the nearest longitudinal furrow, usually reaching mid-width of the next rib, very seldom extended to the second rib on sides; downward directed spine (0)1, central spine 0 (very seldom 1), small and short upper spines 0 (seldom 1); young spines brownish, old spines light grey to almost whitish at base, dark or very dark on the distal third; flower bud with light pinkish scales; flower (Fig. 22) bisexual, 45-55(-65) mm long and 50 mm wide, funnel-form, perianth 1,5-2 times longer than pericarpel; pericarpel dark olive green to bluish, with semicircular scales, pinkish in outer part, bluish-olive green in inner part, perianth segments light creamy-pinkish, throat distinctly dark pink, walls thickened, greenish external part as wide as pink internal part, the two parts sharply separated; style yellow, reaching mid-length of the upper filament length, filaments yellowish, anthers pink; fruit oval, dull bluish, matt, 20-30 mm long and 12-18 mm wide with broad pinkish scales (Fig. 15); seed 0,9-1,1 mm long and 0.9-1 mm wide, dark reddish, matt, cells more or less regularly aligned in longitudinal rows, convex, slightly conical on the upper part, border of hilum regularly curved, barely but distinctly expanded laterally, hilum-micropylar-region broad, completely hidden by the very thick and dense spongy coating, thickened also on bridge separating hilum from micropyle.

**Distribution and variation.**

Researches in the area are not complete, and several hills have never been explored because of difficult access to them.

The investigations so far carried out were done mainly on the hills by side of Ruta 46. Several locations along the Cuesta de Belén were examined, as well as some hills along Ruta 46 westwards from Cuesta de Belén, and the south-eastern foothills of the Cumbre del Venado eastwards from Cuesta de Belén. Even though not all the possible habitats were explored, no plants closely matching the type form of *G. pugionacanthum* were seen in more distant locations of the region.

Figs 9-16 (next page). *Gymnocalycium pugionacanthum*, Cuesta de Belén. Fig. 9: Habitat (Tom 290). Figs 10-16: Plants in habitat (Figs 10, 12: Tom 290. Fig. 11: MM 1514. Figs 13-16: MM 957).



**Cuesta de Belén (the epitype locality)** (Figs 9-24).

All along the granite hills of the southern part of Sierra de Belén and Cumbre del Venado, by side of Ruta 46, *G. pugionacanthum* is widespread and often rather common, with a good population structure and apparently a relatively good regeneration rate, as demonstrated by the presence of some old to very old plants, together with many medium sized specimens and some young seedlings - these last, however, were not present (or were not seen) in some of the explored parts of the hills.

Most of the plants grow in the shade of small shrubs belonging to the dominants of the Monte eco-region such as *Zuccagnia punctata*, *Larrea* spp. (*L. cuneifolia* and *L. divaricata*) (Morello, 1958; Morlans, 1995). These habitats (Jarillal, alluvial hills east of Cuesta de Belén, Fig. 9) are mostly seen along foothills and alluvial parts of the mentioned mountains or directly on foothills composed of granitic rocks with reduced jarillal vegetation, including *Deuterocohnia* spp. (Cuesta de Belén) and occasionally they can be found also in more exposed habitats, amidst stones and gravel, particularly in areas more steeply sloping, and with a southern orientation (reduced vegetation with deuterocohnias). These southern open parts of mountains are often very dry, in consequence of the higher temperature determined by the vicinity to the flat, drier and warmer area of the Salar de Pipanaco.

Variation is relatively conspicuous. Only a part of the plants match the very typical characters of the specimens that were seen in the Fechser's import depicted by Backeberg (Fig. 1), that is, short and strong, straight, perfectly pectinate spines, dark to very dark at the apex and whitish on the proximal half (Fig. 13 and in particular Figs 17-18) - thus confirming that very probably these plants were a selection of the most peculiar forms that were seen by Fechser. The plant that we have selected as the epitype matches pretty well the plant described and depicted by Backeberg (1966) (Fig. 8).

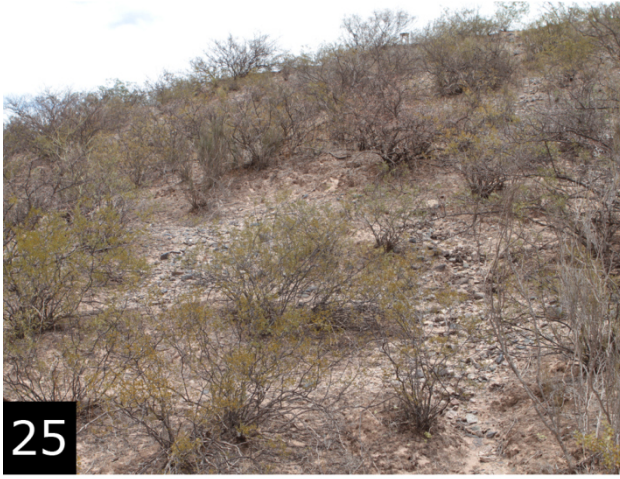
Obviously, there is a continuous variation in the shape of the spines, and also the colour of the body between the extremes. The plants at the opposite extreme show long spines, that are also lighter in colour, less flattened and slightly curved, even though they are generally rather strong. These plants often have a lighter coloured epidermis. We could observe two plants showing the opposite extremes of spination growing side by side (Fig. 16). The majority of the plants that were seen are similar to the typical form, with flat and more or less pectinate spines, that are anyway longer, less dark in colour towards the top, and at least a little more curved.

**Hills between Cuesta de Belén and Belén** (Figs 25-32).

Ruta 46, between Cuesta de Belén and Belén, runs amidst flat alluvial plains and some low alluvial-rocky hills, only a few meters high, with the same type of habitat as in Cuesta de Belén (Fig. 25). More populations of *G. pugionacanthum* live in these hills. They show the same characters seen in the Cuesta de Belén, but they are slightly more uniform in spine length (Figs 26-28), always with some specimens showing the very typical characters of this species (Figs 29, 31-32). However, plants with longer and thinner spines, suberect, are sometimes present (Fig. 30).

Figs 17-24 (next page). *Gymnocalycium pugionacanthum*, Cuesta de Belén. Figs 17-21: Plants in cultivation (MM 957). Fig. 22: Section of the flower of the plant in Fig. 21. Figs 23-24: Seedlings in coll. Kulhánek (Tom 290).

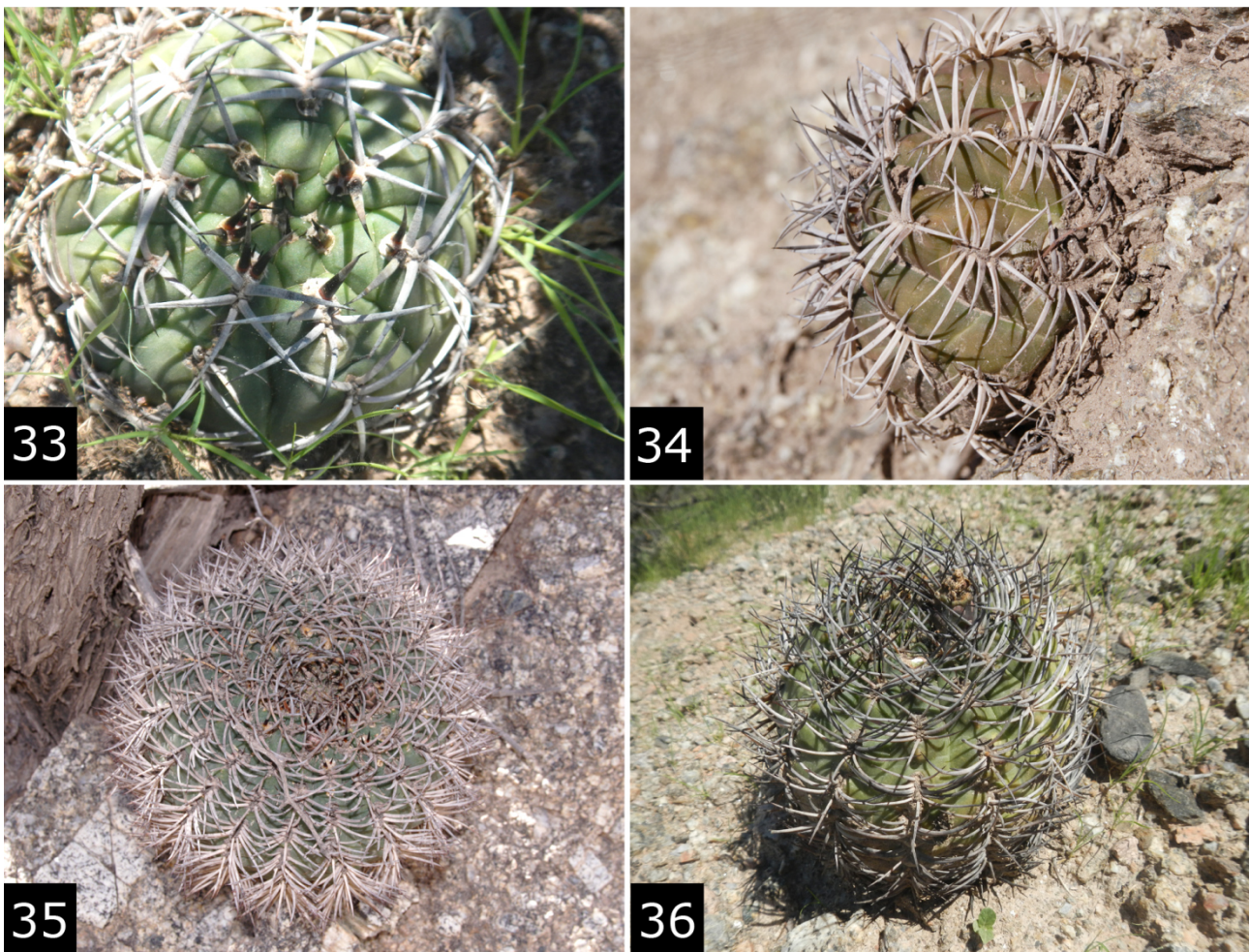




Figs 25-32 (previous page). *Gymnocalycium pugionacanthum*. Hills between Cuesta de Belén and Belén. Fig. 25: Habitat (Tom 706). Figs 26-30: Plants in habitat (Figs 26, 28-30: MM 958. Fig. 27: MM 1513). Figs 31-32: Plants in cultivation (MM 958).

**South-eastern slopes of the Cumbre del Venado (Figs 33-36).**

Ruta 46, north-east of Cuesta de Belén towards Andalgalá, runs along the foothills of the Cumbre del Venado. Plants of *G. pugionacanthum* are always present on the rocky places of the lowest slopes, but they are completely absent from the nearby alluvial or sandy plain. The farther away the plants are from Cuesta de Belén eastwards, the longer and less strong are the spines, and the lowest is the percentage of stronger-spined plants, referable to the description of *G. pugionacanthum*. Also the colour of the fruit is usually more greenish than bluish.



Figs 33-36. *Gymnocalycium pugionacanthum*, south-eastern foothills of Cumbre del Venado. Plants in habitat (Fig. 33: MM 1603. Figs 34-35: Tom 291. Fig. 36: MM 1638).

The typical form of *G. pugionacanthum* seems to be exclusively present along the southern and south-eastern slopes of the Cumbre del Venado, on the Cuesta de Belén, and on the low alluvial-rocky hills west of Cuesta de Belén (Fig. 37). About 20 km more north, along the western foothills of the Cumbre del Venado, on the left side of Rio Ampuyaco, plants almost identical to those

growing near the town of Belén, larger, with longer and thinner spines and green fruit, were found. These are excluded from the typical form of *G. pugionacanthum*.

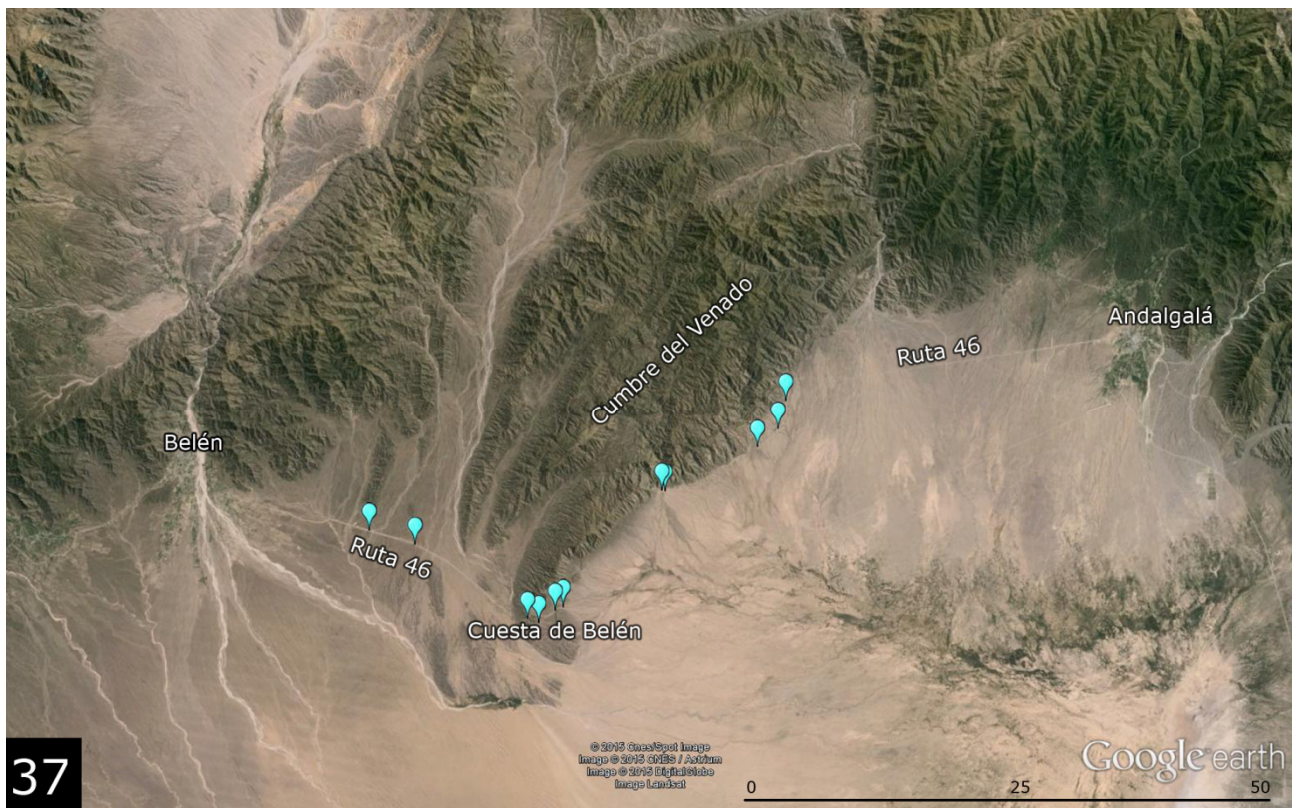


Fig. 37. Distribution of *Gymnocalycium pugionacanthum*. Map from Google Earth.

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#### **CITED FIELD NUMBERS.**

MM 957. Argentina, Catamarca, Ruta 46, Cuesta de Belén, 965 m

MM 958. Argentina, Catamarca, Ruta 46, 17 km East of Belén, 1135 m

MM 1513, Tom 12-706. Argentina, Catamarca, Ruta 46, 18 km East of Belén, 1145 m

MM 1514, Tom 12-707. Argentina, Catamarca, Ruta 46, Cuesta de Belén, 1040 m

MM 1603, Tom 07-291. Argentina, Catamarca, Ruta 46 km 165, 940 m

MM 1604. Argentina, Catamarca, Ruta 46, 950 m

MM 1638. Argentina, Catamarca, Ruta 46 km 153, 930 m

Tom 07-290. Argentina, Catamarca, Ruta 46, Cuesta de Belén, 1100 m

Tom 07-292. Argentina, Catamarca, Ruta 46, 52 km East of Belén, 892 m

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Figs 21-22: courtesy Andrea Funetta

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