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Cover picture: *Gymnocalycium ferrarii*, North of Villa Mazan, Prov. Catamarca, Argentina (photo: Massimo Meregalli)

## Editorial



### Dear *Gymnocalycium* enthusiast!

Every year the *Gymnocalycium* friends meet each other at international conferences in Eugendorf (Austria), Carmagnola (Italy) or in different cities of Holland and Germany, such as in Radebeul (Germany). For these meetings usually a main theme is set, and an intense discussion takes place about this theme. Among the participants there are often strongly divergent views on the treated plants with respect to their morphological expression or systematic assignment. In some rare cases, there are also species in which a broad range and high variability do not cause a significant diversity of opinion. For example the latter applies to *Gymnocalycium schickendantzii* and *Gymnocalycium saglionis*. Contrary to this opinion, the plants of the subgenus *Scabrosemineum* in the Argentine provinces of Catamarca and La Rioja, are somewhat "randomly" identified as *G. catamarcense* rather than *G. pugionacanthum*, *G. hossei*, *G. nidulans*, *G. guanchinense*, *G. glaucum*, etc. A glance at the literature shows the uncertainty of the botanical workers in their systematic classification but also for the correct taxonomic designation.

The meetings in Carmagnola are now trying to reduce this group with many described taxa using the literature, the knowledge of the field collectors and the observations of documented material. You can read the first results in this issue, Dr. Massimo Meregalli presents and summarizes the opinions drawn up and posted on *G. ferrarii*.

We would like to express our special thanks to Mr. Graham Charles (United Kingdom) and Brian Bates (Bolivia), who supports us with the English language, to Mr. Takashi Shimada (Japan), who translates *SCHÜTZIANA* into Japanese and to Mr. Daniel Schweich (France), who has mirrored our publication under: <http://www.cactuspro.com/biblio/>.

***Gymnocalycium*, subgenus *Scabrosemineum*,  
of the surroundings of Mazan  
(Argentina, provinces La Rioja and Catamarca).  
1. *Gymnocalycium ferrarii* Rausch 1981.**



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ABSTRACT:

The results of the VI Italian Gymno-day are presented. This first paper deals with *G. ferrarii* Rausch. After a short analysis of the description, the distribution is discussed and the differences with the other species sympatric with *G. ferrarii* are detailed and illustrated.

**Key words.** Cactaceae, taxonomy, distribution, Argentina

This is the first paper originating from the workshop held during the VI Gymno-Day, Carmagnola (Torino, Italy), July 27-29, 2012. The majority of participants took part in the discussion, with major contributions offered by, in alphabetical order, Ludwig Bercht, Graham Charles, Tomás Kulhanek, Massimo Meregalli, Detlev Metzger, Wolfgang Papsch and Bernhard Schweitzer.

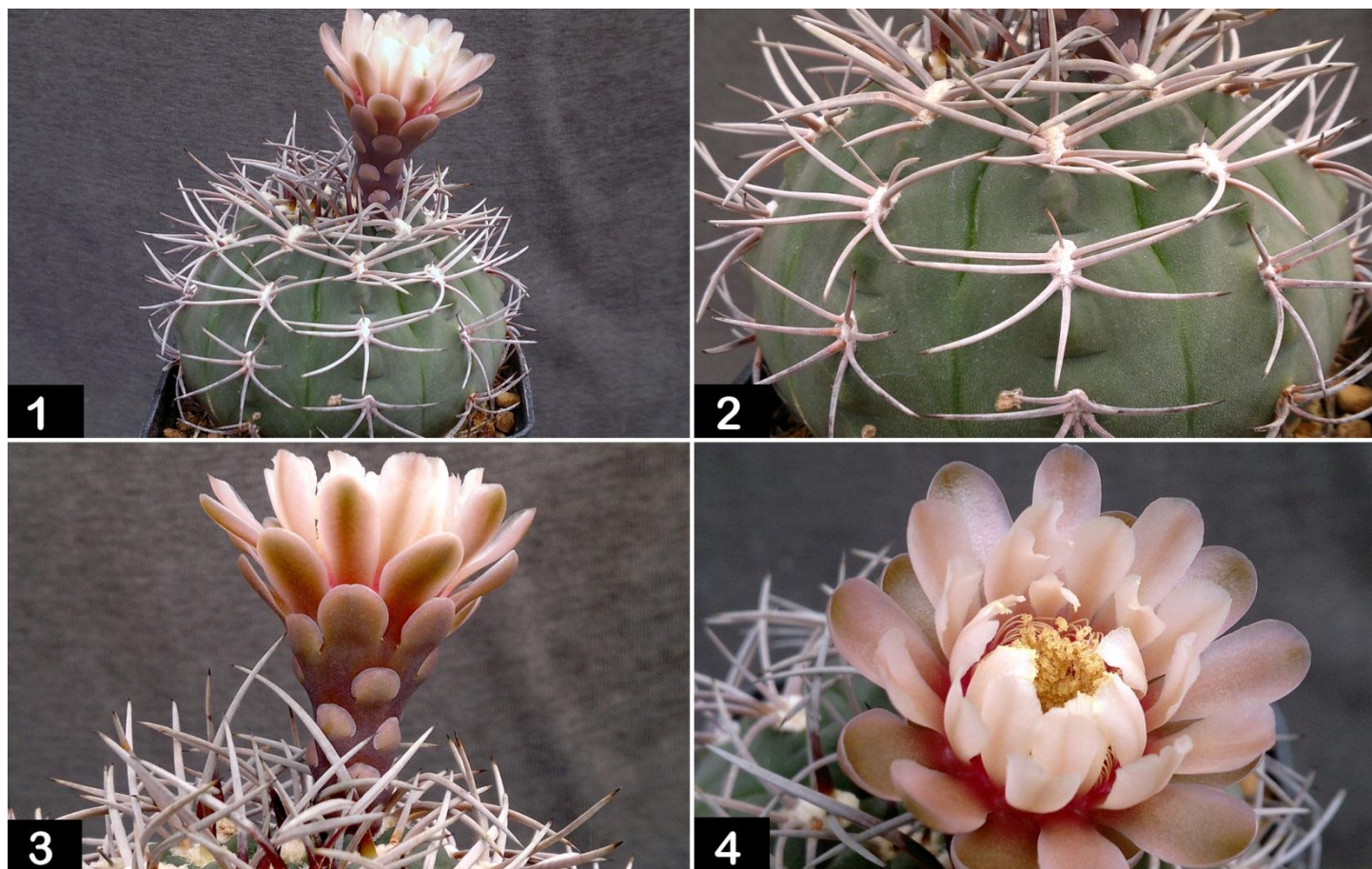
*Gymnocalycium ferrarii* Rausch, 1981 was described based on plants found in the surroundings of "Santa Theresa" [sic!, = Santa Teresita, north of Mazan, La Rioja, Argentina] (Rausch 1981).

The description was relatively good with regard to the vegetative and floral characters of the plant, but unfortunately Rausch did not supply any remarks about the fruit and seeds. He simply wrote "Frucht- and Samentypus wie *Gymnocalycium mazanense* Backeberg" (Fruit and seed type as in *G. mazanense*), a sentence which is indeed not correct. Moreover, the author, albeit recognizing that naming a new species from that region was risky, due to the presence of various forms of the *G. mazanense* group, did not add any comparative remarks useful to differentiate *G. ferrarii* from the

other taxa growing around Mazan. The new species was in fact not based on some morphologic trait, but rather on the growth habit, i.e., the plants growing nearly completely buried in the soil, so that only when in flower can they be seen ("Der hier beschriebene Typ unterscheidet sich von der anderen Formen dadurch, dass er ganz im Geröll vergraben wächst und ohne Blüten kaum zu finden ist", Rausch, 1981: 7). Fortunately, no other *Scabrosemineum* species live at the type locality, thus there are no doubts about the interpretation of this name.

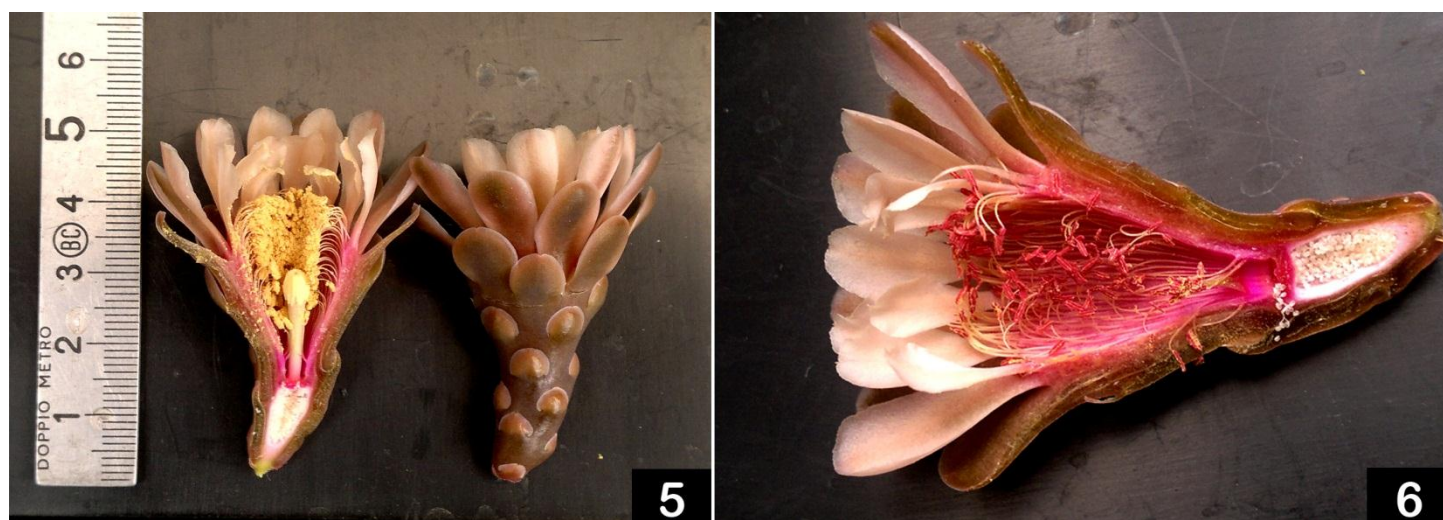
Later on, Rausch (1994) also added a "var. *elegans* Rausch & Kiesling", which however was never described and thus remains a *nomen nudum*.

In the last available complete checklist of the genus (Charles 2009) *G. ferrarii* is referred to a subspecies of *G. glaucum* Ritter, as *G. glaucum* subsp. *ferrarii* (Rausch) G.J. Charles. Phylogenetic relationships among the *Scabrosemineum* species are far from being understood, and molecular studies have so far been unable to differentiate with a statistical support clear-cut species-groups in the subgenus (Meregalli & al., 2010; Demaio & al., 2011). Simply based on a morphological approach, it appears likely that *G. glaucum* and *G. ferrarii* are indeed closely related and may well be considered as subspecies of a single species. However, for the scope of this paper *G. ferrarii* is considered as a valid species.



Figs 1–4. *Gymnocalycium ferrarii* "sp. Santa Teresa", ex Koehres seeds #4035.





Figs 5–6. *Gymnocalycium ferrarii* "sp. Santa Teresa", ex Koehres seeds #4035. Flower section (5); anthers without pollen (6).

Plants and seeds of a "*Gymnocalycium* sp. Santa Teresa" had previously been available to collectors (Figs. 1–6), so, after Rausch's description, the species living in the hills north of Mazan, on the road to Santa Teresita, was identified as *G. ferrarii*. Lacking any character useful to differentiate *G. ferrarii* from other species, collectors who visited the region used the name *G. ferrarii* almost exclusively for plants from the type locality and the immediate surroundings of Mazan. The specimens from different localities were generally referred to other species, such as *G. hossei* F. Haage, *G. mazanense* (Backeberg) Backeberg, *G. nidulans* Frič ex Backeberg, *G. weissianum* Backeberg, etc.







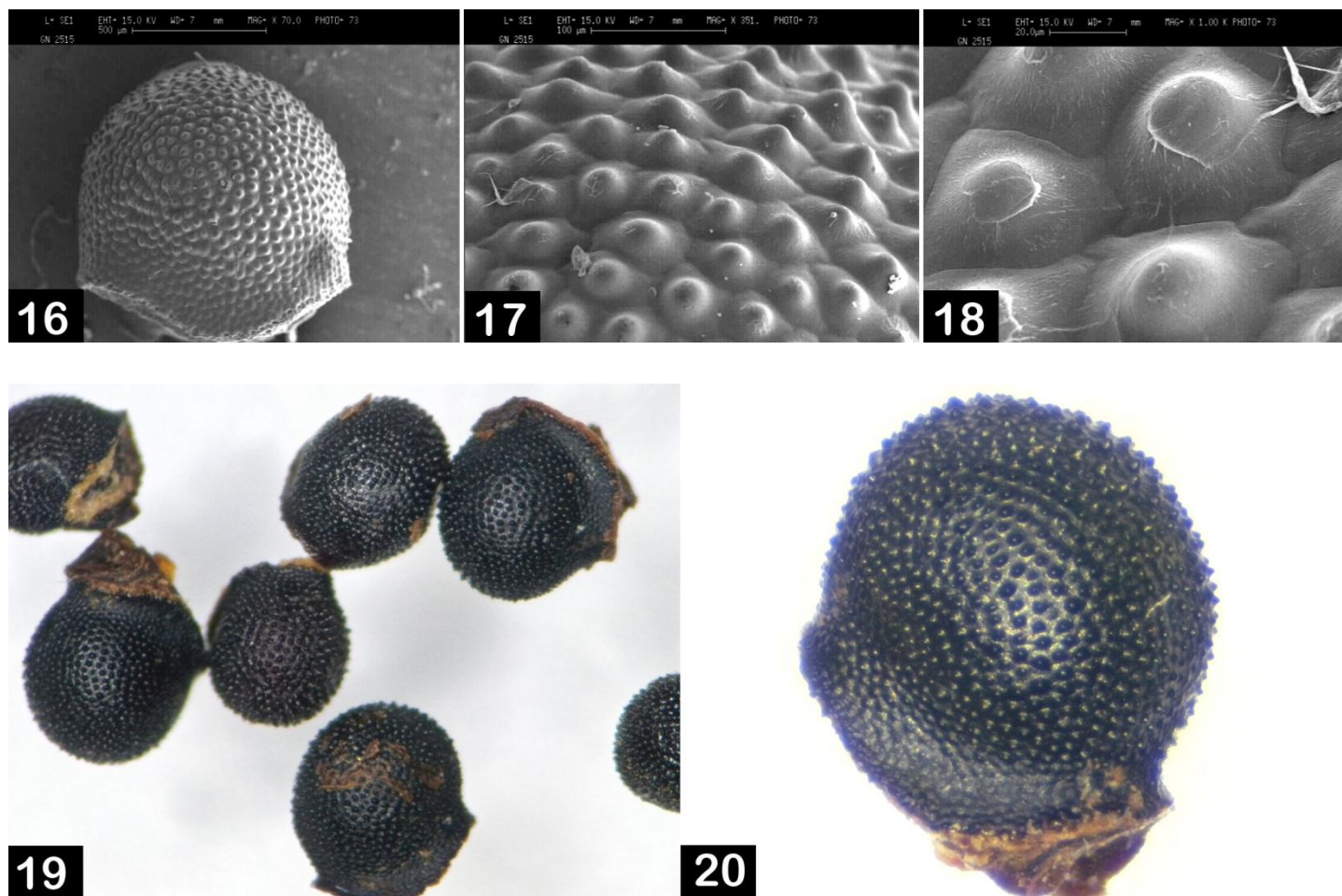
Figs 7–15. *Gymnocalycium ferrarii* MM 943, hills north of Mazan. The hills from the road to Santa Teresita (7, previous page). Close view of a hill with shrubs of *Tephrocactus* (8). *Gymnocalycium ferrarii* in habitat (9–13). Plants in cultivation (14–15).



**Original description.** English translation (from Charles, 2009): Simple, flattened-globular, 30–40 mm high, and 90 mm diameter, greenish–grey, with a turnip-like root up to 15 cm long. Ribs 10–14, vertical, wavy, humps under the areoles protruding chin-like. Areoles sunken, sitting in the humps, oval, up to 7 mm long, grey felted, late becoming bald. Radial spines porrect, in 3 pairs, all slightly curved, up to 30 mm long, awl-shaped, thicker at the base, brown to blackish, later becoming grey, the top most pair and the single one at the bottom are a little weaker. Flowers 45 mm long, 35 mm diameter. Ovary skittle shaped, up to 10 mm long, tube yellowish-green, with wide whitish-pink scales, outside petals round, dirty pink with a brownish-green central stripe, inner petals round and ragged, whitish pink with a pink central stripe. Throat pink. Filaments whitish-pink, anthers yellowish-white. Fruit and seed-type the same as *Gymnocalycium mazanense* Backeberg. Habitat: Argentina, Catamarca, near Santa Theresa, on the rough stony sandy hillsides.

The description can be amended here with data on the fruit and the seed:

**Fruit** oblong-globose, about 15 mm long and 10-12 mm wide, epidermis covered with bluish to dark pinkish or blue-greenish wax, scales light yellowish, semicircular or transverse



Figs 16–20. Seeds of *Gymnocalycium ferrarii* GN 2515, near Santa Teresita SEM (16–18, SEM). Seeds of *Gymnocalycium ferrarii*, STO 238, east of Mazan (19–20, optical microscope).

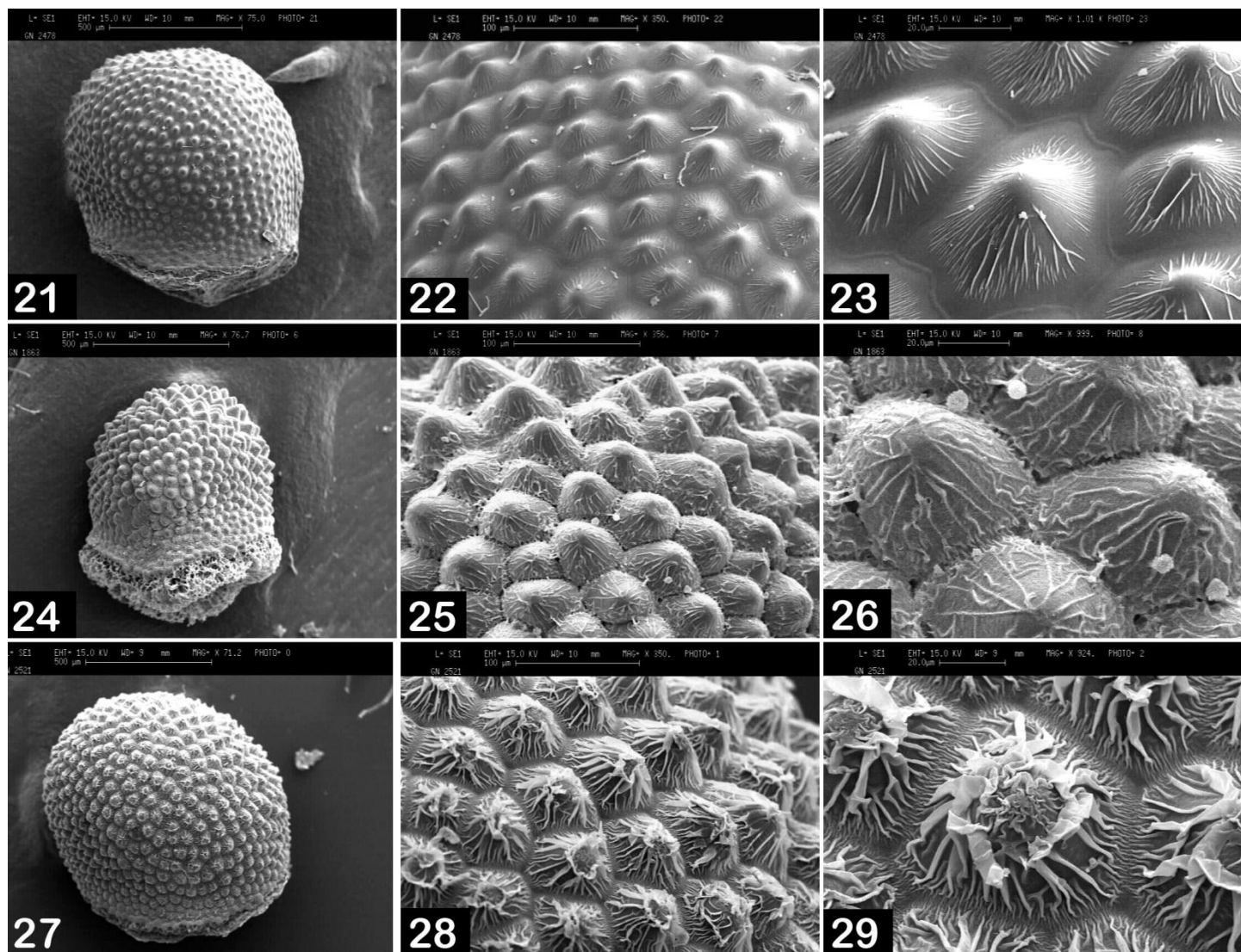


**Seed** (terminology following Barthlott & Hunt, 2000) broadly oval, about 1 mm diameter, reddish-brown to dark brown, usually glossy or near-glossy, seldom scarcely glossy, periphery not differentiated, testa border slightly expanded around hilum, cells isodiametric, irregularly polygonal, size nearly uniform, only slightly smaller near hilum, boundary relief inconspicuous, irregularly curved; periclinal walls convex, low-domed, anticlinal field flat so that periclinal walls are very clearly isolated from each other; cuticular striation very shallow or nearly absent, when present composed of radial striae along the convexity of the periclinal wall and absent from centre; hilum-micropilar region basal, medium-sized, narrowly oval to elliptical, strophiolar pad of spongy tissue scarce to very scarce.

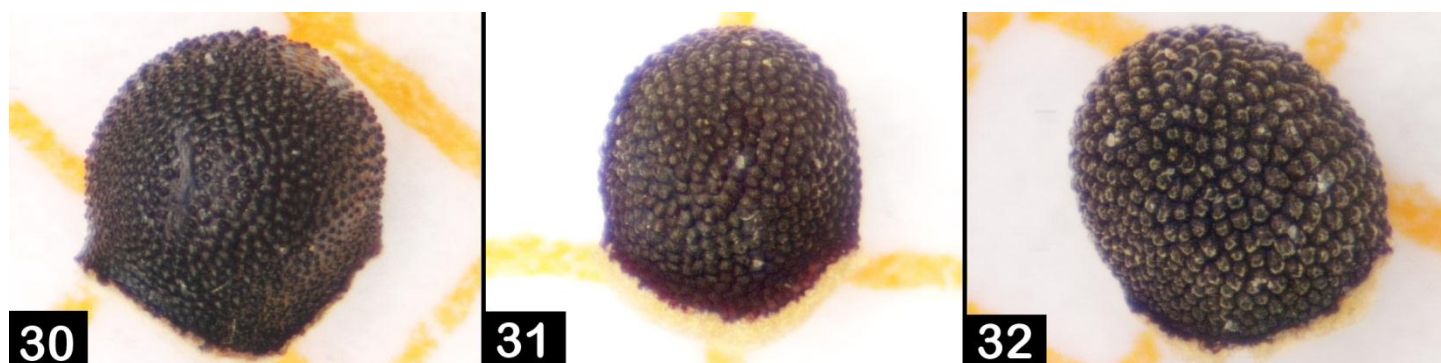
Contrary to what was stated by Rausch, the seed of *G. ferrarii* shows very peculiar characters that allow a positive identification of this taxon with respect to all the other *Scabrosemineum* from the Mazan and Sierra de Ambato region (see Figs. 16–32). It is the only seed with a near-glossy surface, the glossiness due to the very scarce and thin cuticular striation of the testa cells, and they are characterized also by the nearly flat anticlinal field, particularly near the cell boundaries, so that the cells appear reciprocally isolated. In *G. hossei* and *G. ambatoense* the periclinal walls are high-domed, and convexity arises from the cells' boundaries, with evenly convex anticlinal field; the cuticular striation is very thick, usually distinctly folded, even on the central, convex part of the periclinal walls. The testa border in the latter two species is significantly expanded, and distinctly curved to sub-angular in its median part; hilum is oval to elongate, and the strophiolar pad of spongy tissue is thick to very thick. In some respects, the seed of *G. ferrarii* approaches that of *G. castellanosi* Backeberg, also characterized by a typical glare. However, these similarities are not due to true phylogenetic relationships, and, in detail, *G. castellanosi* has par-convex testa cells, with nearly flat periclinal wall, and with a raised central papilla.

Due to the presence of other, previously described, species of this group around Estación Mazan, namely, *G. hossei*, *G. mazanense*, *G. nidulans*, *G. weissianum*, one might question whether *G. ferrarii* was really the first name to be applied to this taxon. This question will be addressed in the second part of the article, which will take into account the other names assigned to plants from this region. In the present paper it is enough to say that it is impossible to differentiate *G. ferrarii* from the other species of this group without knowledge of the seed, but unfortunately a detailed description of the seed was never provided in the protologues. Seeds of plants of undocumented origin, but distributed as seeds of a "*G. hossei* type" - so possibly seeds of plants that, more or less directly, originate from the old original *G. hossei* were examined, and they do not belong to *G. ferrarii*.





Figs 21–29. SEM photos of seed of *Gymnocalycium ferrarii* GN 2478, Cuesta Sébila, 900 m (21–23); *Gymnocalycium* cf. *ambatoense* GN 1863, Cuesta Sébila, 1090 m (24–26); *Gymnocalycium hossei* GN 2521, Sierra Mazan, 43 km S of Mazan (27–29).

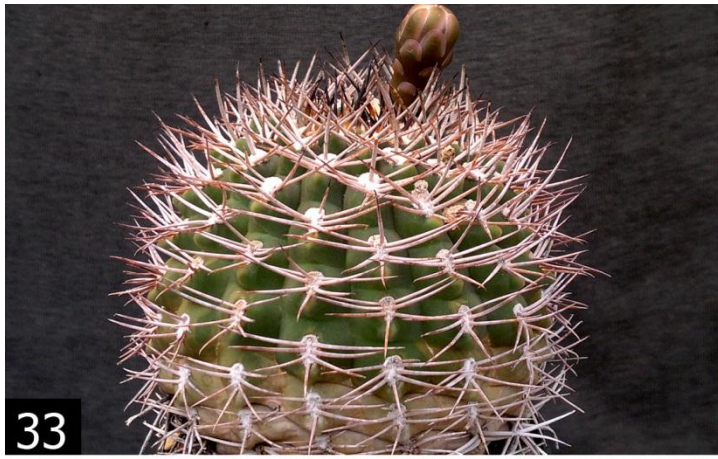


Figs. 30–32. Seeds from optical microscope of *Gymnocalycium ferrarii* GN 1848, Cuesta Sébila (30). *Gymnocalycium* cf. *ambatoense*, GN 1861, Cuesta Sébila (31); *Gymnocalycium hossei* GN 2521, 43 km South of Mazan (32).



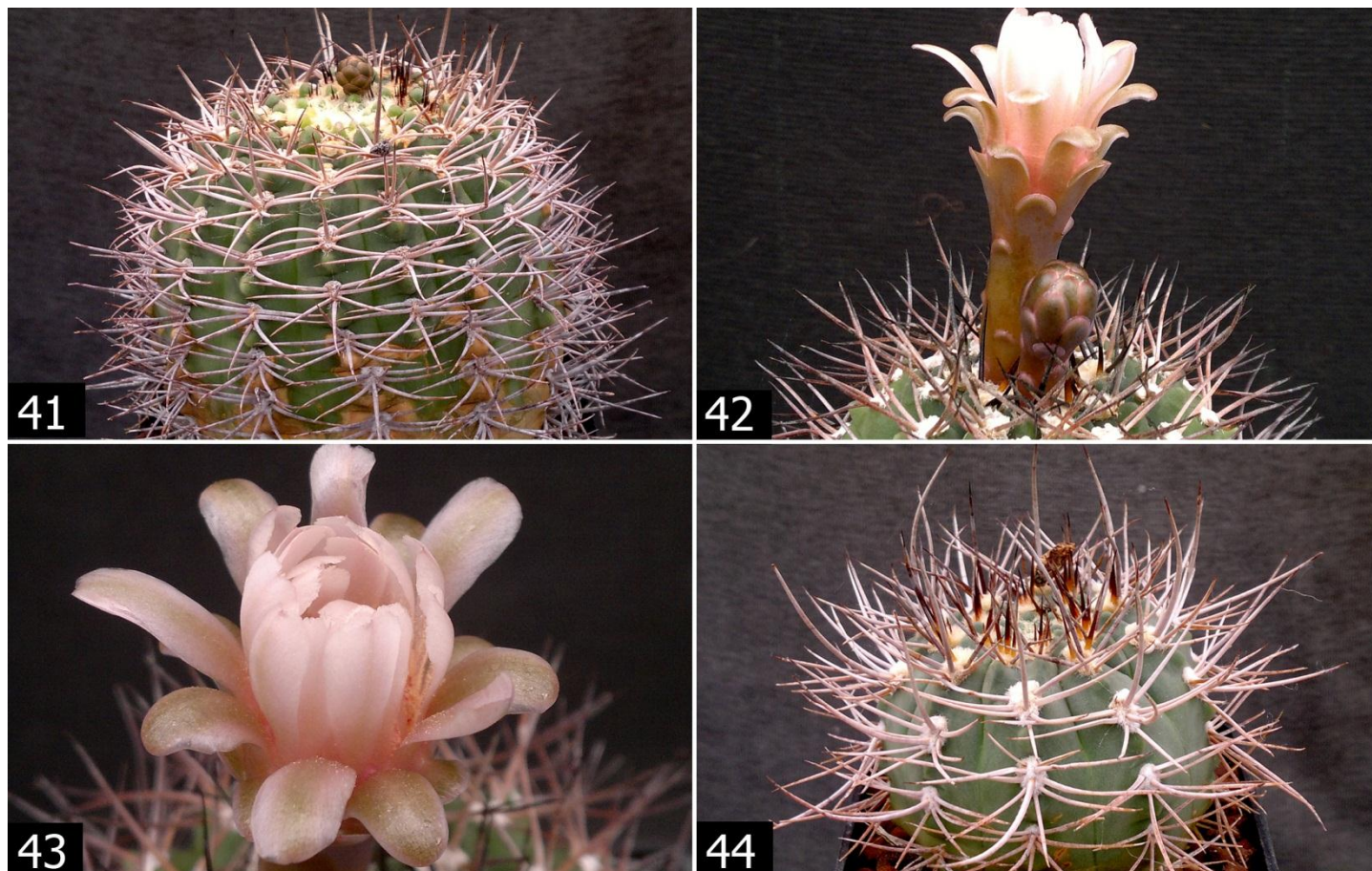
The first indication that *G. ferrarii* had a broader range came with a study of the seeds of the *G. hossei* group proposed by Meregalli & al. (2000). The authors investigated seeds from about 100 plants of documented origin, and found specimens morphologically comparable with seeds of the typical *G. ferrarii* also east of the type locality and in the Cuesta Sébila. This study was reported by Charles (2009), who also reported that seeds taken from the summit of the Cuesta Sébila under his collection number GC 27.02 produced plants similar to *G. ferrarii*, in addition to those that the author referred to *G. hossei* (Figs 34 and 35). Samples of seeds of GC 27.02 were examined in the course of the present study, and indeed the sample was mixed and included seeds belonging to *G. ferrarii* together with seeds that are probably referable to *G. ambatoense* in a broad sense. Charles (2009) produced a distribution map that considered also populations east of Mazan, up to the Cuesta Sébila. Thus it is confirmed that *G. ferrarii* has a broader range (see Fig. 60) than so far supposed. East of Mazan specimens of *G. ferrarii* were found along ruta 60, reaching the ruta 46 crossing at the northern limit of the Cuesta Sébila. Just at the crossing between ruta 46 and ruta 60 *G. ferrarii* is sympatric and fully syntopic with another species of *Gymnocalycium* (Scabrosemineum), here referred to the *G. ambatoense* group and representing the extreme western-most form of that species. Apart from the seeds, the easiest discriminating character is the fruit colour, blue in *G. ferrarii* and glossy greenish in the other species - the bluish colour depending on a thicker coating of wax on the epidermis of the fruit of *G. ferrarii*. The spines of *G. ferrarii* are usually shorter and thicker, and the ribs are less convex, and with less prominent chins. Excepting the previously noticed remark by Charles (2009: 159), who hypothesized to have collected seed of two different species at the Sébila pass, the gymnocalyciums growing along the ruta 60 in the northern side of the Cuesta Sébila, from the pass to the crossing with ruta 46, were generally referred, in seed- and field number lists, to a single, very variable species, often identified as *G. hossei* or *G. mazanense* (which however are not present along the Cuesta Sébila). One notable example is the population P30a, from J. Piltz, which includes two species. It was not possible to get information about the precise collecting site from Piltz, so it is not known whether all the plants of the P30a collection were sympatric or if they were found in various places along the Cuesta Sébila. Based on personal researches, the two species are syntopic just south of the crossing (MM 944 and MM 945).





Figs 33–40. *Gymnocalycium ferrarii* STO 238, East of Mazan (33–36); STO 239, East of Mazan (37–40). Plants in cultivation.



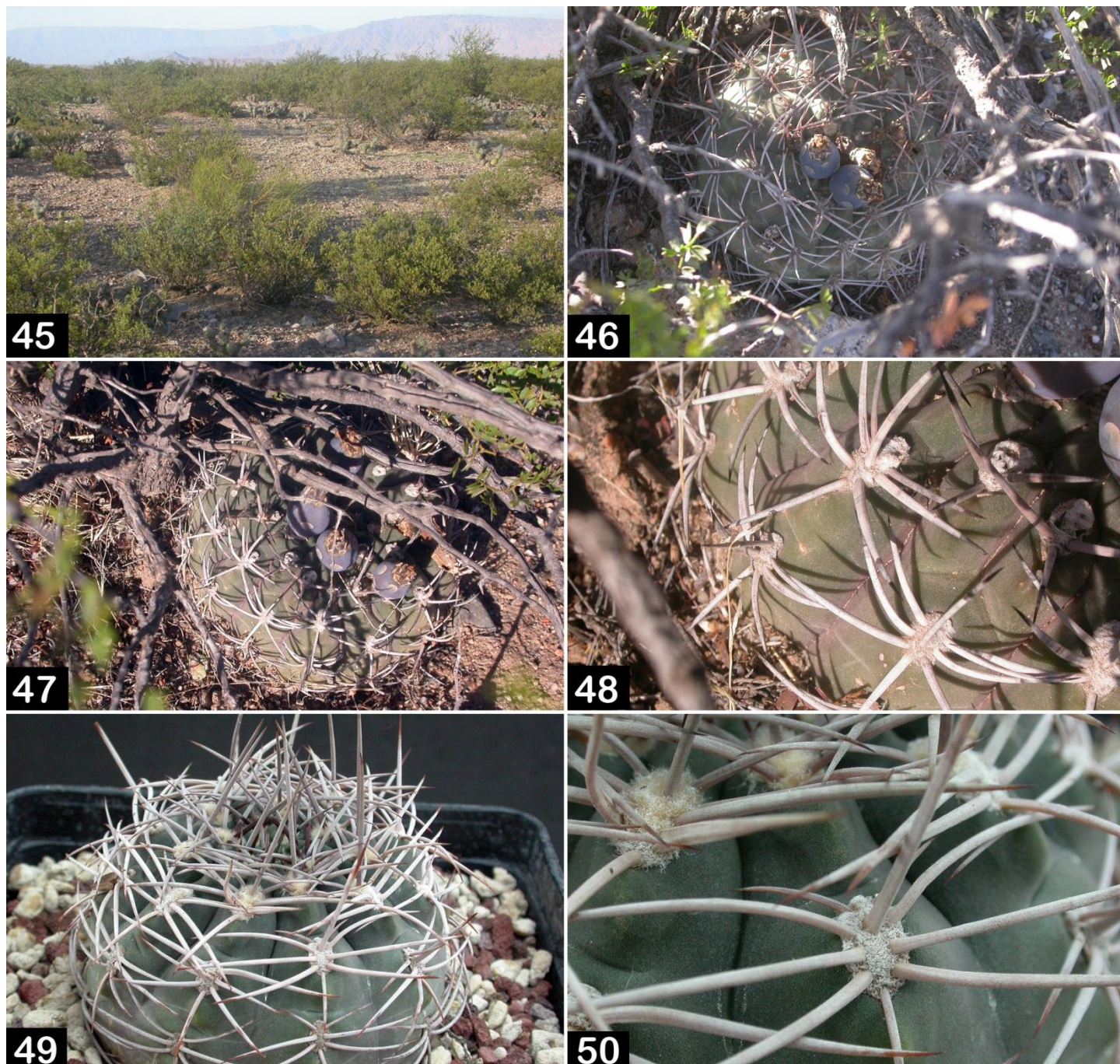


Figs 41–44. *Gymnocalycium ferrarii* STO 240, East of Mazan. Plants in cultivation.

More plants belonging to *G. ferrarii* according to the seed structure were found along ruta 60, up to the pass at 1200 m. Along this road, collections of the second species of *Scabrosemineum*, the form possibly referable to *G. ambatoense*, are also known (MM 946, MM 947, GC 27.02b, GN 1863, VoS 853, and many others). It is not known whether the two species hybridize in nature in the places where they cohabit. Plants producing apparently intermediate seeds, anyway glossy and more similar to seeds of *G. ferrarii* (Fig. 67), were found. Hybridization in cultivation is possible, even though cross-pollination seldom resulted in ripe fruits (personal observation).

This region surely requires more exploration. It is true that a relatively large amount of material is available, but the presence of two syntopic species as suggested by Meregalli & al. (2000) and Charles (2009) was generally not taken into account - due to similarity of the vegetative aspect between the two species that does not allow an immediate recognition. So mixed collections from the northern side of Cuesta Sébila occurred, probably quite commonly and, consequently, some of the plants and seeds currently cultivated are unreliable, deriving from F1-hybrids originated by the propagation of these mixed collections.





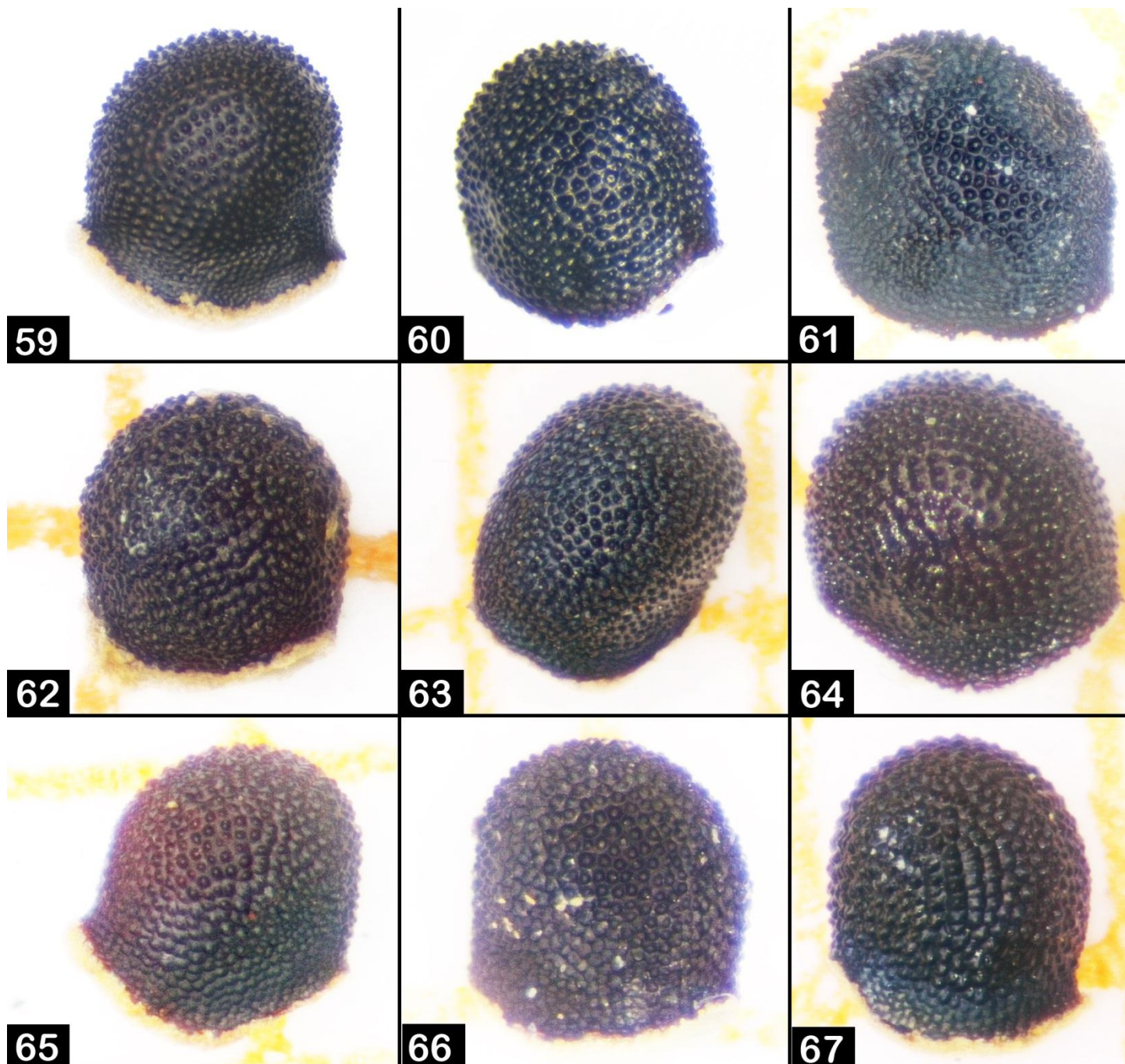
Figs 45–50. *Gymnocalycium ferrarii* MM 944. Crossing ruta 46 x ruta 60. Habitat (45). Plants with fruits (46–47). Detail of the ribs and spines (48). Plants in cultivation (49–50).

Figs 51–58 (following page). *Gymnocalycium* sp. cf. *ambatoense* MM 945, crossing ruta 46 / ruta 60. Plant with fruit, note the green fruit and the different shape of the ribs compared with *G. ferrarii* (51). *Gymnocalycium* cf. *ambatoense* MM 946, Cuesta Sébila, south of MM 944/945 (52). *Gymnocalycium* cf. *ambatoense* MM 947, Cuesta Sébila, 10 km south of crossing (53). *Gymnocalycium* cf. *ambatoense* P 30b, unknown locality along Cuesta Sébila (54). *Gymnocalycium ferrarii* GC27.02a Cuesta Sébila, pass (55). *Gymnocalycium* cf. *ambatoense* GC27.02b (56). *Gymnocalycium ferrarii* P 30a, unknown locality along Cuesta Sébila (57). *Gymnocalycium ferrarii* GC 983.02, N Cuesta Sébila, 1.2 km S crossing ruta 46 / ruta 60 (58). Photos 54–58: Graham Charles.









Figs 59-67. Seeds of *Gymnocalycium ferrarii* from optical microscope. STO 127, S. Teresita (59). STO 238, East of Mazan (60). GN 2477, East Estación Mazan (61). GN 1854, Cuesta Sébila (62). GN 2478, Cuesta Sébila (63). GN 2480, crossing Cuesta Sébila (64). P30a, Cuesta Sébila (65). GN 2993, Cuesta Sébila (66). Seeds showing intermediate characters between *G. ferrarii* and *G. cf. ambatoense*. GN 1856, Cuesta Sébila (67).

To precisely define the range of *G. ferrarii* more investigations should be carried out. The chain of hills chain east of the type locality, parallel to ruta 60, is so far unexplored and it may host several more populations. On the hills south of Mazan, *G. ferrarii* is probably present for a short stretch along ruta 10. In this area it is probably sympatric, and possibly syntopic with *G. hossei*, but no precise information is available in this regard. Only the seed allows a sure identification, but *G. hossei* has

generally longer and thinner spines, and the flower has a style reaching the upper anthers; the pericarpel is generally greenish instead of pinkish as in *G. ferrarii* and the perianth is usually cream coloured, rather than pinkish. Researches in this region were always limited to the surroundings near the road, and a more complete exploration of the hills to the west should allow us to recognise the southern-most limit of the species' range. At the crossing with ruta 9, and along this last road, only *G. hossei* is present.

The northern-most limit of distribution of *G. ferrarii* should probably be found either north of Santa Teresita - along the eastern margin of the Salar de Pipanaco, and further east, on the western-most slopes of the Sierra de Ambato. Plants were found around Poman, which could be referred to *G. ferrarii*. However, they differ in the thinner and longer spines, and also the seed is less glossy and shows some differences in the structure of the testa cells.

The ecological requirements of *G. ferrarii* appear to be rather variable: north of Mazan plants were found on the top of granitic hills, on bare soil and in full sun. The plants in this region are always nearly completely buried in the soil. It seems that the type locality was further north, since Rausch (1981) referred to the plants being in sandy soil, and also some of the collections examined apparently originate from the immediate surroundings of Santa Teresita. East of Mazan, at the crossing of rutas 46 and 60, all specimens were found in sandy soil and under shrubs. Here the majority of the plants have a bigger size, possibly also in relation to the less extreme habitat condition, and grow higher above the ground. In higher parts of the Cuesta Sébila the habitat is more rocky, but generally with a good shrub cover offering shelter to the plants.

So, all the usual limits of knowledge of Argentine Cactaceae are evidenced in the history of *G. ferrarii*: the first, insufficient and in part imprecise description led to a very narrow concept of the species, restricted to the type locality; moreover, regardless of the many collectors who went to that area, exploration has been limited to the surroundings near to the main or secondary roads and usually all the collectors had only the intent of finding plants, but not of understanding the complex taxonomy of this and the related species. No research in the nearby mountains and hills was ever carried out, because access is only possible by walking, an exercise too seldom done. So, much more specifically targeted effort is required in the Mazan-Sébila region to clarify taxonomy and distribution of the species present in this area.



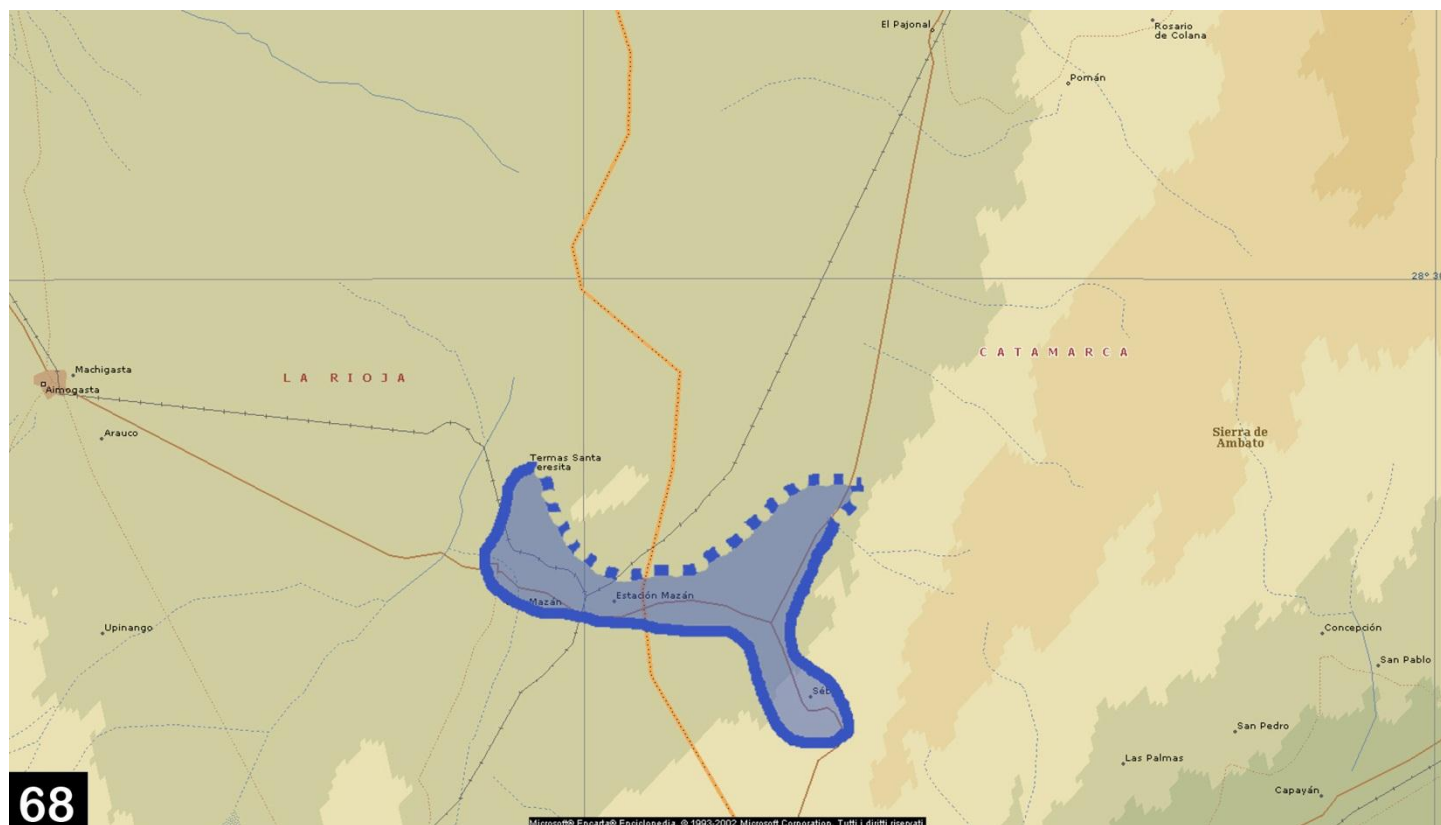


Fig. 68. Distribution map of *Gymnocalycium ferrarii* based on the documented specimens examined. The northernmost limits are not known at present.

ACKNOWLEDGEMENTS. I wish to thank all my friends who provided me with seeds, plants, photos of plants and various information. Other than to those already mentioned in the introduction, I am deeply indebted to Franz Berger, Victor Gapon, Gert Neuhuber, Jörg Piltz and Franz Strigl. Graham Charles has kindly checked the English. All the photos by Massimo Meregalli, except when otherwise indicated.

The following populations of *G. ferrarii* were examined (seeds, and seeds + plants\*):

GC 27.02a\* (mixed collection) Cuesta Sébila, pass

GC 983.02 N Cuesta Sébila, 1.2 km S crossing ruta 46 / ruta 60

GN 1848: Cuesta Sébila

GN 1854: Cuesta Sébila

GN 1856: Cuesta Sébila, 1100 m

GN 2477: East Estación Mazan



GN 2478: Cuesta Sébila, 900 m

GN 2480: crossing Cuesta Sébila

GN 2515: near Santa Teresita, 800m.

GN 2993: Cuesta Sébila

HV 0793: north of Villa Mazan

HV 1581: north of Villa Mazan

HV 1710: Santa Teresita

JO 129: Estacion Mazan (identified as *G. mazanense*)

JO 179: Sierra Mazan (identified as *G. mazanense*)

LB 4484: east Mazan, crossing R 60 x R 46 (identified as *G. hossei*)

MM 0943\*. Cerro Mazan

MM 0944\*. N of Cuesta Sébila, crossing ruta 46 / ruta 60.

P30a\* (mixed collection, *G. ferrarii* and *G. sp. cf. ambatoense*). Unknown locality in the Cuesta Sébila

P136\*. Estación Mazan

P385\*. Cerro Mazan

sp. Santa Teresa\*: North of Mazan, Santa Teresita

STO 49\*. Santa Teresita

STO 127\*. Santa Teresita

STO 238\*. East of Mazan

STO 239\*. East of Mazan

STO 240\*. East of Mazan

VS 0062: Sierra Ambato (identified as *G. hossei*)



The following seeds of plants mistakenly identified as *G. ferrarii* were examined:

JO 0122: Machigasta (seed belonging to *G. hossei* in broad sense)

JO 0123: Aimogasta (seed belonging to *G. hossei* in broad sense)

JO 0124 Udpinango (seed belonging to *G. hossei* - Sierra Velasco seed form)

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