

Schütziana

The Gymnocalycium Online Journal



Volume 12, Issue 2, 2021
ISSN 2191-3099

This journal was published on August 1st, 2021

Content

Papsch, Wolfgang	Editorial	p. 2-3
Schädlich, Volker	<i>Gymnocalycium anisitsii</i> (K. Schum.) Britton & Rose - a Rearrangement	p. 4-29

Published: August 1st, 2021

Legal notice

Publisher: WORKING GROUP SCHÜTZIANA, Mario Wick, Am Schwedderberg 15, 06485 Gernrode, Germany

Editorial team and responsible for the content: <https://www.schuetziana.org/index.php/contact-us>.

SCHÜTZIANA is the journal of the WORKING GROUP SCHÜTZIANA.

Source of supply: SCHÜTZIANA is available only as a pdf-file via World Wide Web and can be downloaded here:

<https://www.schuetziana.org/index.php/downloads>.

The content of the respective article expresses the opinion of the author and is not necessarily that of the WORKING GROUP SCHÜTZIANA.

The issues of SCHÜTZIANA are free of charge and may be distributed freely. The content and the pictures of the articles of SCHÜTZIANA are property of the author and may not be used for other purposes than reading, printing and storing without permission.

© 2021 WORKING GROUP SCHÜTZIANA. All rights reserved.

ISSN 2191–3099

Cover photo: *Gymnocalycium anisitsii* VoS 525 in culture (photo: V. Schädlich)

Editorial

Dear *Gymnoclycium* friends

Wolfgang Papsch



We are sometimes overrun by unexpected events. Hardly had Ludwig Bercht taken on the editorial office with vigour and drive in autumn, when his sudden death ended his ambitious plans, not only for our magazine, but also for those of *SUCCULENTA*. He was able to finish merely one edition of our magazine. His projects concerning his dealing with his huge cacti collection, realisation of long-term scheduled lecture tours and, of course, further study trips to Argentina, Paraguay, Bolivia etc. came to an abrupt end. Ludwig leaves a gap in the whole cacti community and his all too soon path across the rainbow bridge has left us all deeply saddened behind.

As the saying goes, time is a great healer and we must look ahead. Thus, a successor to Ludwig Bercht had to be found in the editorial office of *SCHÜTZIANA*. This task will be taken over by me. Being the henceforth senior in age of the group I hope for a good cooperation with my younger fellow campaigners. I have presented a part of my activities to the readers of *SCHÜTZIANA* for discussion since the founding of the study group twelve years ago by Tomi Kulhánek, Massimo Meregalli, Mario Wick and myself. Being the new editor, it is my special concern to increase the knowledge about secured and presumed relationships within the genus *Gymnoclycium* on a wide basis. I invite the whole *Gymnoclycium* community to take part in this ambitious intention with a lot of contributions in order to broaden the present image of this Latin American genus, which is so popular with collectors.

These days modern means of communication make an exchange of thoughts easier. They can combine different angles of research and investigative methods, leading to an advanced approach of thinking. The sphere of activities is extensive. Locality data, ecological and climatic influences as well as geological conditions can yield valuable clues. Cultivation and propagation data are also in demand. Findings from chromosome analysis have already been incorporated into recently published contributions and first conclusions can be drawn from already published results of DNA analyses. All these sections, especially those based on molecular research, have to be dealt with intensively in the future. Watching, studying, taking notes and pictures, drawing, documenting and finally publishing is to be the motto for the time to come. *SCHÜTZIANA* is ready to present its knowledge to a broad readership.

In well-informed circles Volker Schädlich is regarded as a connoisseur of the subgenus *Muscosemineum*'s representatives. In his paper on *Gymnoclycium anisitsii* he follows exactly the above-mentioned requirements item by item. Accordingly, his conclusions about this taxon, which has been the subject of controversial discussions in the past, are well-founded and

documented. Extensive field studies in combination with findings from studying cultivated plants now yield a detailed image of this Paraguayan species.



Ludwig Bercht searching for cacti in Bolivia.

We would like to express our warmest thanks to Mrs Iris Blanz (Austria) who supports us with the translation into English, to Mrs Larisa Zaitseva (Russia) for the translation into Russian, to Mr Victor Gapon (Russia) for the content corrections of the Russian edition, to Mr Takashi Shimada (Japan) for the translation into Japanese, to Mr Jiahui Lin (China) for the translation into Chinese, to Mr Václav Johanna (Czech Republic) for the translation into Czech and to Mr Daniel Schweich (France), who mirrors our publications under: <https://www.cactuspro.com/biblio/>.

***Gymnocalycium anisitsii* (K. Schum.) Britton & Rose - a Rearrangement**

Volker Schädlich

Bergstraße 1, 03130 Spremberg (Germany)

Email: volker@gymnos.de



ABSTRACT

All localities of *G. anisitsii* (K. Schum.) Britton & Rose known so far in Paraguay, Brazil and Bolivia are presented. Although the specie's type locality is situated on the Arroyo Tagatiyá-mi, the starting point of its spreading can presumably be found in the Tucabaca valley.

KEYWORDS

Cactaceae, Gymnocalycium, anisitsii

INTRODUCTION

Gymnocalycium anisitsii is a species very variable in many features. In the past this led to the intention to divide the plants into two species by all means. This goes back, above all, to the first descriptions of *G. anisitsii* K. Schum. and *G. damsii* K. Schum. The pictures of the first descriptions show, in the case of *G. anisitsii*, a plant with long spines, for *G. damsii* one with short spines. The author of a publication in the magazine GYMNOCALYCIUM of the year 2013 takes up this topic. It was proven that at the time of the first description of *Echinocactus Damsii* (1903) a valid publication already existed in the form of a description of *E. Anisitsii* in 1900. Therefore, the name *G. anisitsii* (K. Schum.) Britton & Rose has priority. This contribution takes a closer look at those taxa which, in the author's opinion, must be assigned to *G. anisitsii*.

Localities in Paraguay

The so far known distribution area in Paraguay (fig. 1) extends from the town Concepción in north-eastern Paraguay to Rio Apa, which at the same time forms a natural border with Mato Grosso do Sul in Brazil. Up to now the only evidence of plants having been found in Paraguay is from the Departamento Concepción on the left bank of Rio Paraguay.

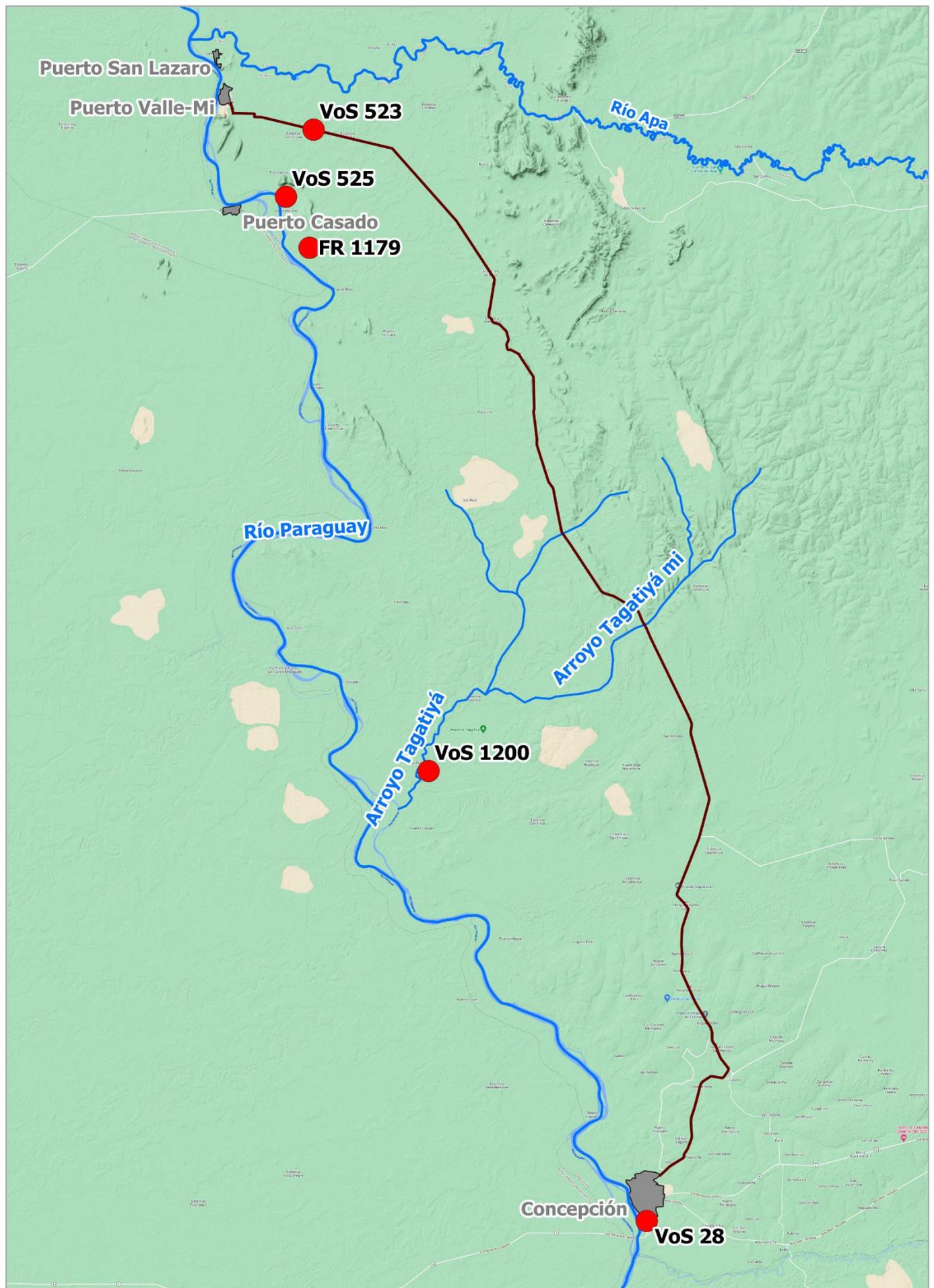


Fig. 1: Localities of *G. anisitsii* in Paraguay

map: M. Wick.

Description of the plants:

Body solitary or sprouting, no spots on epidermis, flat spherical to short cylindrical, up to 130 mm Ø, up to 180 mm high, light to dark green, matt to shining, apex slightly depressed 6-15 ribs, often divided into chin-like protuberances by pronounced groove across. The protuberances are often brownish, close to the areoles often darker. Spines up to 60 mm in length, the longest central spine, if present, greyish white, yellowish to brownish, tip of the spine darker, short and rigid to long and twisted. 0-1 central spines, 5-7 marginal spines. Flowers white to delicate pink, funnel- to bell-shaped, up to around 60 mm in length, filaments white, style white, segments of the stigma white to cream-coloured, anthers grey to blackish. Fruit red, spindle-shaped, lacerating longitudinally, up to 3 cm long. Seed ± compact ovate to almost spherical, in direction of the basally situated hilum-micropylar region (HMR) straight or mostly ± inclined. Length 0.68-0.92 mm, $M(30) = 0.834$ mm. Width 0.70-0.88 mm, $M(30) = 0.794$ mm. Testa light brown, matt. Rim of the HMR wide, not bulging, running down straight, in places somewhat bent towards the outside.

Localities of *Gymnocalycium anisitsii* near the town Concepción



Fig. 2: Locality near the town Concepción before urbanisation (VoS 28, 1168). Many shrubs remain green in winter due to frequent precipitation.

I was able to visit the locality of *G. anisitsii* near the airport in 2001 for the first time. The area where the plants grew did not exceed 200 square metres. The terrain is flat, the soil fine-grained, consisting of a mixture of sand and clay. The plant covering is made up of low succulent shrubs and small trees (fig. 2). Slightly elevated places frequently occur as a result of erosion.

G. anisitsii, *Echinopsis rhodotricha* K. Schum. and *Opuntia anacantha* var. *retrorsa* (Speg.) Kiesling can be found there along the fringes of the shrubs. Only once, in 2006, I could find *Frailea*

concepcionensis Buining & Moser there. *G. anisitsii* is very variable, all kinds of spines occur: short, long, twisted or completely devoid of spines. The flower colour varies from purely white, slightly greenish to pink-coloured. In droughts the soil becomes hard as rock. During precipitation it swells and becomes smudgy and muddy. Then there is stagnant water in depressions for days. Within one year about 1300 mm precipitation occurs (<https://de.climate-data.org/suedamerika/paraguay/concepcion/concepcion-3855/> 13.09.2020). There is not one single month a year without any rain. The long-time average temperature is 23,8°C. On my last visit in 2016 this locality had disappeared owing to urbanisation.



Fig. 3-4: There can be a lot of rain in this area, then the plants can be submerged for days. The surface of the soil swells and becomes water-impermeable (VoS 290).



Fig. 5: The plants presumably flower throughout the year (VoS 28).



Fig. 6: Older plants can become short columnar (VoS 1168) ...



Fig. 7: ... or they remain flat and get up to 13 cm wide (VoS 1168).



Fig. 8: Different phenotypes of *G. anisitsii* in cultivation.



Fig. 9: Flower section of *G. anisitsii* VoS 28 Concepción.



Fig. 10: Seeds of *G. anisitsii* VoS 290.

Locality of *G. anisitsii* in the surrounding of the River Tagatiyá-mi

In 1898 János Dániel Anisits went on a journey which took him as far as Fuerte Olimpo in north-eastern Paraguay. Two of his companions (Barbosa Rodrigues and PhD Borelli, assistant at Turin University), had already been Mr Anisits' travel companions before in 1897. The venture started on January 10th, 1898. The route was covered by ship, boat, on horseback and on foot. The total distance of about 1.000 km could be reconstructed with the help of his field data. On January 25th an unknown flowering *Echinocactus* (Nemes 1999) was found close by the River Tagatiyá-mi).



Fig. 11: Locality of *G. anisitsii* VoS 1200 near the River Tagatiyá

photo: C. Hefti.

In order to reach this area nowadays it takes some luck and the help of local people. The whole area is private property and divided into many individual estancias.

G. anisitsii occurs here in sparsely growing forest not far from the River Tagatiyá. I could find this locality with the help of local people in 2012. It has been the first proof of *G. anisitsii* from this area since the first collection of Prof Anisits on 25th January 1898. The plant covering is here mainly made up of high palm trees and deciduous tree. The soil is grey, fine-grained, containing clay. Further cacti are *Harrisia spec.* and *Opuntia spec.*



Fig. 12: *G. anisitsii* grows up the trunk of a palm tree.



Fig. 13: The variability of the plants is high (VoS 1200).



Fig. 14: *G. anisitsii* with short spination (VoS 1200).



Fig. 15: *G. anisitsii* with long spines (VoS 1200) photo: C. Hefti.



Fig. 16: *G. anisitsii* VoS 1200 in cultivation.



Fig. 17: Flower section of *G. anisitsii* VoS 1200.



Fig. 18: Seeds of *G. anisitsii* VoS 1200.

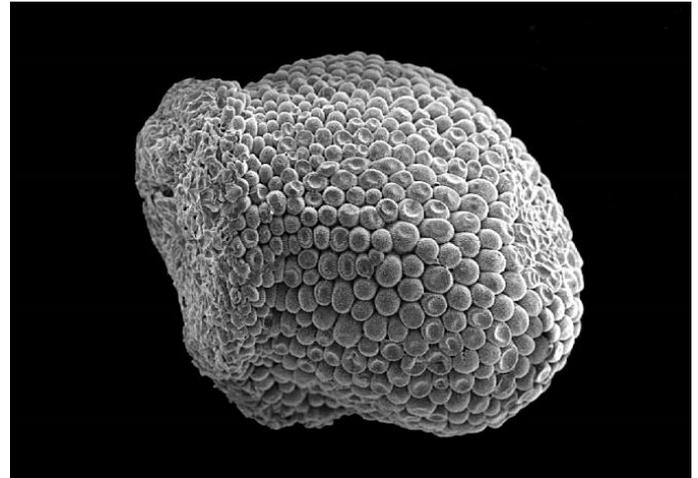


Fig. 19: Seed of VoS 1200 in lateral view; slightly inclined. The HMR's partly bent outside rim can be recognized.

The way north to Departamento Concepción (fig. 20-26)



Fig. 20: Some years ago, the way north used to be cumbersome.



Fig. 21: Today there is a new road to Valle-Mi. The only cement factory in Paraguay is there.



Fig. 22: Close to San Alfredo: old bridge across Rio Aquidaban. It was always an adventure to drive across the wooden bridge.



Fig. 23: These days nothing reminds of this adventure, the river can be crossed in short time.



Fig. 24: Arroyo Tagatiyá north of San Alfredo.



Fig. 25: Rattlesnake (*Crotalus durissus*) in the foothills of Sierra San Luis.



Fig. 26: Argentine black-and-white tegu (*Tupinambis merianae*) in the same area.

Localities in the north of Departamento Concepción

Here cacti grow in open Chaco vegetation. Their accompanying vegetation is different from the one occurring with populations farther south. *Stetsonia coryne* Britton & Rose, *Cleistocactus baumannii* subsp. *horstii* (P. J. Braun) N. P. Taylor and *O. anacantha* var. *retrorsa* can be found. The soil is sandier.



Fig. 27-28: *G. anisitsii* VoS 523, east of Puerto Valle-Mi.



Fig. 29: Iglesia Virgen de Fatima in 2009.



Fig. 30: Eight years later the church has not only changed in colour.

Friedrich Ritter, too, collected in this area. He found *G. anisitsii* near Puerto Risso and brought it into circulation with the field number FR 1179 and the designation *G. damsii*.



Fig. 31: *G. anisitsii* VoS 523 in cultivation.



Fig. 32: Flower section of *G. anisitsii* VoS 523.



Fig. 33: Seeds of *G. anisitsii* VoS 523.



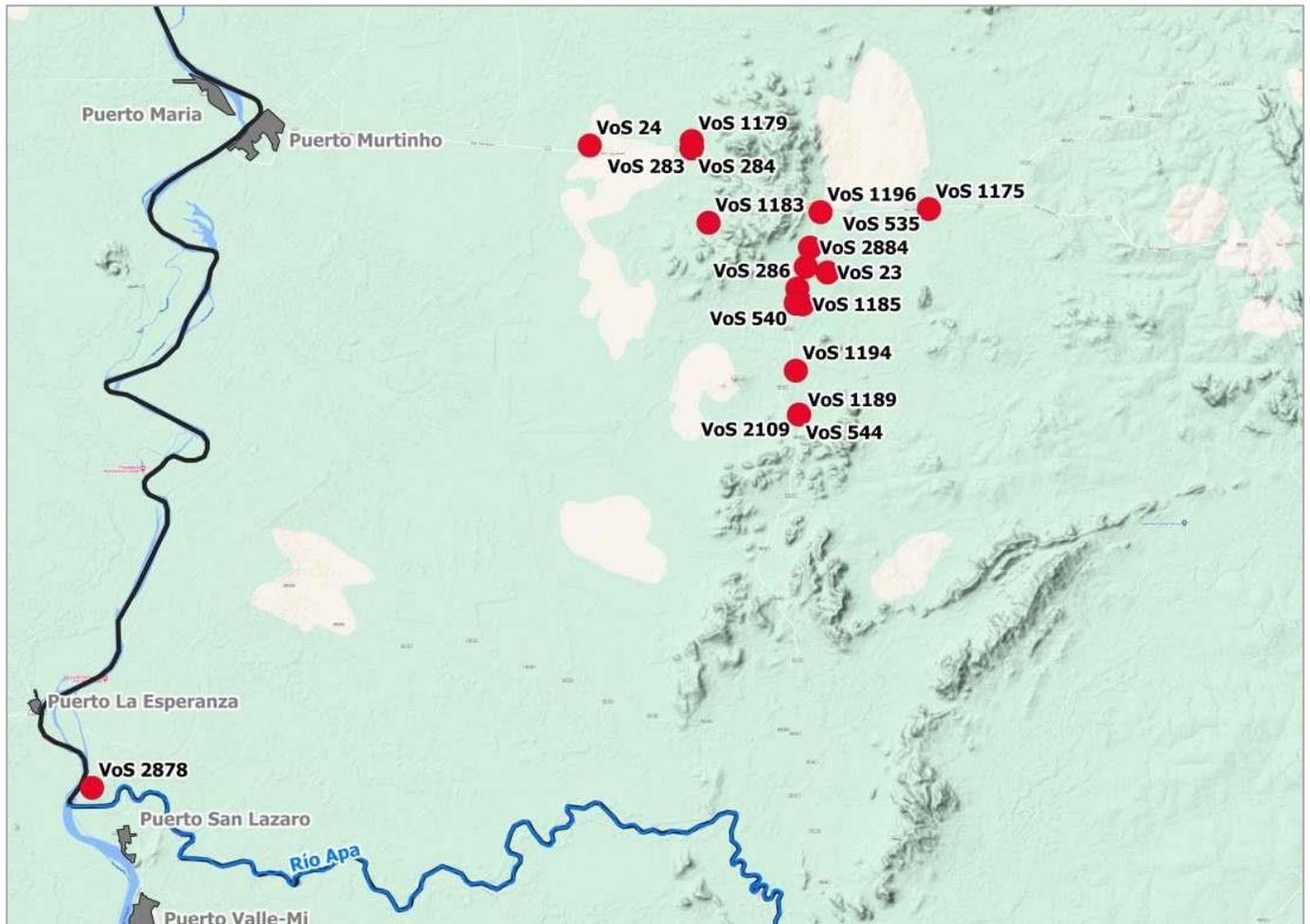
Fig. 34: *G. anisitsii* VoS 525, locality Tres Cerros.



Fig. 35: Flower section of *G. anisitsii* VoS 525.



Fig. 36: Seeds of *G. anisitsii* VoS 525.

Localities of *G. anisitsii* in Mato Grosso do Sul, BrazilFig. 37: Localities of *G. anisitsii* in Mato Grosso do Sul, Brazil

map: M. Wick.



Fig. 38: Rio Apa, frontier river between Paraguay and Brazil.

Locality estuary of Rio Apa, right on Rio Paraguay (VoS 2878)

This locality, discovered in 2019, is the link between the southern localities in Paraguay and the habitats situated further north, east of Porto Murtinho. It is located in an area which can only be reached by boat via Rio Paraguay. Presumably, there are further localities in the area along the river in northern direction. The landscape is frequently in its original state along the river, there are often merely narrow strips of original vegetation preserved. It is hardly possible to penetrate

into these areas onshore, as the neighbouring regions are private property and consist of cultivated land almost exclusively. Huge fazendas, mostly for breeding cattle, shape the landscape.



Fig. 39: Habitat VoS 2878 not far from Rio Paraguay.



Fig. 40: Here the plants reach a remarkable size: up to 18 cm high and 13 cm in diameter.

The population of *G. anisitsii* VoS 2878 is situated in open woodland near the river. Deciduous

trees and palm trees are the highest vegetation. The soil is grey and fine-grained, containing clay. Here *E. rhodotricha* K. Schum., *H. tortuosa* (J. Forb. ex Otto & A. Dietr.) Br. & R., *C. baumannii* subsp. *horstii* and *O. anacantha* var. *retrorsa* are the accompanying cacti. The Echinopsis species reach a height of up to 80 cm.



Fig. 41: The soil of locality VoS 2878 is covered with a layer of leaves.



Fig. 42: Seeds of *G. anisitsii* VoS 2878, here, too, the HMR's rim being bent towards the outside is clearly visible.

Localities east of Porto Murtinho

The Brazilian Chaco is situated south west of Mato Grosso do Sul, east of Porto Murtinho. Only very small habitats along the property lines of large agricultural businesses have been preserved. It must be assumed that these localities will disappear in the near future due to land use and environmental impacts. Over the period from 2001 to 2019 a steady decline in spherical cacti could be recognized at the locality of *G. anisitsii*. The population was decimated when I visited last in October 2019, supposedly due to climate change, of which the consequences can be recognized here as well. As the habitats often merely consist of narrow strips of only few metres of original vegetation, the plants are especially endangered during long-lasting droughts.



Fig. 43: Locality *G. anisitsii* VoS 23 in 2001.



Fig. 44: Habitat of *G. anisitsii* VoS 283.

Further spherical cacti were found at the localities of *G. anisitsii*: *G. matoense* Buin. & Bred., *Frailea melitae* Buin. & Bred., *F. angelicana* Diers & Schädlich, *Discocactus silicicola* Buin. & Bred. and *E. rhodotricha*.



Fig. 45: The fruits become reddish-violet when ripe. Seeds are distributed by birds, locality VoS 2880.



Fig. 46: Abundantly sprouting population of *G. anisitsii* VoS 540.



Fig. 47: Here, too, the plants are extremely variable, locality *G. anisitsii* VoS 2880.



Fig. 48: *G. anisitsii* VoS 283 in cultivation.



Fig. 49: *G. anisitsii* VoS 286 in cultivation.



Fig. 50: *G. anisitsii* VoS 544 in cultivation.



Fig. 51: Flower section of *G. anisitsii* VoS 283.



Fig. 52: Flower section of *G. anisitsii* VoS 540.



Fig. 53: Seeds of *G. anisitsii* VoS 2880.

Discussion

G. anisitsii is extremely variable in all the localities in Paraguay and Brazil. The habitats of the plants do not differ significantly, they grow in Paraguay in Chaco vegetation near Rio Paraguay in fine-grained, clay containing soil which is impermeable to water. The soil swells when it rains and becomes smudgy, but is very hard in dry times. In the woods on the banks of Rio Paraguay the plants always grow on the left side of the river.

In Matto Grosso do Sul (Brazil) I know an occurrence on Rio Paraguay. Most localities are situated east of Porto Murtinho in an area with a north-south extension of about 20 km. This area is part of

the southern foothills of the Pantanal, There are small islands of Chaco vegetation. These localities are very much endangered by climatic influences and pressure of civilisation. As the strips of original vegetations are very small the populations are continually exposed to pressure. Over the last 18 years a rapid decline in population density could be observed. There are populations with an extreme inclination to offsetting in the apex region. Even small offsets show this tendency. Until then I had been able to watch this tendency only in vegetatively propagated plants. In sowings of seeds from that region I have so far not been able to see any offsetting of the seedlings. Till and Amerhauser (2003) assume that this sometimes extreme tendency to offsetting might be an abnormality or illness, or may be attributed to a virus infection. This tendency, which can be found in only a few populations, made Pierre Braun (1991) describe the plants from this locality as *G. damsii* var. *multiproliferum*. Later he recombined them to *G. anisitsii* subsp. *multiproliferum* (Braun 1995). Further investigations with controlled sowings of extremely offsetting plants may possibly help to shed light on the matter. In other localities of the same region there are also normally offsetting populations.



VoS 28.



VoS 1200.



VoS 523.



VoS 286 strongly sprouting.

Fig. 54: Four-year-old seedlings from all distribution areas of *G. anisitsii* in Paraguay and Brazil.

Conclusion

All plants from the listed localities of Paraguay and Brazil are identical in flower, fruit and seed structure and correspond with the type of *G. anisitsii*. Therefore they must be assigned to *G. anisitsii* subsp. *anisitsii*.

Localities in the Tucabaca valley in eastern Bolivia

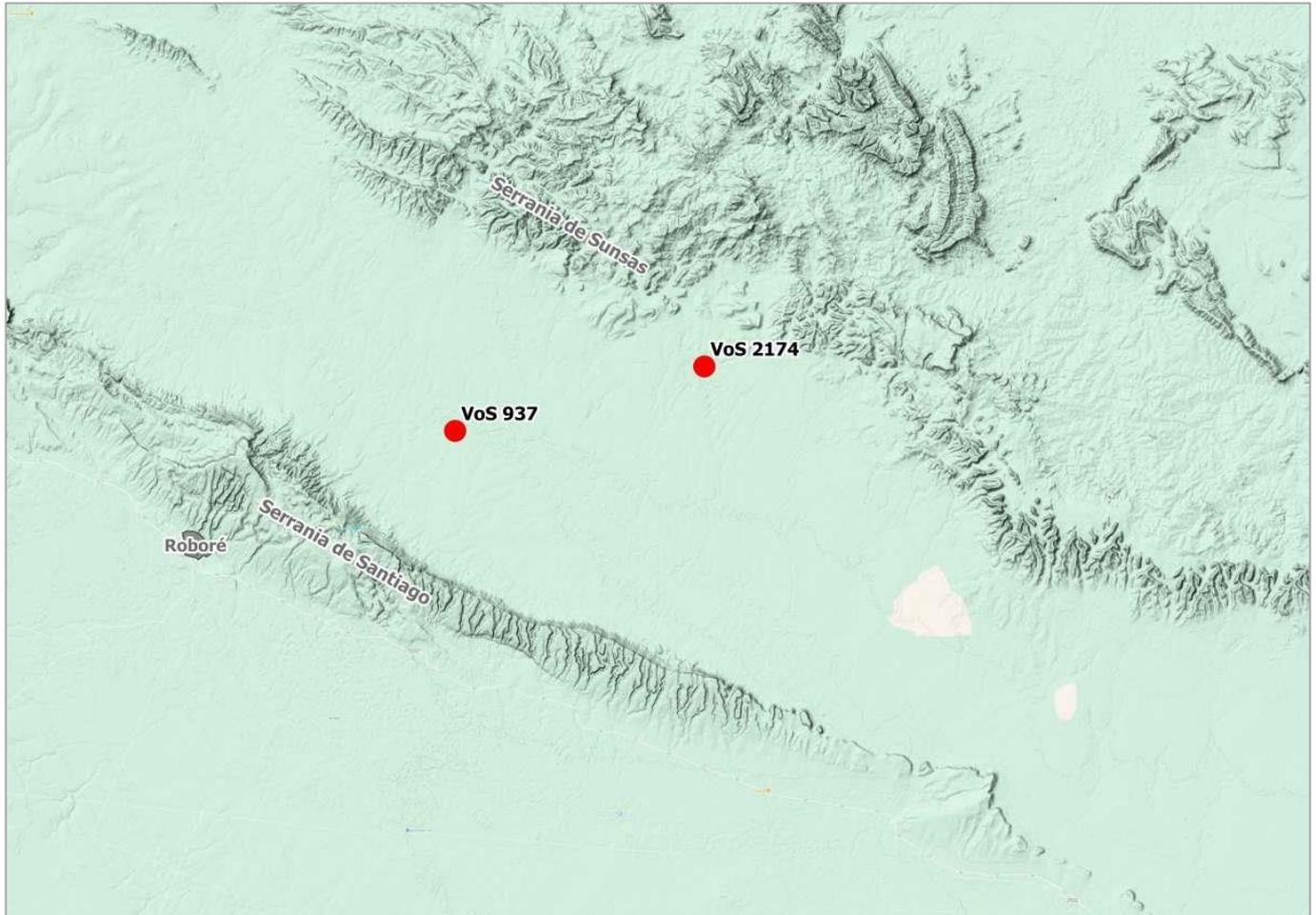


Fig. 55: Localities of *G. anisitsii* in Tucabaca valley

map: M. Wick.

Until some years ago this area was known as Tucavaca valley. The name of the reserve was changed in order to preserve the Chiquitanean roots. There is no letter “v” in this language. The name is derived from Chiquitanean “Tukabash”, the name of a bird (*Chauna torquata*) in this region.

The Tucabaca valley is situated between two mountain chains: the Serranía de Santiago and the Serranía de Sunsas. The road leading through this valley is impassable after rainfall. The whole area is a nature reserve of extreme importance nowadays. It is home to one of the biologically most important xerophytic forests world-wide (Parker et al. 1993).

The localities known to me are situated at the beginning and at the end of the valley.



Fig. 56: The eponyms of the valley, Southern Screamers *Chauna torquata*.



Fig. 57: Bridge across Rio Tucabaca.



Fig. 58: Habitat *G. anisitsii* subsp. *tucavocense* VoS 2174 in Tucabaca valley.



Fig. 59: *G. anisitsii* subsp. *tucavocense* VoS 2174 in Tucabaca valley.

The *Gymnocalycium*s of the Tucabaca valley correspond in many features with those of *G. anisitsii* from Brazil and Paraguay. The Tucabaca valley was presumably the starting point of the plants' distribution in southern direction. Till and Amerhauser had considered this possibility before. They write on this subject, "*The main distribution area of G. damsii and G. anisitsii is in eastern Bolivia, a long way off from both plants' type locality on Rio Paraguay. This seeming contradiction can be easily explained by the periodically occurring heavy floods in years with unusually heavy rainfalls in the rain period. Then seeds and fruits are carried along to the south by the water of Rio Tucavaca. This river has not been totally investigated yet. It rises near San Juan about 100 km northeast of Roboré, flows through the Tucavaca valley, which is several km wide between the Serranía de Sunsás and the Serranía de Santiago. From the Bañados de Otuquis onwards it is also called Rio Otuquis. Finally, it flows after a total of 450 km into Rio Paraguay near Bahía Negra, as mentioned above (Hammerschmid 1965)*" (Till & Amerhauser 2004). For me, too, this concept of spreading is comprehensible. I found a good argument in favour of this assumption during my visit to Tucabaca valley in 2017. It was the first time that I could cross the valley completely. *E. rhodotricha*, *C. baumannii* subsp. *horstii* and *O. retrorsa* grow at the locality VoS 2174, too, along with *G. anisitsii*. Exactly these accompanying cacti can also be found at the localities of *G. anisitsii* in Brazil. *E. rhodotricha* and *C. baumannii* subsp. *horstii* have not been found so far along the route between El Tinto and Puerto Suarez at the Brazilian border. At all the localities of *Gymnocalycium* and *Frailea* in this region *E. hammerschmidii* Cárđ. and *C. samaipatanus* subsp. *divimiseratus* (Cárđ. ex Bkbg.) M. Lowry can be found as accompanying cacti.



Fig. 60: *G. anisitsii* subsp. *tucavocense* offsetting here, too.



Fig. 61: *G. anisitsii* subsp. *tucavocense* is relatively flat, also at old age.



Fig. 62: Surprising accompanying vegetation *C. baumannii* subsp. *horstii* and *E. rhodotricha*.



Fig. 63: *G. anisitsii* subsp. *tucavocense* VoS 937 in cultivation.



Fig. 64: *G. anisitsii* subsp. *tucavocense* L 361 in cultivation with the typical appearance of plants from the Tucabaca valley: shining epidermis and mostly distinct, reddish-brown markings below the areoles.



Fig. 65: 4-year-old seedlings of *G. anisitsii* subsp. *tucavocense* VoS 937.

Plants from the Tucabaca valley were first collected by Father Hammerschmid. He dispatched the plants to the German company Uhlig. In 1963 Backeberg described these plants as *G. damsii* var. *tucavocense*. In 2002 plants from the Tucabaca valley (STO 95-983, locality on Rio Tucavaca) were described as *G. damsii* subsp. *evae* by Halda, Horáček & Milt. Both descriptions are invalid as *G. damsii* is a double description of *G. anisitsii* (nom. illeg. Art 43.1).

Two years later, in 2004, Till & Amerhauser described plants from the Tucabaca valley as *G. anisitsii* subsp. *holdii* var. *tucavocense*. However, the plants described as *G. anisitsii* subsp. *holdii* belong to the relationship of *G. megatae* (Schädlich 2021). Therefore, it is required to assign the plants from the Tucabaca valley to a new position. As the plants correspond with *G. anisitsii* subsp. *tucavocense* they are recombined to *G. anisitsii* subsp. *tucavocense*.

Gymnocalycium anisitsii (K. Schum.) Britton & Rose subsp. ***tucavocense*** (H. Till & Amerhauser) Schädlich comb. et stat. nov.

Basionym: *Gymnocalycium anisitsii* subsp. *holdii* var. *tucavocense* Backeb. ex H. Till & Amerhauser, Die Gymnocalycien des Gran Chaco und der Savannen aus Argentinien, Bolivien und Paraguay 3: Zur Identität des *Gymnocalycium anisitsii* und der übrigen Taxa der Serie (k) *Periferialia*. - *Gymnocalycium* 16(3): 529 (2003).

Synonym: *G. damsii* var. *tucavocense* Backeb., nom. illeg.

G. damsii subsp. *evae* Halda, Horáček & Milt, nom. illeg.



VoS 937 from the Tucabaca valley.



VoS 1200 near the river Tagatiyá-mi.



VoS 2104 from Tres Cerros.



VoS 286 near Porto Murtinho Brazil.

Fig. 66: Seedlings of *G. anisitsii* forms from the various localities.

The *Gymnocalycia* from the Tucabaca valley differ from the *G. anisitsii* type: the epidermis is always very shining and frequently dark on the lower part of the body, the protuberances are rounded. The seedlings correspond with the *G. anisitsii* type: flat appearance, up to 130 mm in diameter, larger seeds without noticeable bulges at the HMR rim and the outer walls of the cupola-shaped testa cells are larger. Their habitats are markedly separated from those of *G. anisitsii*, about 480 km in linear distance to the localities around Porto Murtinho.



Fig. 67: Flower section of *G. anisitsii* subsp. *tucavocense* VoS 937.



Fig. 68: Flower section of *G. anisitsii* subsp. *tucavocense* VoS 2174.



Fig. 69: Seeds of *G. anisitsii* subsp. *tucavocense* VoS 937.



Fig. 70: Locality of *G. anisitsii* subsp. *tucavocense* VoS 937 at the beginning of the valley.



Fig. 71: Seeds of *G. anisitsii* VoS 1200.

Seeds of *G. anisitsii* subsp. *tucavocense* VoS 937.



Fig. 72: In 2008 we witnessed the complete ruta 4 being flooded by Rio Tucavaca. The river leaves the Tucabaca valley between the Serranía de Santiago and the Serranía del Carmen.

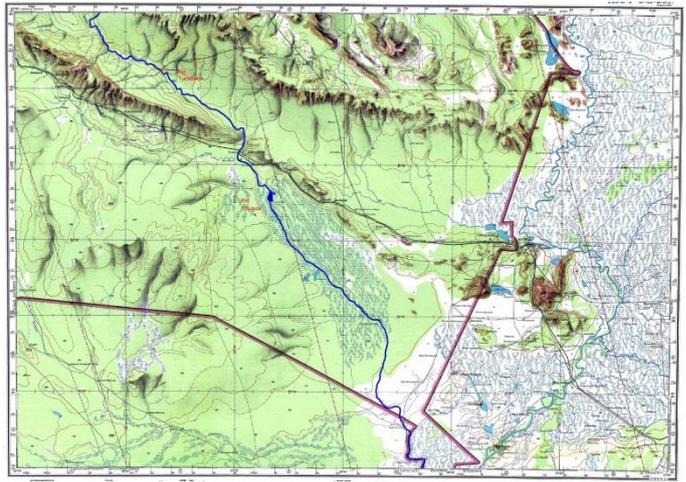


Fig. 73: The blue line shows the course of the river (Rio Tucavaca, farther on Rio Otuquis) from the Tucabaca valley to Rio Paraguay. Presumably seeds and fruits of *G. anisitsii* were thus transported as far as Brazil.
map: Russian military map.

In 2003 a contribution in the magazine GYMNOCALYCIUM newly describes and recombines some taxa to *G. anisitsii* (Till & Amerhauser 2003). Another publication on the topic followed one year later (Till & Amerhauser 2004). There the two authors established the following conspectus for *G. anisitsii*:

1.1.1. *G. anisitsii* (K. Schum.) Britton & Rose subsp. *anisitsii* var. *anisitsii*

1.1.2. *G. anisitsii* subsp. *anisitsii* var. *griseopallidum* H. Till & Amerhauser

Syn.: *G. griseo-pallidum* Bkgb. nom. nud.

1.1.3. *G. anisitsii* subsp. *anisitsii* var. *pseudo-malacocarpus* Bkgb. ex H. Till & Amerhauser

Syn.: *G. pseudo-malacocarpus* Bkgb., nom. nud.

1.2.1. *G. anisitsii* subsp. *holdii* var. *holdii*

1.2.2. *G. anisitsii* subsp. *holdii* var. *tucavocense* Bkgb. ex H. Till & Amerhauser

Syn.: *G. damsii* var. *tucavocense* Bkgb., nom. inval.

1.3.1. *G. anisitsii* subsp. *volkeri* Amerhauser

In the author's opinion the taxa *G. anisitsii* subsp. *anisitsii* var. *griseopallidum*, *G. anisitsii* subsp. *anisitsii* var. *pseudo-malacocarpus* and *G. anisitsii* subsp. *volkeri* assigned by H. Till and Amerhauser to *G. anisitsii* do not belong there. They will be assigned newly in a publication to follow.

Conclusion

From my point the following conspectus ensues for *G. anisitsii*:

G. anisitsii (K. Schum.) Britton & Rose subsp. ***anisitsii***

G. anisitsii (K. Schum.) Britton & Rose subsp. ***tucavocense*** (H. Till & Amerhauser) Schädlich.

ACKNOWLEDGEMENT

I would like to thank my travel companions Ludwig Bercht, Alexander Arzberger, Christian Hefti, Holger Lunau and Helmut Amerhauser for joining me in various journeys through Paraguay and Brazil. I am grateful to Mario Wick and Ludwig Bercht for designing the maps. My sincere thanks also go to Ludwig Bercht, Reiner Sperling, Holger Lunau, Tomas Kulhánek, Wolfgang Papsch, Thomas Strub, Christian Hefti and Mario Wick for the discussions held in Radebeul.

LITERATURE

- Backeberg C. (1959) Die Cactaceae 3: 1779-1761 - Jena: G. Fischer.
- Backeberg C. (1966) Das Kakteenlexikon: 167, 172. - Jena: G. Fischer.
- Braun P. (1991) *Gymnocalycium damsii* var. *multiproliferum*, P. J. Braun. Eine neue Sippe aus Mato Grosso do Sul, Brasilien - *Kakt. and. Sukk.* 42(10): 228-231.
- Braun P. & Esteves E. (1995) Nieuwe combinaties en namen voor Cactussen uit Brazilië, Bolivia en Paraguay - *Succulenta* 74 (3): 130-131.
- Esser G. (1982) Vegetationsgliederung und Kakteenvegetation von Paraguay - in: *Tropische und subtropische Pflanzenwelt* 38:1-113.
- Halda J. J., Horáček L., Milt I. (2002) Nove popisy a kombinace. - *Acta Mus. Richnoviensis* 9(1): 58-59.
- Hammerschmid L. J. (1965) *Gymnocalycium Gulf Oil* 70. - *Kakt. and. Sukk.* 16(12):234-236.
- Nemes L. (1999) Anisits János Dániel, emlékszám. - *Debreceni Pozsgás Tár* p. 3-59 - LITOGRAFIA: 4032 Debrecen.
- Parker T. A., Gentry A. H., Foster R. B., Emmons L. H. & Remsen J. V. jr. (1993) The lowland dry forests of Santa Cruz, Bolivia: A global conservation priority. - *Conservation International*, Washington, DC.
- Schumann K. (1900) *Echinocactus Anisitsii* K. Sch. - *Monatsschr. Kakteenk.* 10(12) p.183.
- Schumann K. (1900) *Echinocactus Anisitsii* K. Schumann. - *Blühende Kakteen* 1: tab. 4.
- Schumann K. (1903) *Echinocactus Anisitsii* K. Sch. n. spec. - *Gesamtbeschreibung der Kakteen. Nachträge 1898 bis 1902*:118-119. - Neudamm: J. Neumann.
- Schumann K. (1903) *Echinocactus Damsii* K. Sch. n. spec. - *Gesamtbeschreibung der Kakteen. Nachträge 1898 bis 1902*:119-120. - Neudamm: J. Neumann.
- Schädlich V. (2013) Ist *Gymnocalycium damsii* (K. Schum.) Britton & Rose eine Doppelbeschreibung von *Gymnocalycium anisitsii* (K. Schum.) Britton & Rose - *Gymnocalycium* 26(1) 2013:1059-1076.
- Till H. & Amerhauser H. (2003) Die *Gymnocalycien* des Gran Chaco und der Savannen aus Argentinien, Bolivien und Paraguay. Teil 3.- Zur Identität des *Gymnocalycium anisitsii* und der übrigen Taxa der Series (k) *Periferalia*. - *Gymnocalycium* 16(3): 523-532.
- Till H. & Amerhauser H. (2004) Die *Gymnocalycien* des Gran Chaco und der Savannen aus Argentinien, Bolivien und Paraguay. Teil 4.-Zur Identität des *Gymnocalycium damsii* und seiner Formen aus der Subsectio C1 *Periferalia*. - *Gymnocalycium* 17(1): 545-560.