



Pterocactus

Jewels of the Cono Sur

Elisabeth & Norbert Sarnes

Cono Sur = Southern Cone

The 'Southern Cone' refers to the southern tip of South America below the tropic of Capricorn.



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Preface

There are only a few surveys of the genus *Pterocactus*. The first one was published in 1964 by Castellanos. A milestone was certainly the work of Roberto Kiesling in 1982. It was not until 2017 that the very readable special issue of *kaktusy* about this genus by Lumir Král appeared. However, some questions still seem to be unanswered, as we are repeatedly asked for help with identification.

During our last trip to Argentina in 2019, we were finally able to resolve a longstanding ambiguity for us. Therefore, we decided to take advantage of the isolation enforced by the pandemic to present our view on the genus *Pterocactus* in this publication.

We deliberately do not call this publication 'Revision of the Genus' because we consider only morphological features of the plants. It is the case today that modern revisions are mainly based on genetic studies. We are happy to leave this field to the botanists. We see ourselves as 'field runners' and plant lovers. As such, with this publication we would like to offer practical help for the identification of the described species to all who love the genus *Pterocactus*, based on our many years of experience.

Supplement

Seed

The seed of pterocacti is enclosed in an aril (seed coat), as is usual with opuntias. This is what you see when the fruit opens. Since cactus friends use to call this a 'seed', we use the term here as well, although it is botanically incorrect.

Shape of the segments

In the book we refer to the usual shape of full-grown segments and have tried to describe them with known geometric shapes. However, these terms only fit approximately.



Pterocactus tuberosus southern Mendoza

Introduction

In general, Opuntias are rather rarely found in the collections of cactus friends. Exceptions are the hardy Opuntias, which are mostly cultivated outdoors. The space requirements of the plants and the unpleasant glochids are especially deterrents. Fortunately, this is where the pterocacti differ. They do not grow large and glochids play almost no role. Instead, the plants of this genus surprise us with particularly interesting spination and unusual flowers. Many plant lovers also love the caudex-like root of the pterocacti.



Pterocactus hickenii with exposed caudex

Our interest in the genus was aroused when we decided to take an intensive look at the cacti of Patagonia. Besides *Maihuenia*, *Maihueniopsis* and *Austrocactus*, the genus *Pterocactus* can be found everywhere in this region. Even further north you can still find interesting pterocacti.

Outside the flowering season it is exceedingly difficult to find a *Pterocactus* in habitat. We understood

Roberto Kiesling immediately when he told us that *Pterocactus australis* is the jewel among the cacti of Patagonia. Often the plant is indistinguishable from the grass in which it grows. Many listeners at our lectures did not want to believe that *Pterocactus tuberosus*, of all things so common in collections, was one of the last pterocacti we saw in the field. It is a real master of camouflage.



Pterocactus australis at the Río Santa Cruz - nearly invisible without flower

Not only was it difficult to find the plants themselves, but also obtaining the literature, especially the first descriptions, was a challenge. With many sources, Roberto Kiesling was a great help to us. However, it is not at all easy to decide what this plant looks like just based on a description. It is not only us who are confronted with this problem, we experience it again and again when we are asked about the identification of pterocacti. How does *Pterocactus australis* differ from *Pterocactus fischeri*? It was a similar situation with *Pterocactus araucanus*, which for a long time was considered to be the same as the recently described *Pterocactus neuquensis*.



Pterocactus fischeri at the Río Picun Leufú - or *P. australis* after all?

For many years we had the problem that two different looking plants were called *Pterocactus hickenii* by cactus lovers, botanists, and ourselves. It was not until our last trip in 2019 that we had the epiphany: two different taxa exist. We were lucky to see both taxa in flower at the same time at several sites but could not find hybrids at any of them. At home, we found during literature research that both species had already been validly described for a long time.

Especially the last point was decisive for us to start this book. In addition to the eleven validly described taxa presented here, we know of three other previously undescribed pterocacti. We still have unanswered questions about all three. We do not expect to be able to describe them in the foreseeable future. These plants are also presented in this book.

The genus *Pterocactus*

When K. Schumann established the genus *Pterocactus* in 1897 together with the description of *Pterocactus kuntzei* (today *Pterocactus tuberosus*), this plant was the most important for him out of the extensive material to be newly described that he had received from Kuntze.

Because of the glochids, which could even be found on the fruit, the plant could be clearly assigned to the Opuntioideae. What prompted him to establish a new genus was 'the circumscissile, true, unifoliate capsule and the perfectly and broadly winged seed.' The winged seed also led to the name '*Pterocactus*' (Greek: pteron = wing) and of course immediately fired the imagination.



In this *Pterocactus tuberosus* you can see very nicely the seed and the open fruit capsule

Plants that grow in a region with strong winds and have such a pronounced winged fringe around the actual seed must of course be wind dispersed. We assumed this at first. In the course of time, however, we noticed that a large part of the seeds could always be found close to the plants (radius less than 50 cm) even in the strongest wind.



Despite strong winds, the fallen seeds lie directly under the mother plant

Perhaps the border has a different function than previously assumed. It may be that it serves as a water reservoir for the seedling's start-up phase or as initial fertilizer, as sun protection or as a soil anchor. There have been no precise studies on this so far. From our own experiments we know that the flight properties of the seed are rather below average.

Another characteristic of the genus *Pterocactus* is the large underground tuber, which all plants of the genus have and need. Without the swollen root - a huge storehouse for nutrients and water - dry periods cannot be survived and there would be no strength to bring the fresh stems to flower.



The rootstock is much larger than the segment

It is also striking that the pterocacti have both juvenile and adult stems. The young stems of different species are sometimes indistinguishable. Thus, a juvenile stem can belong to *Pterocactus australis*, *Pterocactus fischeri* but also *Pterocactus valentinii*. Only when this segment becomes adult - i.e., mature for flowering - can it be used to distinguish between the species.



Pterocactus australis with juvenile and adult (with central spine) stems.



Juvenile stem where no distinction can be made between *P. fischeri* and *P. valentinii*

All pterocacti form more or less numerous segments that can be detached and rooted. We are firmly convinced that this is the most common way of propagation of the plants in habitat. Besides this monoclonal vegetative propagation, there is also generative propagation via seeds. This is also important because extensively vegetatively propagated plants lose the ability to flower during their life. The flowers are always terminal, usually on the adult stem or, in two species, more frequently on separate lateral flowering shoots. The number of seeds densely packed in the fruit can vary greatly and is usually in the range of less than 10 to 40. The fruit itself gradually dries up before it bursts open 'cut around'.

Either it flaps open, and the seed is gradually released, or the dried flower umbilicus pops off like a lid and takes a few seeds with it. The remaining seeds then remain in the fruiting body and are only set free when this part dries off.



Site of *P. australis* and *P. skottsbergii* near Chile Chico, Chile

Even though populations of two species have been found in the Chilean border area near Chile Chico, pterocacti are Argentinian cacti. Except for the long cylindrical species *P. meglolii*, *P. gonjianii* and *P. spec.* 'Fiambala', all other species occur in Patagonia and the province of Mendoza. This region is the main distribution area of the pterocacti. *Pterocactus australis*, together with *Austrocactus aonikenkensis*, is also the cactus that ventures furthest south. Beyond the 50th parallel, both can still be found in several places.



Southern *Pterocactus australis* in flower at the beginning of December

Pterocactus araucanus CASTELL. 1964

Body offsetting, forming mats, sometimes only singular stems visible; **roots** turnip like, partly also cylindrical or pear-shaped **segments** underground; stems spherical to obpiriform, small, up to 3-4 cm long and 1.5-3.0 cm thick; **epidermis** grey-brown or reddish brown, rarely greenish grey; **areoles** on prominent tubercles, arranged in spirals; areoles in the centre of the tubercles, elliptical, 2 mm long and 1 mm broad, with light wool, **glochids** (mostly only



Distribution area of *Pterocactus araucanus*

visible on older areoles) and spines; **spines** about 4-6, small, pointing downwards, pale, max. 1 mm long, mostly 3 stronger additional ones, ± 2 mm long, black, pointing downwards, the lowest being the longest, often appressed or curved towards the stem. **Flowers** singular, apical, funnel-shaped with flat ovary sunk into the apex of the segment, ca. 3.5 cm diameter; tepals spatulate, pointed, orange with darker mid-stripe in the upper half; filaments same colour as the tepals; stamens brilliant yellow; style surpassing the stamens, pale, stigma lobes ca. 5, red. **Fruit** as an extension of the segment, about 2 cm diameter with large flat umbilicus, spines around the umbilicus longer than those of the segments. Fruits open after maturity (usually in the following year) by detaching the part of the umbilicus. Some of the seeds are attached to the umbilicus, while most of the seeds remain inside the segment. **Seeds** surrounded by an aril, which is wrinkled, irregularly disc-shaped, 4-5 mm diameter with an incomplete wavy rim with approx. 2 mm width.

Distribution: in the provinces of Chubut, Río Negro and Neuquén

In the first revision of the genus *Pterocactus* by Castellanos (1964), he described a plant that he had already found in 1945 on the plateaux near the Río Hualjaina (or Gualjaina) in the province of Chubut. His holotype also originates from there. In the herbarium of Buenos Aires, he had examined a specimen collected by Ragonese in 1935 near Zapala (BA 13471), which he also considered to be *Pterocactus araucanus*.



Plateau near Gualjaina, Province of Chubut

Later, many collectors searched for *Pterocactus araucanus* only in the area around Zapala. This region was much easier to reach than the area of the type near the Río Hualjaina. In the description, however, it is explicitly stated that *P. araucanus* flowers terminally from the main segments. The pterocacti near Zapala, which were thought to be *P. araucanus*, usually flower from special lateral flower segments and differ from *P. araucanus* in other characteristics. Therefore, R. Kiesling and the authors described these plants in 2016 as *Pterocactus neuquensis*.



Pterocactus araucanus near Gualjaina

In the run-up to the description of *P. neuquensis*, we not only visited the populations at Río Gualjaina and near Zapala together with Roberto Kiesling but we also searched intensively for populations of pterocacti in the regions between these two places. During this expedition we were able to find many previously unknown occurrences of *Pterocactus araucanus* in the provinces of Chubut, Río Negro, and southern Neuquén. Therefore, we can now narrow down the distribution area of the species much more precisely.



Pterocactus araucanus near Gastre in the north of the province of Chubut



This is also *Pterocactus araucanus* near Gastre, but these plants lack the red pigment

In all these populations *Pterocactus araucanus* flowered terminally. The flowers were always copper-coloured to (much more rarely) brassy yellow. On the dry plateaux near Gualjaina, almost only individual stems or small clusters were to be found. Besides plants with a reddish-brown epidermis, several plants with greenish-grey epidermis could be seen here. Further north we found much larger pads and almost only plants with reddish-brown epidermis. We found the northernmost population about 100 km south of Zapala.



Pterocactus araucanus on the plain of Gualjaina with the typical terminal buds and the spines pressed against the body



Plant from the northernmost population in the south of the province of Neuquén

Another species with which *Pterocactus araucanus* can be confused is *Pterocactus skottsbergii* (see under that species which plants are meant). Both species have more or less spherical to inverted pear-shaped segments. Both often have identical colour of the epidermis and both flower orange. So how can they be distinguished? The stems of *Pterocactus araucanus* are conspicuously humped. The elliptical areoles are in the centre of the rounded tip of the tubercles. In *Pterocactus skottsbergii* the tubercles are mostly only suggested, and the round areoles sit on the upper third of the tubercles. Another distinguishing feature is the spination. The strong black central spines of *Pterocactus araucanus* are pressed or claw-like bent towards the body. The central spines of *Pterocactus skottsbergii* are arranged radially around the areole or also splayed. Spines over 1 cm long are only found on *Pterocactus skottsbergii*. In *Pterocactus araucanus* the flat ovary is only at the top of the stem. In contrast, the round ovary of *Pterocactus skottsbergii* fills a large part of the stem.



Comparison between *Pterocactus araucanus* (left) and *Pterocactus skottsbergii* (right), which shows the arrangement of the areoles and spines

Based on the morphological characteristics described, *Pterocactus araucanus* can be easily distinguished from *Pterocactus neuquensis* and *Pterocactus skottsbergii*.



Seed of
Pterocactus araucanus



Pterocactus australis (F.A.C. Weber) Backeb. 1950

Body offsetting, \pm forming mats, often only singular segments visible; with a big **taproot**; **segments** small, mostly spherical, up to 1 (-6) cm long and 1-2 cm thick; **epidermis** dark green to violet; segments with strong prominent tubercles arranged in spirals, tubercles round-oval to rhomboid; **areoles** round, on top of the tubercles; **spines** distinguishable into radial and central spines, radials 10-15, fine, white, radiating, central spines 1-2, mostly only from areoles on the upper half of the segments

(sometimes lacking), very variable, usually distinctly longer than the radial spines, stiff or flexible, \pm flattened, husk-like, straw coloured, blackish or brown, later ash grey, one of the centrals from the upper part and one from the centre of the areole. **Flowers** singular, apical, funnelform with flat ovary sunken in the apex of the segment, 3 cm diameter; tepals broad spatulate, sometimes a little indented at the upper margin, clearly pointed, yellow, rarely pale yellowish pink, mostly markedly veined; filaments yellowish; stamens yellow; style yellowish, clearly surpassing the stamens; stigma lobes yellowish to light green. **Fruit** as an extension of the stem, with distinct umbilicus, the areoles around the umbilicus bear longer spines than the other segments. Fruits open after maturity (usually in the following year) by dehiscent near the umbilicus. Some seeds stay with the umbilicus while most of them remain inside the fruit. **Seeds** wrinkled, irregularly disc-shaped, 3.5 -5.0 mm diameter with a small rim (1-2 mm) that surrounds the seed only incompletely.



Distribution area of *Pterocactus australis*

Distribution: in the provinces of Santa Cruz, Chubut, Río Negro, Neuquén and near Chile Chico in Chile

Pterocactus australis was described by the French military doctor Weber in 1898 as *Opuntia australis*. He had received the original material from his colleague Couteaud who had collected the plants on the Río Santa Cruz near what is now Cmte. Luis Piedra Buena. The combination in *Pterocactus* was made by Backeberg in 1950.



Pterocactus australis at the Río Santa Cruz near Piedra Buena in our collection



Camouflaged *Pterocactus australis* near El Calafate, Santa Cruz

The variety *arnoldianus* described by Backeberg, which is said to be distinguished by black central spines, has no justification in our view.

The name 'australis' means 'southern' and refers to the occurrence in the deep south of Patagonia. Probably *Pterocactus australis* is the most southern cactus of all. At least on our travels we have not found any other cactus further south.



Pterocactus australis on the beach of Puerto Lobos, Chubut

The species seems to be very adaptable. *Pterocactus australis* can be found directly on the beach of the Atlantic Ocean, but also at the foot of the Andes in the downdraft of a glacier. The southernmost occurrences are beyond the 50th parallel and the northernmost occurrence known to us is west of Zapala in the province of Neuquén at the 39th parallel.



On this plain in the downdraft of the Viedma Glacier we found *P. australis*

An important feature of *Pterocactus australis* is its flattened papery or round corky central spines. They help the plant to camouflage itself in the dry grass. Therefore, it is so difficult to find the dwarf plants outside the flowering season. Even the flowers - mostly straw-yellow or brass-coloured - are not particularly striking. We had already found three plants at a site near El Calafate in the south of Santa Cruz before we discovered the only flowering plant.

In general, the plants are very scattered. It is exceedingly rare to find many plants. We know of only one exception: at the northernmost occurrence we saw tens of specimens in a relatively short time.

The only *Pterocactus* with which *P. australis* can be confused, and is frequently confused, is *Pterocactus fischeri*. Both species often have flattened central spines. The distinction is easy when the plants are in flower. Very rarely one finds a yellow or brass coloured flower on *P. fischeri*. But even then, the red stigma lobes gives *Pterocactus fischeri* away, because *P. australis* always has yellowish or light green stigma lobes.



Three flowers of *Pterocactus australis* and a flower of *Pterocactus fischeri* in comparison

The two species can also be reliably distinguished looking at the fruits. We will go into this in more detail in the chapter about *Pterocactus fischeri*.



Flower of a plant from the plain at the Viedma Glacier



Seed of *Pterocactus australis*

In the first description, Weber describes the shape of the tubercles as "cucumber-shaped". However, this can only be seen occasionally depending on the nutritional state of the plants. This characteristic cannot be used as an aid to differentiation from other species.

But what do you look for when the plants are not flowering?

In older identification keys, the shape of the shoots and the orientation or shape of the central spines were used. This may help but depends very much on the individual specimens you have. Approximately, elongated to oblong oval segments are an indication of *P. fischeri* and spherical stems point to *P. australis*. In addition, the shoots of *Pterocactus australis* are firmly fused together and do not simply fall off, as is sometimes the case with *Pterocactus fischeri*. The exact position of the central spines is hardly recognisable in densely spined plants and is also variable. This leaves only the "glochid test": in contrast to *P. fischeri*, no glochids can be seen on the areoles of *Pterocactus australis*.



The segments of *Pterocactus australis* are spherical to slightly oval while *Pterocactus fischeri* has elongated to oblong oval segments



Pterocactus fischeri Britton & Rose 1919

Body offsetting, low, 10 cm or less; with large **tap-root**; **segments** spreading to upright, elongated to oblong, ca. 1.5 cm diameter; **epidermis** dark green or brownish to reddish green; segments with flat elongated tubercles arranged in spirals, tubercles rather rhomboid at the base, almost as broad as long; **areoles** oval, in the upper part of the tubercles, with light wool, yellowish **glochids** in the upper part of the areoles, 3-4 mm long; **spines** numerous, distinguishable into radial



Distribution area of *Pterocactus fischeri*

and central spines, radial spines 12 or more, fine white, bristly, spreading, ca. 6 mm long, central spines usually 4 of which 2 are distinctly stronger, 1.0-1.5 cm (in some cases up to 7 cm) long, very variable, straight, \pm curved upwards, flattened, sometimes curly, crème coloured, brownish or black, tips and/or base often yellowish. **Flowers** singular, apical, funnel-shaped, from a thickening at the top of the segment, ca. 3-5 cm diameter; tepals broad spatulate, irregularly indented at the upper margin, distinctly pointed, colour very variable, pale pink, yellow or ruby red; filaments similarly coloured like the tepals; **stamens** brilliant yellow; style yellowish to pale rose, significantly surpassing the stamens; stigma lobes ca. 5-7, red, only exceptionally greenish. **Fruits** apical, as a spherical thickening of the tip of the stem with a deep umbilicus, the areoles around the umbilicus always with flattened spines longer than those of the other areoles. Fruits gradually dry up, with the epidermis rupturing and releasing the seeds. **Seeds** wrinkled, irregularly disc-shaped, 4-5 mm diameter with an incomplete irregular wing (3.0-4.5 mm).

Distribution: in the provinces of Río Negro, Neuquén, and Mendoza



Different forms of *Pterocactus fischeri*

The species was described by Britton & Rose based on a plant collected by Walter Fischer in the province of Río Negro in 1914. Today we know that the main distribution area of the species is in the provinces of Neuquén and Mendoza. The stem illustrated with the first description is slender cylindrical with only weakly developed flat central spines in the upper part of the segment. The plants, which are now called *Pterocactus fischeri*, show a very great variability. This applies to the shape of the stems, the spination as well as the flower colour.



One of the most beautiful combinations of flower colour and spines

The variable appearance makes it difficult to assign plants to this species. Smaller, heavily spined forms can be confused with *Pterocactus australis* (for delimitation see under that species). What we only briefly mentioned there is the different shape of the fruits. The fruits of *Pterocactus fischeri* are conspicuous spherical thickenings at the ends of the stems. The fruit opens with a ring-shaped split and gradually releases the seeds. In *Pterocactus australis* the flowering segments transform into fruiting bodies. When the seeds ripen, the umbilicus is blown away. A large part of the seeds remains deep in the fruiting body and is only released when it dies.



Pterocactus fischeri with yellow flower south of Zapala, Neuquén

Weaker spined plants with slender segments are often difficult to distinguish from *Pterocactus valentinii*. It becomes difficult when both species are also found at the same locality. As *Pterocactus fischeri* usually develops the flattened central spines only on adult stems, the juvenile stems of *P. fischeri* and *P. valentinii* cannot be distinguished. Adult stems of *Pterocactus valentinii* do not have flattened central spines. The flowers of *P. valentinii* are small, slenderly funnel-shaped and mostly flesh-coloured to brownish, very rarely red. The flowers of *P. fischeri* are funnel-shaped and often open wide. The colours of *P. fischeri* range from light pink to strong yellow tones to deep purple.

There are transitions in the flower shape, so that it is not a reliable distinguishing feature.



In this *Pterocactus fischeri* from Mendoza the flower is more like *Pterocactus valentinii* in size and shape, but the spination is typical for *Pterocactus fischeri*.



mm

Seed of *Pterocactus fischeri*



Pterocactus fischeri west of El Sosneado, Mendoza



Pterocactus gonjianii R. Kiesling 1982

Body offsetting, loosely spreading above the soil, mostly only singular stems visible; with a very large **taproot**; **segments** cylindrical, 5-10 cm long and 1.0-1.5 cm diameter; **epidermis** purple, a little bit frosted; tubercles arranged in spirals, rhomboid, 4-6 mm long and broad, 1-2 mm high surrounded by a furrow; **areoles** on the apex of the tubercles, round, 2 mm diameter, with a darker marking below, with a lot of white wool; in the upper part with plenty of **glochids** (2



Distribution area of *Pterocactus gonjianii*

mm); **spines** 6-10, not distinctly separated between radial and central spines, glassy white to light brown, (1)-3-4 mm long. **Flowers** are sunken into the apex of the stems, terete, 4-5 mm diameter; tepals broad spatulate, slightly indented, crème coloured to yellowish; filaments crème coloured; stamens yellow; style crème coloured, distinctly surpassing the stamens; stigma lobes 5, green or purple. **Fruit** as nearly globular thickening at the top of the segment, ~2.5 cm long and 2 cm \varnothing , drying up at maturity and opening horizontally. **Seeds** plenty, flat disc-shaped, 3-5 mm, completely surrounded by a wing of 4-5 mm width.

Distribution: in the provinces of San Juan and La Rioja



Seed of *Pterocactus gonjianii*

mm



High plateau on the way to the Agua Negra Pass – type locality of *Pterocactus gonjianii*

In the context of his revision of the genus (1982), R. Kiesling also described the species *Pterocactus gonjianii*. The type of *P. gonjianii* was collected in the Departamento Iglesia, San Juan on the way to the Agua Negra Pass. Another locality mentioned is Tocota, further south, in the same Dpto. In 2018 we found a population of *Pterocactus gonjianii* much further north in the province of La Rioja, Dpto. Vinchina. All the localities that we know of have one thing in common: they are gravelly areas where the plants are standing unprotected. They are plants from high valleys between 1800 and 2700 metres.



P. gonjianii (left) and *P. reticulatus* (right) at the same site

Already in the first description R. Kiesling refers to the similarity of the species with *Pterocactus reticulatus*, which grows associated with *P. gonjianii* at its type locality. Both species are very difficult to find, as they are perfectly adapted to the ground by the colouring of their epidermis. The flowers of *P. gonjianii* arise from the apex of the main stems. This distinguishes it from *Pterocactus reticulatus*, whose flowers appear on separate lateral segments. The stems of *P. gonjianii* are also slimmer and more cylindrical than the more elongated ovoid stems of *P. reticulatus*. The areoles of *P. gonjianii* bear more spines and glochids compared to *P. reticulatus*.



Typical *Pterocactus gonjianii* with tuberculate segments

Another species with which *P. gonjianii* can be confused is *Pterocactus tuberosus*. Both species have pencil-like stems and in both species, there is sometimes a dark marking of the epidermis below the areoles. *Pterocactus gonjianii* is distinguished by easily recognisable tubercles on the stems. The flowers of *P. tuberosus* are always intensely coloured and do not show the delicate colouring of *P. gonjianii*.

The proximity to *Pterocactus* spec. 'Fiambalá' will be discussed in more detail under that name.



Flower of *Pterocactus gonjianii* from seeds collected at Tocota, San Juan



Pterocactus gonjianii from La Rioja showing the typical tubercles on the segments

Pterocactus hickenii Britton & Rose 1919

Body offsetting, forming low clusters, sometimes only single segments visible; with very large **taproot**; **segments** elongated, 2-3(-6) cm long and up to 2-3 cm diameter; **epidermis** green to grey green; segments with prominent strong tubercles; **areoles** positioned towards the axil, with white wool and numerous yellowish **glochids**, with rudimentary caducous leaflets on the tip of the tubercles; **spines** ca. 8-10, radial and central spines cannot be distinguished, needle-like, spreading, sharp, more or less stiff,



Distribution area of *Pterocactus hickenii*

yellow with brown base, to 2 cm long. **Flowers** singular, apical, funnel-shaped with oval ovary which is sunken in the apex of the stem, 3-4 cm diameter; tepals spatulate with slightly fringed margin and strongly pointed, orange to copper-orange, distinctly veined; filaments a similar colour to the tepals; stamens yellow; style pale rose, distinctly surpassing the stamens; stigma lobes 5, purple red to violet. **Fruit** clearly exserted from the stem, with large, slightly sunken umbilicus, fruits dry up gradually and detach from the segment. **Seeds** wrinkled, irregularly disc-shaped, 3.5-5.0 mm diameter with incomplete wavy rim of ca. 1-2 mm width.

Distribution: in the provinces of Santa Cruz and Chubut

In our introduction we already mentioned that our last trip in 2019 brought us new insights into *Pterocactus hickenii*. Since 2006, we have regularly visited the provinces of Santa Cruz and Chubut. Over the years we have found numerous populations of *Pterocactus hickenii*, or so we assumed. In the process, we noticed that there seem to be different forms of this species.



Exceptionally beautiful cluster of *Pterocactus hickenii* near the Atlantic Coast in the north of the province of Santa Cruz

We could distinguish three forms in the field. We found plants with spherical segments, which mostly had very short, dark spines. Next to them were plants that also had spherical stems, but with much longer spines. The latter we considered to be *Pterocactus skottsbergii* because we had heard so. As these two globular forms grow together - with all transitions – we regarded the name *Pterocactus skottsbergii* as a synonym of *Pterocactus hickenii*. We have always held this view. The third form has elongated segments, yellow spines and strongly pronounced tubercles. Because of the yellow spines we have given it the working name 'aureispinus'.



(left) *Pterocactus* elongated form with yellow spines, (centre) *Pterocactus* spherical form with short, dark spines, (right) *Pterocactus* spherical form with long, dark spines

We have known for some time that there are a few places where the globular and the elongated forms grow together. As we have never found transitional forms, we had assumed different flowering times. However, on this trip we were able to observe for the first time that both forms flower at the same time. This made it clear that they must be two different taxa. This was also confirmed by the flower sections. Was it now necessary to describe the 'aureispinus' form?



Flowering *Pterocactus hickenii* at the Río Senguer



Pterocactus skottsbergii at the same site at the Río Senguer



Flower section of *P. hickenii* (left) and *P. skottsbergii* (right)

Back home we studied the original descriptions of *Pterocactus hickenii* and *Pterocactus skottsbergii* intensively for the first time. In doing so, we realised that we had had a wrong understanding of both species over all these years. We had simply adopted the general opinion of what *P. hickenii* and *P. skottsbergii* should look like.

↓ *Pterocactus hickenii* SAR 4162 at the Gran Bajo de San Julián



According to this, *Pterocactus hickenii* was the plant with the short spines and *Pterocactus skottsbergii* the plant with the long spines. However, if we look at body shape and spine colour based on the first descriptions by Britton & Rose, *P. hickenii* is elongated with yellow spines and *P. skottsbergii* is spherical with black spines of variable length. This also reflects the reality in the habitat. There are plants with elongated segments and yellow spines, i.e., *Pterocactus hickenii* as described, and spherical plants with dark spines corresponding to the description of *Pterocactus skottsbergii*. The flower colour is very similar in both taxa, but the flower structure differs. They are therefore two different taxa.



Comparison of grafted seedlings of *P. hickenii* (left) and *P. skottsbergii*



Seed of *P. hickenii*

Exactly 100 years after the first description we have realised in the field that the taxa *Pterocactus hickenii* and *Opuntia skottsbergii* described by Britton & Rose in 1919 have their justification.

Pterocactus hickenii, as described by Britton & Rose and added to by us, is very well distinguishable from all other pterocacti.





Pterocactus megliolii R. Kiesling 1971

Body offsetting, sometimes only single segments visible; with very large **taproot**; stems cylindrical, usually not segmented, ca. 5 (3-10) cm long and 0.5-1.0 cm diameter; **epidermis** whitish grey (in cultivated plants also green); segments with small hexagonal to irregular tubercles arranged in spiral rows, not clearly marked by a furrow; **areoles** in the centre of the tubercles, round, 0.5 mm diameter and 1-2 mm apart, with dense, long (-1.5 mm) felty wool; **glo-**



Distribution area of *Pterocactus megliolii*

chids only few or completely missing, in the upper part of the areole; below the areole a tiny triangular pointed succulent leaf (0.5-1.0 mm) which dries quickly and falls off; **spines** 10-25, separated into radial and central spines, up to 2 mm long, curved back, radial spines 10-20, appressed, glassy (similar to the glochids), centrals 0-5, light brown to dark. **Flowers** singular, apical, terete, sunken in the apex of the segment, up to 5-6 cm diameter; tepals spatulate, with an irregularly frayed edge and a small tip, brilliant yellow, the outer tepals with a brownish mid-stripe; filaments tapered, same colour as the tepals; stamens yellow; with a light style that distinctly surpasses the stamens; stigma lobes ca. 6-8, red. **Fruit** apical, as a nearly globose thickening of the end of the segment, with \pm sunken umbilicus, on the outer part very similar to the segments, but the areoles a little further apart and bristles surrounding the umbilicus, drying off at maturity and splitting horizontally. **Seeds** large, irregularly disc-shaped, 3-4 mm diameter, surrounded completely by a rim up to 5 mm broad.

Distribution: in the provinces of San Juan and La Rioja



Pterocactus meglolii in cultivation

The species was described in 1971 by Roberto Kiesling. The type originates from the Dpto. Zonda in the province of San Juan. The first description also refers to the occurrence in La Laja in the Dpto. Albardón, San Juan. In November 2018 we discovered another population of *Pterocactus meglolii* much further north in Dpto. Gral. F. Varela, La Rioja. In the province of San Juan, the localities are endangered due to heavy urbanisation. It is very difficult to find plants there at all. The region is one of the hottest and driest areas in Argentina.



Fruit and seed of *Pterocactus meglolii*

The slender stems can be confused with *Pterocactus tuberosus* or *Pterocactus* spec. 'Fiambala'.

P. megliolii often differs from *Pterocactus tuberosus* by the size of the stems. The stems of *P. megliolii* are usually shorter. The differentiation is easier when looking at the areoles because *P. megliolii* has conspicuously more hairs. The indistinct tubercles of *P. megliolii* are equilateral (isodiametric), whereas in *P. tuberosus* they are longer at the bottom than at the top.



Pterocactus megliolii (San Juan, left), *Pterocactus megliolii* (La Rioja, centre), *Pterocactus tuberosus* (Mendoza, right)

We will go into the comparison with *Pterocactus* spec. 'Fiambala' under that name.

The most impressive features of *Pterocactus megliolii* are the very large, bright yellow cupped flowers and the large disc-shaped seeds. Due to its great willingness to flower, this species is particularly popular among cactus lovers.



Pterocactus neuquensis R. Kiesling, E. Sarnes & N. Sarnes (2016)

Body offsetting, forming low clusters, sometimes only individual segments are visible, stems above and underground; with very large **tap-root**; **segments** elongated, mostly conical to piriform, more rarely also flattened roundish, 2.5 to ca. 6.0 cm long and 1.5 to ca. 4.0 cm thick; **epidermis** brownish, beige or greenish grey, partly with a violet hue; segments with flat rounded tubercles, often only marked by wavy lines or lacking completely and getting smaller towards the apex. **Areoles** only slight-



Distribution area of *Pterocactus neuquensis*

ly sunken in the upper part of the tubercles, round, up to 2 mm diameter, with little light felt and sometimes surrounded by a darker rim; areoles near the apex almost without **glochids**, older areoles with conspicuously large, porrect bunches of glochids, glochids mostly longer than the spines. **Spines** 3-7, mostly tiny and nearly invisible with the naked eye, ± appressed, 3-4 pointing downwards, the others, if present, sideways, and upwards, ca. 1.0-2.0 mm long, brownish with lighter tip. **Flowers** usually occur from a lateral segment, flower segment club-shaped, ca. 3.0 cm long and 1.8 to 2.0 cm thick, receptacle like the vegetative segments on the outside, but with somewhat larger tubercles and with stronger spines on the areoles, ca. 4 cm diameter, sunken in the apex; tepals purple red to brownish-red, rarely also copper coloured; filaments red; stamens brilliant yellow; style light pink, ca. 2 mm thick, distinctly surpassing the stamens; stigma lobes ca. 7, purple red. **Fruit** nearly spherical with a large, slightly sunken umbilicus, and very much resembling the vegetative segments. **Seeds** irregularly disc-shaped, 4-5 mm diameter, incompletely surrounded by a rim ca. 2 mm wide.

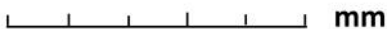
Distribution: in the province of Neuquén



Pterocactus neuquensis near the Arroyo Carreri, Neuquén

On a warm summer evening in Mendoza in January 2012, we were chatting with Roberto Kiesling about the pterocacti in the Zapala area. We had given these plants, which were called *Pterocactus araucanus* by most cactus friends, the working name "conoideus" because of the often cone-shaped segments. When we realized that there were still some unanswered ques-

tions, we decided to use the next trip to look for answers together in the field. As a result of this trip, we described *Pterocactus neuquensis* in 2016.



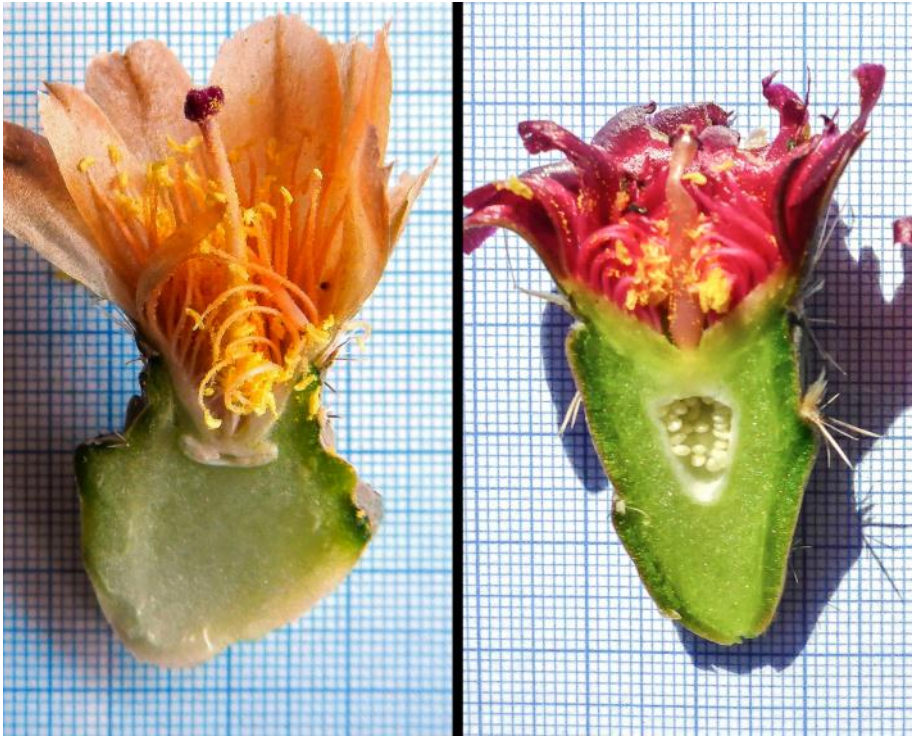
Seed of *Pterocactus neuquensis*



These cone-shaped segments led to the working name *Pterocactus* 'conoideus'



Pterocactus neuquensis with its typical lateral flower



Comparison of the flower sections of *Pterocactus araucanus* (left) and *Pterocactus neuquensis* (right)

During this trip we had noticed that apart from the mostly spineless conical stems, there are also plants with stronger spination and rather rounded stems. The distinction between these two forms of *Pterocactus araucanus* is, however, easily possible if one compares the respective flower sections. All forms of *Pterocactus neuquensis* form mainly lateral flower segments, whereas *Pterocactus araucanus* always flowers apically.

P. neuquensis cannot be confused with other pterocacti.

Occasionally one hears that this *Pterocactus* looks like a *Puna*. We consider this a 'sales argument' that should be quickly forgotten. The plants do not need such support, because their flowers are unique.



Pterocactus neuquensis south of Zapala



Pterocactus neuquensis

Pterocactus reticulatus R. Kiesling 1971

Body offsetting with only few stems above the soil, sometimes only a single stem visible; large **tap-root**; **segments** more or less spherical to pear-shaped, 2-3 cm long and 1-2 cm diameter; **epidermis** violet-grey; tubercles rhomboid, arranged in spiral lines, well pronounced, up to 3 mm high and surrounded by a furrow; **areoles** on the apex of the tubercle, elliptical or elongated, 2 mm long and 1-2 mm broad, with whitish woolly felt, inconspicuous, only few **glochids** in the upper part of the areoles; **spines** about 6, arranged as radials, pectinate, sometimes a porrect central spine, all only about 0.5 mm long.



Distribution area of *Pterocactus reticulatus*

Flowers apical on a laterally produced flower segment, sunken in the apex of the segment, terete, 4-5 cm diameter; tepals broad spatulate with a somewhat frayed rim and sometimes a little pointed, white-rose-mother of pearl; filaments whitish; style white-rose, distinctly surpassing the filaments; stigma lobes 5-9, pointed, black-purple. **Fruit** lateral, almost spherical to obovoid with a flat umbilicus, with areoles and spines like the vegetative segments but less; at maturity drying off and splitting horizontally. **Seeds** large, flat, disc-shaped; ca. 4 mm diameter and surrounded completely by a broad wing-like rim (ca. 3-4 mm). (G.C.I don't think this is an aril)

Distribution: in the provinces of San Juan and Mendoza

Seed of *Pterocactus reticulatus* →





Pterocactus reticulatus on the high plateau of Uspallata, Mendoza
– view of the Andes Mountains



Even with pterocacti there are cristate forms every now and then

It was a small sensation when Roberto Kiesling described two new pterocacti from the province of San Juan in 1971. Especially *Pterocactus reticulatus* showed a special feature that was unknown for this genus until then: lateral reproductive segments. The flowers and later the fruits develop from these. Otherwise, it shows some similarities with the later described *Pterocactus gonjianii*, which we already mentioned under that name.



Here you can see the reproductive segments of *Pterocactus reticulatus* very well

In the northern distribution area of *Pterocactus reticulatus* and in the southern distribution area of *Pterocactus gonjianii* both species grow together at the same localities. Already in the first description R. Kiesling points out that there are transitional forms (hybrids?) between *P. reticulatus* and the then still undescribed *P. gonjianii*. We have also seen such plants. Here the classification is difficult.

In the high valley of Uspallata, Mendoza province (southern distribution area), *Pterocactus reticulatus* is found exclusively.



One of the transitional forms between *P. gonjani* and *P. reticulatus*



The flower *Pterocactus reticulatus* is extraordinarily elegant

Pterocactus skottsbergii (Britton & Rose) Backeb. 1950

Body offsetting, forming flat clusters, sometimes only single segments visible; **root** tuberous, very large; **segments** globose, 2-3 cm diameter; epidermis grey-brown or reddish brown; segments with obtuse ±flat tubercles; **areoles** almost on the top of the tubercles, with white wool and short yellowish **glochids**; **spines** ca. 8-10, needle-like, porrect, sharp, stiff, radial spines crème coloured, the 3-5 central spines dark brown to black, often with yellow tip, up to 2 cm long. **Flowers**



Distribution area of *Pterocactus skottsbergii*

singular, apical, funnellform with flat ovary sunken in the apex of the segment, 3-4 cm diameter; tepals spatulate with slightly frayed rim and acuminate, brass-yellow to copper-orange, conspicuously veined; filaments similar colour as the tepals; stamens yellow; style distinctly surpassing the stamens; stigma lobes 5, purple-red to violet. **Fruit** resembles the segments with large, slightly sunken umbilicus, fruits dehiscent after maturing (usually in the following year) by detaching the area of the umbilicus. Some seeds remain attached to the umbilicus while the rest stay deep inside the fruit segment. **Seeds** wrinkled, irregularly disc-shaped, 4-6 mm diameter surrounded by an incomplete wavy rim of ca. 1.0-1.5 mm width.

Distribution: in the provinces of Santa Cruz and Chubut and near Chile Chico in Chile

Pterocactus skottsbergii was first mentioned as *Opuntia Skottsbergii* Britton et Rose nov. spec. by Carl Skottsberg in his travelogue in 1916. It was not until three years later that *Opuntia skottsbergii* was actually published by Britton & Rose in the first volume of their work 'The Cactaceae'.



View of the Lago Buenos Aires

Backeberg then placed this species in the genus *Pterocactus* in 1950. Skottsberg himself states that he first found the plants on sandy, dry patches in the middle reaches of the Río Fenix on 10 December 1908. Two days later he found the same species at the southeast corner of Lago Buenos Aires.



Typical *Pterocactus skottsbergii* at the Río Fenix

We cannot explain how it came about that *Pterocactus skottsbergii* was equated with *Pterocactus hickenii*. Maybe it was because of the same mistake we made in the beginning - people did not study the original descriptions carefully. It is also possible that the almost identical flower colours and distribution areas contributed to this. One should also not forget that even today the south of Patagonia is rarely visited by cactus researchers and cactus enthusiasts. In any case, we know of no one who, like us, has visited about a hundred different localities of both species. Perhaps this intensive work in the field was necessary to recognize the obvious differences.



Beautiful large cluster of *Pterocactus skottsbergii* near Río Mayo

These differences between *Pterocactus hickenii* and *Pterocactus skottsbergii* have already been discussed in detail under *Pterocactus hickenii*.

Another species with which especially the short-spined forms of *Pterocactus skottsbergii* can be confused is *Pterocactus araucanus*. We have explained in detail how to distinguish these two taxa under *P. araucanus*.

We would be pleased if this 'rehabilitation' of *Pterocactus skottsbergii* would soon be acknowledged by scientists as well.



Open fruit and seed of *Pterocactus skottsbergii*



Pterocactus skottsbergii from the border region of Santa Cruz and Chubut



Southern *Pterocactus skottsbergii*
at the Lago Viedma



Pterocactus skottsbergii
near the Paso Huemules

Pterocactus tuberosus (Pfeiff.) Britton & Rose 1919

Body offsetting, usually producing only few stems; **root** very large, tuberous; **segments** cylindrical, thin, 5-20 cm long and 0.5-1.5 cm diameter; **epidermis** brown to greenish brown with a violet line below the areoles; tubercles very low, only slightly visible, arranged in spiral lines; **areoles** round to slightly oval, ca. 1 mm long, with sparse white wool, **glochids** nearly invisible; with a tiny pointed succulent leaflet below; **spines** 8-12, white, bristle-like, 0.5-1.0 mm long, radiating. **Flowers** singular,



Distribution area of *Pterocactus tuberosus*

sunken in the apex of the segment, terete, 3-5 cm diameter; tepals broad spatulate with a slightly wavy rim and somewhat pointed, light yellow, yellow, or slightly tinted orange-brown to brown, often with a darker stripe in the middle; filaments same colour as the tepals; stamens light yellow; style light, significantly longer than the filaments; stigma lobes ca. 6, pink to red, sometimes also green. **Fruit** as a globular thickening of the end of the segment, from the outside very similar to the vegetative segments, drying off completely when ripe and dehiscing horizontally setting free the seeds that are arranged like a fan. **Seeds** flat, disc-shaped, ca. 5 mm diameter and completely surrounded by a 2.5-3.5 mm broad winged rim.

Distribution: in the provinces of Neuquén, Río Negro, Buenos Aires, La Pampa, Mendoza, San Luis, San Juan, La Rioja, Córdoba, Tucumán, Catamarca, Salta

When Schumann described *Pterocactus kuntzei* and designated it as the type species of the genus, this plant had already been described as *Opuntia tuberosa* by Pfeiffer in 1837. Thus *P. kuntzei* is a later synonym of *P. tuberosus*.

Another synonym is *P. decipiens* from Cordoba described by Gürke in 1907. In his revision of the genus *Pterocactus* from 1982, R. Kiesling describes the forma *lelongii*, which has more and thinner stems as well as green stigma lobes. According to observations in culture and nature, the number and thickness of the stems is very variable. Deviating green instead of the usual red stigma lobes have been occasionally observed not only in other populations of *Pterocactus tuberosus* but also in other pterocacti. The lack of red affects not only the colour of the stigma lobes, but also that of the flower and the epidermis.



Exposed tuber of *Pterocactus tuberosus* near Las Grutas, Río Negro

Therefore, we consider all these minor variations fit within the diversity of *Pterocactus tuberosus*. Note: If we were to make distinctions here, we would have to despair with the richness of forms of *Pterocactus fischeri*.



Pterocactus tuberosus is much easier to find with flowers



Two very well camouflaged fresh fruits of *Pterocactus tuberosus*

Without question, *Pterocactus tuberosus* is the most commonly cultivated *Pterocactus*. Perhaps this is because the numerous stems fall off and root easily. It is not rare in the habitat either, but as a master of camouflage it is difficult to find. The plants like to grow in the light shade of small shrubs and can hardly be distinguished from dry branches. Of all the pterocacti, *Pterocactus tuberosus* has the largest distribution area.



In these bushes we found several *P. tuberosus*



This light copper-tone of the flowers is quite rare in *Pterocactus tuberosus*

The species can be confused with *Pterocactus gonjianii* (for delimitation see under that name), *Pterocactus meglolii* (see under that name) and with *Pterocactus* spec. 'Fiambala'. All have yellow flowers, although the mostly brownish-yellow flowers of the spec. 'Fiambala' are smaller. Above all, the clearly visible tubercles and the greenish colouring of the epidermis of spec. 'Fiambala' help in distinguishing them. In culture we noticed that the spec. 'Fiambala' is much more sensitive to cold than *Pterocactus tuberosus*.



Seed and open fruit of *Pterocactus tuberosus*

Pterocactus valentinii Speg. 1899

Body offsetting, forming small clusters above the soil; **root** tuberous, rather small; **segments** cylindrical, 4-8 cm long and 1.0-1.5 cm diameter, bluntly rounded at the top; **epidermis** green; segments with delicate tubercles; **areoles** tiny (1.5 mm diameter), round, barely arranged in spirals, without spines in the upper part but with frizzy, whitish-greyish wool, lower part densely spined; **spines** 25-35, all homogeneous, radiating, transparent, 3-4 mm long. **Flowers** apical, sunk in the apex, funnellform,

ca. 2 cm diameter; **tepals** spatulate pointed, flesh-coloured to light copper-coloured, exceptionally also magenta-red; filaments same colour as the tepals; stamens light yellow; style similar colour as the filaments, distinctly surpassing these; stigma lobes ca. 6, light red. **Fruits** as a club-shaped to globular thickening of the stem, with similar spination, drying off when ripe and dehiscent horizontally. **Seeds** flat, irregularly disc-shaped, 4-5 mm diameter, winged rim not completely closed, 1.0-2.5 mm broad.



Distribution area of *Pterocactus valentinii*

Distribution: Chubut, Neuquén, Mendoza

Seed of *Pterocactus valentinii* →





Site of *Pterocactus valentinii* on the Peninsula Valdes

When Spegazzini described *Pterocactus valentini* in 1899, he referred to plants he had received from Dr. J. Valentin from near Trelew and from Dr. F. Lahille from the Peninsula Valdes. The latter is deposited as a lectotype in the Herbario Museo de La Plata (LP003939). Later there was a dispute between Spegazzini and Britton & Rose about this species. Spegazzini had probably sent a cactus from La Plata with the name *Pterocactus valentinii* to the W. and L. Steere Herbarium in New York in 1915 (NY00386143), which was clearly a *Pterocactus australis*. Therefore Britton & Rose considered the name *Pterocactus valentinii* as a synonym of *Opuntia australis* and in turn described *Pterocactus valentinii* again in 1919 as *Pterocactus pumilus* Britton & Rose. From our point of view *Pterocactus valentinii* is the older and therefore correct name.



Pterocactus valentinii on the Peninsula Valdes



Pterocactus valentinii from the border area of Mendoza/Neuquén

Pterocactus valentinii can hardly be confused, at best young segments of *Pterocactus fischeri* look very similar to *Pterocactus valentinii*. If both species occur at the same locality and only young segments can be seen, there is no way to distinguish them. As soon as the segments are ready to flower, the stems of *P. fischeri* stand out because of the flattened central spines. *Pterocactus valentinii* also has smaller and narrower flowers compared to *Pterocactus fischeri*.



Pterocactus valentinii with dark spines east of Zapala

While in Chubut only densely white spined forms of *Pterocactus valentinii* with reddish-yellow flowers are found, in Neuquén and Mendoza dark spined forms and even occasional magenta flowering plants can also be found.



Magenta flowering *Pterocactus valentinii* in the south of the province of Mendoza

Pterocactus spec. 'Chubut'

It was chance that helped us to find these plants. We were in the north of Chubut province looking for more localities of an *Austrocactus* to describe when we suddenly saw red flowers behind a knoll. It quickly became clear that it was a *Pterocactus*.

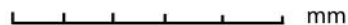


View at the slope with the pterocacti

The body immediately reminded us of *Pterocactus skottsbergii*, but the spination and flower colour did not match that species. Also, the locality is more than 250 km away from the next known locality of a *Pterocactus skottsbergii*. At least we were lucky to see flowers immediately and on or in two plants there were also a few old seeds.



Seed of *Pterocactus* spec. „Chubut“ →





This *Pterocactus* has an impressive flower colour

From our point of view, it does not make sense to describe a plant from the vastness of Patagonia for which only one locality is known. The distribution area is too small. So far, we have not managed to visit the region again to search intensively for further localities. This is a firmly planned project for one of the next trips. Only with a known distribution area would we be able to describe this *Pterocactus*.

We are already curious whether we will be able to grow new generations in our collection in a few years. If these are as stable as the plants at our place of discovery, it should be certain that this is not a hybrid but a new species.



Pterocactus spec. 'Chubut'

Pterocactus spec. 'Fiambala'

The pterocacti west of Fiambalá, Catamarca, on the road to Paso San Francisco, have been known for a long time.

You can find these pterocacti between 1900 m and 3100 m. For some there are two species, others speak of only one species. Taxonomically they have been classified with *Pterocactus tuberosus*, *Pterocactus megliolii* and *Pterocactus gonjianii*.



Ruta 60, where the pterocacti are located, is well maintained

Since, like all slender-cylindrical pterocacti, they can be propagated easily via stems and seeds, they are well distributed in cultivation. Nevertheless, no one has yet attempted to define or describe this taxon.



Typical segment of *Pterocactus* spec. 'Fiambala' with a fruit beginning to form



Pterocactus spec. 'Fiambala'

We ourselves believe that taxa have more or less contiguous ranges. Therefore, to clarify the spec. 'Fiambala', we searched for pterocacti in the province of La Rioja west of the Sierra Famatina. When we found a new population of *Pterocactus gonjiani* in Dpto. Vinchina, we thought we were closer to the solution. But only a little later we found a new population of *Pterocactus meglolii* in Dpto. Gral. F. Varela. This means that the distribution of either species could reach as far as Fiambalá. For *Pterocactus tuberosus* this is not a problem anyway. So, the finds have not taken us any further with this question.



← flower section and ↑ seed of
Pterocactus spec. 'Fiambala'



Plant with woolly areoles at ~ 2700 m

We currently assume that this is a taxon that shows different characteristics at different altitudes. This is similar to *Tephrocactus bonnieae*, which has spines on the areoles below 3000 m, whereas the areoles of these plants above 3000 m are always spine-free.

As the segments of the spec. 'Fiambala' have tubercles, which are not found in *Pterocactus tuberosus*, we exclude this affiliation. We have never seen yellowish or even yellowish-brown flowers of *Pterocactus gonjianii*. But perhaps the new find from La Rioja will surprise us. The small flower of *Pterocactus* spec. 'Fiambala' and the lack of wool on the areoles speak against *Pterocactus meglolii*. So, it remains to be seen what the plants from the transition area reveal or whether it is not a completely new species to be described.





Pterocactus spec. 'Neuquen'

Plants of this species are hardly common in collections and were described in the kaktusy special of 2017 as a northern form of *Pterocactus hickenii*. The locality was near the Tromen volcano. We knew the plants since 2013 when Roberto Kiesling showed them to us as a 'new' *Pterocactus* in the south of Neuquén province. This means that there are two widely separated localities of this taxon in the province of Neuquén. There is said to be a third population, but we have not yet visited it.



This is *Pterocactus* spec. 'Neuquen'

It should not be a problem, if you know two localities, to sift through the necessary material and to assign the plant to a known taxon or to describe it as new. But sometimes the devil is in the detail.



Seed of *Pterocactus* spec. 'Neuquen'

It was not until 2016 that we were lucky enough to photograph the plants in flower at the southern locality. The surprise was great because the flower clearly showed that this could not be *Pterocactus hickenii*. But flowers are only one part of the identification of a plant. What about fruits and seeds? Only seeds, for example, give us the opportunity to study these plants at home in peace. It took us two years before we finally found some seeds. Usually, all fruits of both populations are empty! Barren fruits, however, suggest either only one clone that has spread locally, or a hybrid. We are now on the right track and will soon be able to observe these plants in cultivation and then hopefully say more about these interesting pterocacti.



Pterocactus spec. 'Neuquen' in flower

Cultivation and Propagation

Fortunately, pterocacti are not very demanding in cultivation. As plants with tuberous roots, they need large, deep pots and a well-drained substrate. We have had particularly good experiences with a purely mineral substrate. Like almost all cacti, pterocacti need a lot of light. Especially the species from Patagonia are happy to have a lot of fresh air.



Pterocactus hickenii and *skottsbergii* plants in our Patagonium

If it is windy, they will feel right at home. Since pterocacti only flower from newly formed segments, it is essential to start watering and fertilizing very early. Here in the Rhineland, we start the first watering and fertilizing in February/March, when the daytime temperatures reach double figures for a few days. Night temperatures below zero degrees do not bother us then. We continue watering until the end of the flowering period, when the substrate has dried out completely. As fertilizer, we use half the dose of a common flowering plant fertilizer with each watering. In midsummer, we take a watering break when the temperatures rise above 30° C. In the beginning we had many losses because we watered the plants out of pity when it was hot. The result was rotten roots. Since we have stopped giving water during hot periods, we no longer have this problem. In autumn (September/October) we give water and fertilizer again so that the plants are well prepared for winter dormancy. In winter - November to February - we keep the plants completely dry. For winter dormancy, we divide our pterocacti into two clusters: the "hardy" and the "sensitive".

The 'hardy' ones include: *P. araucanus*, *P. australis*, *P. fischeri*, *P. hickenii*, *P. neuquensis*, *P. skottsbergii* and *P. valentinii* as well as the spec. 'Chubut' and spec. 'Neuquen'. These overwinter in our Patagonium, a kind of open, unheated greenhouse.

Among the 'sensitive' ones are: *P. gonjianii*, *P. megliolii*, *P. reticulatus* and *P. tuberosus* as well as the specimen 'Fiambala'. These overwinter in a greenhouse with frost protection.

We know that some of the 'sensitive' ones can tolerate low temperatures below zero, but we prefer not to take any unnecessary risks.

During the winter dormancy (depending on time and desire) we prune back a large part of the slender shoots (*gonjianii*, *megliolii*, *tuberosus* and spec. 'Fiambala'). We want to ensure that all their energy goes into the formation of new flowering shoots in spring. In nature, these old stems would simply dry up and fall off.



Pterocactus tuberosus, making fresh segments after pruning

We had already mentioned in the introduction of the genus that pterocacti reproduce both vegetatively and generatively. This applies in the same way to the propagation of cultivated plants. Presumably, the vegetative propagation of cultivated plants is much more common because this leads easily and quickly to flowering plants. Cuttings of *Pterocactus* have the advantage that they are easy to obtain, root easily and also develop the typical turnip root. However, if this is used excessively, it can lead to a drastic reduction in the flowering ability of the plants propagated in this way. That is why it is important to keep growing plants from seed. The difficulty usually lies in obtaining the seeds. To obtain seeds, you need several clones of a species that flower at the same time, if possible, are pollinated and then hopefully produce a lot of seeds. For many species this means more than ten seeds per fruit. Seed production is a very laborious business with pterocacti. You need a lot of plants and a lot of space. Especially the most sought-after species from Patagonia or new finds produce the fewest seeds.



Only 12 seeds were in this fruit of a *Pterocactus* spec. 'Fiambala'

Fresh seed germinates reliably and raising seedlings is not particularly demanding. Even older seeds can still produce good germination rates.



Seedling of *Pterocactus australis*

Just do not get nervous when the seedlings of the globular species, such as *P. australis*, look like small *Pterocactus tuberosus*. This is completely normal. Only when the first small swollen root has formed do typical looking stems develop.

We are often asked whether it makes sense to graft pterocacti. We did this once - preferably on *Austrocylindropuntia subulata* - which also worked well. However, it does not bring any advantages. The plants do not flower faster, sprout only slightly more, but look untypical and are more sensitive to frost. Therefore, grafting pterocacti is not worthwhile.

The genus *Pterocactus* is particularly worth cultivating because of its easy propagation and care, its extremely attractive flowers, and its insensitivity to low temperatures.

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Identification Chart

segments cylindrical	segments with tubercles	flower pale pink to yellowish	<i>P. gonjani</i>
		flower yellow to brownish	<i>P. spec.</i> 'Fiambala'
	segments smooth	epidermis rather green	<i>P. meglolii</i>
		epidermis brown	<i>P. tuberosus</i>
segments oval to elongated	mostly lateral flowering segments		<i>P. reticulatus</i>
	pronounced pointed tubercles	flower orange	<i>P. hickenii</i>
		flower purple red	<i>P. spec.</i> 'Neuquen'
	elongated blunt tubercles	all spines fine, needle-like	<i>P. valentinii</i>
		central spine(s) flat	<i>P. fischeri</i>
	central spine(s) flattened or cork-like, thickened		<i>P. australis</i>
segments spherical to club-shaped	central spine(s) not flattened nor cork-like, thickened	mostly lateral flowering segments	<i>P. neuquensis</i>
		spines appressed	<i>P. araucanus</i>
	flower apical	spines porrect	<i>P. skottsbergii</i>
		flower orange to brownish yellow	<i>P. spec.</i> 'Chubut'



Foto: Dr. Konrad Müller

The authors, Elisabeth and Norbert Sarnes, have been intensively involved with the cacti of Argentina and Chile for several years. Their special love is for the plants of Patagonia.

For a long time, the plants of the genus *Pterocactus* were considered well understood. The plants at Fiambalá, the unusual plants in Chubut and Neuquén and the error in *Pterocactus hickenii* and *Pterocactus skottsbergii* show that not everything in this genus has been clarified yet.

