



GYMNOCALYCIUMS

by

E. W. Putnam

NATIONAL CACTUS AND SUCCULENT SOCIETY

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Cover picture : *Gymnocalycium quehlianum* in the collection of H. and C. Broogh.

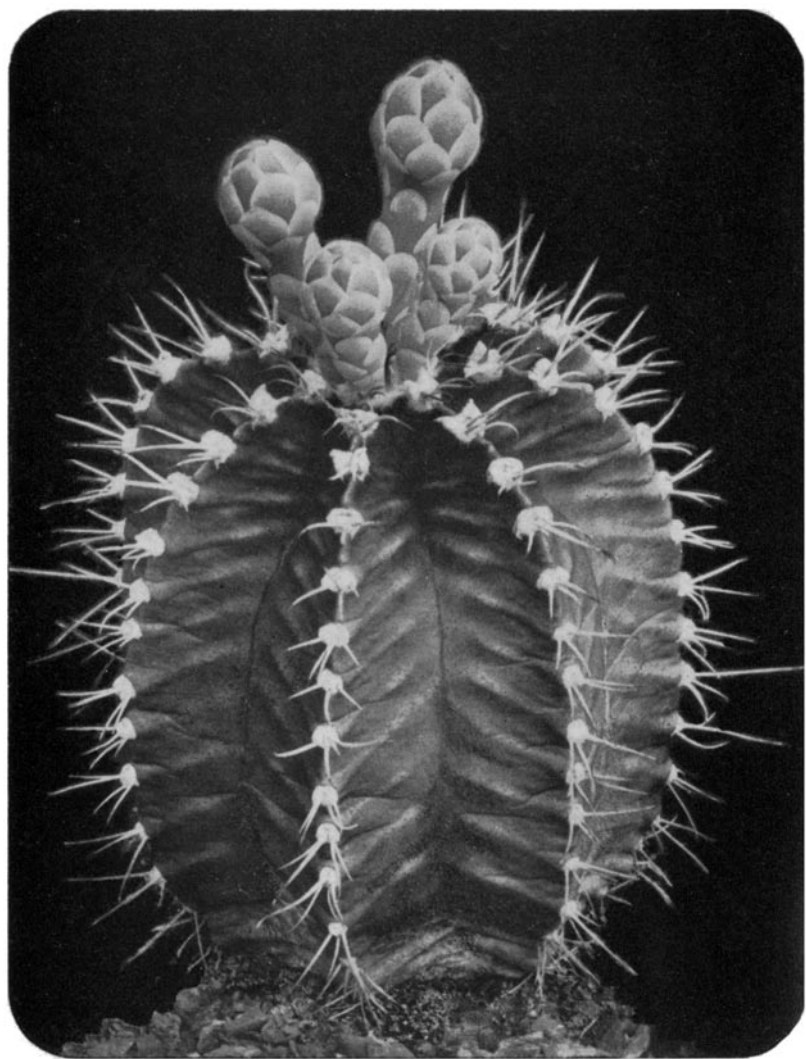
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GYMNOCALYCIUMS

A Guide for Growers

by E. W. Putnam

THE NATIONAL CACTUS AND SUCCULENT SOCIETY



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Frontispiece : *Gymnocalycium friedrichii* in the author's collection. This is one of the most attractive species in the genus *Gymnocalycium*. See pages 26 and 28 for notes and another view of the same plant.

Preface

Although I have had a strong interest in the whole of the cactus family for over twenty years, it has been the plants of the genus *Gymnocalycium* which have brought me the greatest pleasure and interest and have led to many valued friendships with like-minded enthusiasts in Britain and abroad. Because I have given many illustrated lectures on these plants during the past fifteen years or so, I have found myself classified as an expert on the genus. I would prefer to be called an enthusiast or even a fanatical collector and grower, for I have no claim to scientific expertise in this field. In writing this booklet I have had in mind the great majority of cactophiles whose pleasure comes more from cultivating plants than from botanical studies of them. The scientific study of *Gymnocalyciums* is very important but must be left in the hands of those competent in such matters. The results of the studies should not be ignored by the rest of us however. Because scientific articles are often written in technical language they are passed over by the average cactophile as boring or incomprehensible. I have tried in this small booklet to bring in some of the scientific aspects in everyday language for those who like to know just a little more about their plants than when to water them or what colour flowers they will have.

It is fitting to record here my thanks to all those who have aided and abetted my addiction to *Gymnocalyciums* over the years and have helped and encouraged me in the writing of this booklet. If this booklet has a dedication, then it should be to the memory of two stalwart friends now deceased, both lovers of *Gymnocalyciums*, in whose debt I shall always be: the late Annie Dixon of St. Albans and that great plantsman Ron Ginns. Among the many others to whom I owe much are John Donald, Günther Moser, Len Newton, Gordon Rowley, Geoffrey Swales, Dr Bohumil Schütz, Hans Till and Chris Webb. As far as this booklet is concerned, special thanks must go to Geoff Swales for much helpful criticism, advice and additional information used in the text, to Gordon Rowley for painstakingly reading my draft and advising me on the rules of nomenclature, to Helmut Broogh, Bill Keen and Peter Chapman for help with photography and design and to my wife Pamela who has endured a nightly typewriter symphony for a very long time.

Hooley, 1977.

E. W. Putnam.

Gymnocalyciums in the Cactus Family

The origins of the cactus family, the *Cactaceae*, in past times are somewhat obscure, largely because no authentic fossil remains have been discovered. However, modern geological and botanical science together indicate that the ancestors of the cacti most probably arose some millions of years ago in the northern part of the vast ancient continent which eventually split asunder and, after the two halves very slowly drifted apart, became our present-day continents of Africa and South America. The direct ancestors of the cacti were probably by then established in the area which later became partly flooded to form the Caribbean Sea. From here they spread into North and South America, slowly evolving new forms.

In South America races of globular cacti were evolved which were distinctly different from those evolving in North America and one group of these gave rise to the present-day *Lobivias*, *Rebutias*, *Notocacti*, *Gymnocalyciums* and others. The *Gymnocalyciums* seem to have arisen first somewhere in the huge area stretching from the Argentinian province of Cordoba across to the Atlantic coast of Uruguay. From here they apparently spread to the north, east and south and as far west as the foothills of the Andes. Today, with the exception of *Opuntia* and *Rhipsalis*, *Gymnocalycium* is the most widespread cactus genus in South America, being found as far south as the River Chubut in Patagonia and occurring over much of Argentina and Uruguay, Paraguay, the south-eastern fringes of Brazil and in the southern half of Bolivia.

Although, as will be discussed later, there can be problems in identifying species of *Gymnocalycium*, there is no difficulty at all in distinguishing *Gymnocalyciums* from other cacti. In general they are globular plants with relatively few ribs which are divided into blunt tubercles, often chin-like in shape. A horizontal cleft is plainly seen below the tubercle in nearly all species. The areoles are on the upper sides of the tubercles and may carry from three to about twenty-five spines, according to the species, though in the great majority of species the spine-count lies between five and nine. The spines vary considerably throughout the genus, from very thin and short to long and thick, and may be straight or curved. One species (*G. hamatum*) is described as having hooked spines. Some species branch freely to form clumps, others remain normally as single stems. Some (e.g. *G. andreae*) have large tap-roots while others (*G. damsii* et al.) have rather shallow and feeble root-systems. Flower-buds appear right alongside the areoles, at their upper side. The buds are bare, smooth and scaly, often quite long and snake-like. There are no spines or hair associated with the buds or flowers. In most species the flowers are quite large and are long-lasting, a single bloom sometimes lasting ten or twelve days before wilting.

Gymnocalyciums are considered to be fairly closely related to the genera *Weingartia*, *Neowerdermannia* and *Sulcorebutia*. I do not propose to discuss this subject here but it may be as well to mention that P. Hutchison proposed the inclusion of *Weingartia* and *Neowerdermannia* in the genus *Gymnocalycium* and published a number of name changes for this purpose. Thus one may come across *Gymnocalycium westii* (= *Weingartia westii*) and one or two other reclassified *Weingartias* in the literature or even in collections. Recent discoveries and studies by Lau, Donald and others indicate that *Weingartias* are in fact much closer to *Sulcorebutias* than to *Gymnocalyciums*, and it seems unlikely that any drastic reclassification of the genus *Gymnocalycium* will be acceptable to most modern specialists.

One other point on classification may be mentioned. In nurserymen's catalogues and some literature will be found the name *Brachycalycium tilcareense*. This name was one of the late Curt Backeberg's odder creations and it has found little favour among cactus specialists. The general view is that the name is unjustified and that the plant concerned should be correctly known as *Gymnocalycium tilcareense*.

Distribution

As has been mentioned already, *Gymnocalyciums* have a very wide distribution in South America, their habitats ranging from Patagonia in the south up beyond the Tropic of Capricorn in western Paraguay and southern Bolivia. Although the northerly species are found in the tropics, they are not necessarily tender or difficult to cultivate, since many grow at considerable heights in the mountains where the climate is far harsher than in the lowlands.

The natural habitats vary greatly. Some species are found among grasses and shrubs on low ground, others occur in rocky locations on mountainsides. Certain species (*G. griseo-pallidum* and *G. pseudomalacocarpus*) survive in the extremely hostile environment of the so-called Grey Hell of south-eastern Bolivia, growing in salt-caked soil close to the *salinas* (salt lagoons) of this otherwise arid waste.

A Note on the Seed-Classification of *Gymnocalyciums*

During the 1930's Fric and Kreuzinger pointed out that there are several distinct types of seed in the genus *Gymnocalycium* and they suggested that the plants could be classified on this basis. More recently Dr Bohumil Schütz and Prof. Dr Franz Buxbaum, working independently, have developed Fric and Kreuzinger's suggestions and have put forward classifications which are very similar to one an-

other for the plants in the genus *Gymnocalycium*. The seed-classification can be seen to have a good basis because species falling into the same seed group are found to be similar in other ways and to come from the same area.

The seed groups as suggested by Dr Schütz are regarded as subgenera of *Gymnocalycium* and he divides the genus into five such subgenera. The first of these, in which the plants have very large seeds, was originally called the subgenus *Macrosemineum*, but the international code for botanical nomenclature says that a subgenus which includes the type species for the whole genus must have the same name as the genus itself. The type species for the genus *Gymnocalycium* is *G. denudatum* and this is one of the large-seeded species. So the subgenus of the large-seeded *Gymnocalyciums* has to be called *Gymnocalycium* too.

Dr Schütz's classification is as follows:—

Subgenus *Gymnocalycium*

The seeds are black and from 1 mm to 3 mm in diameter, more or less round in shape. The ripe fruits are green or greenish. Species in this group include *G. denudatum*, *G. fleischerianum*, *G. uruguayense*, *G. schroederianum* and *G. leeanum*. The plants of this subgenus occur mainly in Uruguay and eastern Paraguay. (Dr Schütz divides this subgenus further into two Sections, putting the Paraguayan species, *G. fleischerianum* and *G. paraguayense*, into a separate Section from the rest.)

Subgenus *Ovatisemineum*

The seeds are black, about 1 mm in diameter, spherical and truncated at the hilum end. Ripe fruits are mainly greyish or bluish. This group includes *G. gibbosum* and its close relatives, *G. chubutense* and *G. brachypetalum*, as well as *G. baldianum*, *G. deesziaum* and *G. bruchii*. The last-named is separated, together with *G. albispinum*, into a separate Section from the rest.

Subgenus *Microsemineum*

This includes a very wide range of plants, all having small seed. The seeds are brown or black, mainly from 0.1 mm to 0.5 mm in diameter. Ripe fruits may be green, grey or blue. Dr Schütz divides this subgenus into five Sections thus:—

Section *Microsemineum*: *G. saglionis*, *G. pflanzii* et al.

Section *Hybopleura*: *G. hybopleurum*, *G. multiflorum* et al.

Section *Calochlora*: *G. calochlorum*, *G. capillaense* et al.

Section *Loricata*: *G. spegazzinii*, *G. bayrianum* and *G. cardenasianum*

Section *Mazanensia*: *G. hossei*, *G. mazanense* et al.

Subgenus *Trichosemineum*

Here the seeds are up to 1 mm in diameter, brown and shiny and distinctly shell-shaped. This group contains *G. quehlianum* and its

many relatives, such as *G. ragonesei*, *G. stellatum* and *G. vatteri*. The ripe fruits are blue-grey.

Subgenus Muscosemium

The seeds are up to 1 mm in diameter, light brown and spherical. The fruits are usually red when ripe. Dr Schütz divides the subgenus into two sections on the basis of the position of the flowers, the plants of his **Section Muscosemium** producing flowers from new areoles at the crown while those of **Section Periferalia** flower from older, lateral areoles. This is a distinctive group of species which is readily identifiable without examination of the seeds. There is a strong development of skin pigmentation among these plants, many showing red or red-brown patternings, especially when young. The subgenus includes some of the largest known species of *Gymnocalycium*, up to 30 cm in diameter.

In the latter part of this booklet the subgenus, where known, to which each species belongs is noted.

Some historical notes

The first *Gymnocalycium* known to European botanists and plantmen was *Gymnocalycium denudatum* which was described by Link and Otto in 1828 under the name *Echinocactus denudatus*. The name *Gymnocalycium*, derived from Greek words meaning "naked bud", was coined about twenty years later. Karl Pfeiffer, a remarkably versatile German physician, proposed that all the then known South American cacti with similar features to *Echinocactus denudatus* should be grouped in a new genus, *Gymnocalycium*. Little notice was taken of Pfeiffer's suggestions until the 1920's, when Britton and Rose published their great work on the cactus family and accepted Pfeiffer's proposed genus.

Prominent people in the history of the *Gymnocalyciums* include the Czech explorer and plant hunter A. V. Fric, who found large numbers of new cacti in the 1920's during his wanderings in South America. Somewhat later Curt Backeberg added further new species during his plant-hunting journeys before the second World War. After that war Friedrich Ritter's name became famous among cactophiles and he too found new species of *Gymnocalycium* in the wild. More recently there have been many dedicated plant-hunters searching the vast wildernesses of South America, among them Leopoldo Horst and the late Albert Buining, who brought us *Gymnocalycium horstii*, *G. horstii* var. *buenekeri* and *G. matoense* and rediscovered van Osten's long-lost *G. schroederianum*.

The study of *Gymnocalyciums* from the taxonomic point of view has in recent years been carried on by Dr Bohumil Schütz, Prof. Dr Franz Buxbaum, John Donald, Geoffrey Swales, Günther Moser,

Gerhart Frank, Hans Till and others. Some welcome tidying up of the profusion of specific names has been done by John Donald, who has brought order into the group of Bolivian species around *G. pflanzii*. A list of literature references for further study is given on page 13.

Cultivation

Gymnocalyciums offer very few problems in cultivation. They grow well in greenhouses in Britain as long as these are frost-free in winter. Some of the species are probably frost-resistant, in view of their natural habitats. *G. bruchii*, for example, may tolerate temperatures as low as ten degrees below zero on the Celsius scale, i.e. 18 degrees of frost on the Fahrenheit scale! Gymnocalyciums can be grown and flowered successfully as house-plants, if given sunny positions, preferably in south-facing windows, and can also be kept in garden frames with minimum frost protection.

The only species likely to show dissatisfaction under these conditions are those from Paraguay which belong to the group known as the Muscosemineae. The best-known of these is *Gymnocalycium mihanovichii*. Others in this group include *G. friedrichii*, *G. damsii* and *G. anisitsii*. These Paraguayan species enjoy a warm, moist climate during part of the year in their natural habitat, this being followed by dry heat. Under damp and chilly conditions in European greenhouses they are vulnerable to moulds and fungi. It is desirable to be particularly careful with these species in winter, either giving them just a little extra heat or else ensuring that they are not allowed to be both cold and moist. However, even these relatively sensitive species are robust enough to survive usually, even under adverse conditions, though they may suffer some damage from fungus attacks.

The soil used for Gymnocalyciums can be the same as is used for any other cacti. Different growers have different preferences but all the various soil mixtures seem to produce equally good results. A nourishing compost with good drainage properties can be made from a mixture of about three parts of John Innes No. 2 compost with one part of coarse sand and about a half to one part of damp peat or leaf mould. I have grown some hundreds of Gymnocalyciums successfully in such a mixture over a period of about fifteen years.

As with all cacti, Gymnocalyciums need plenty of light and clean, fresh air. The scorching of Gymnocalyciums by the sun is, in my experience, a very rare occurrence. They have tough skins which are not easily damaged by the sun or by insect pests. The plants can be watered generously when in growth, from late March to October

usually, though watering can start at the end of February in favourable years.

Flowering in my own collection in south-eastern England starts usually in late March, *Gymnocalycium bruchii* and *G. leeanum* v. *netrelianum* being the earliest of the genus to bloom each year. More and more species come into flower during April and May, the latter usually being the peak month for blooms, though there is much flowering in June also. After this many species are still flowering in July and August but by September the main flowering season for *Gymnocalyciums* is over. Nevertheless, from September onwards through the autumn and into the winter certain Paraguayan species, notably the varieties of *Gymnocalycium damsii* and also *G. anisitsii*, will continue to flower and it is not unusual for blooms to be open on these during the Christmas period.

Pests and Diseases

Gymnocalyciums have relatively thick, tough skins and are therefore resistant to the attacks of sucking insects and mites to some degree. In my own experience, attack by red-spider mite on these plants is quite rare. Other kinds of mites have been reported as attacking cultivated cacti in recent years but I have seen no indisputable evidence of *Gymnocalyciums* falling victim to these. An unsightly reddish-brown skin coloration which seems to start at soil level and creep upwards does occur occasionally: I have noted three plants so affected among about three hundred in my own collection in the past five or six years and have been shown others. This condition may be ascribable to a mite of some kind but I have been unable to detect any such organism on the plants concerned. Plants so affected can recover and produce new clean growth later. The condition described is not to be confused with the familiar yellow-brown discoloration which very commonly occurs on *Gymnocalycium multiflorum* plants as they grow older. This is so widespread that I take it to be a natural ailment of this species.

The root mealybug will infest *Gymnocalyciums* if not combatted vigorously. Infestations are seen as greasy bluish-white or pure white woolly tufts in the soil and on the roots and the mealybugs themselves are easily seen. These pests are not lethal to the plants but will tend to weaken them and should be eliminated. Systemic pesticides are effective.

Attacks by other pests are rare in my experience and plants of this genus are in general much more pest-resistant than *Rebutias*, *Lobivias* or *Coryphanthas*.

Fungus attacks can occur where plants are cultivated badly. These are readily avoided by maintaining hygienic growing conditions

and not allowing plants to be in wet soil at low temperatures. A hazard common to all cacti arises with dead flowers or fruiting remnants left on plants. Under damp conditions these can act as nurseries for various moulds and rotting can spread into the plant body. Such remains should be detached from plants once they are withered and easily detachable.

Propagation

Propagation of *Gymnocalycium* by seed is very simple. A good range of species is available from seed suppliers and the N.C.S.S. annual list commonly contains many species. I have raised considerable numbers of *Gymnocalycium* from seed and have found that most seed germinates somewhat more slowly than that of many of the popular cactus genera such as *Mammillaria* or *Notocactus*. On average, seed I have sown has taken three to four weeks to germinate under normal propagation conditions. Once germinated there is usually very little difficulty in raising the seedlings, though the Paraguayan species such as *G. friedrichii* and *G. damsii* do better if given a little extra warmth. Many species, as noted later in this booklet, can be brought into flower at the age of two to three years from seed. I sow seeds rather later than most enthusiasts and often have very good crops from sowings made in July in pans kept on the greenhouse shelves and covered with glass and tissue paper or with plastic covers.

Vegetative propagation is also quite simple. Species which branch readily, such as *G. bruchii*, *G. proliferum*, *G. damsii* var. *tucavocense* and some forms of *G. denudatum*, yield offsets which can be detached or cut off and set in soil for rooting during the warmer months. Any plant suffering damage to the crown will most probably produce a cluster of offsets. And any *Gymnocalycium* can be grafted for propagation purposes. Grafting alone may induce "pupping", but if not, it is simple to cut off the upper part of the plant (which can be re-grafted) whereupon the stump is practically certain to produce offsets. The grafted stump can be kept as a "mother-plant" for quite a long time and will provide a steady succession of offsets which can be removed and rooted.

Fruits are formed readily on *Gymnocalycium*s and the ripe seeds from them germinate easily, but it must be realised that such seed is likely to be of hybrid origin. True seed will only be obtained if stringent precautions are taken to ensure that only plants of the same species are pollinated from each other's flowers. To do this, the plants concerned have to be isolated not only from other plants but also from pollinating insects. The flowers of all cacti are visited in our English greenhouses by bees, hover-flies and other creatures capable of transferring pollen from flower to flower.

If seed from one's own plants is to be sown or distributed to other cactophiles it is most necessary that it should be plainly labelled as being of probable hybrid origin unless very strict precautions have been taken to ensure that it is truly seed of a known species.

The Anatomy of the Plants

The roots of our plants are vitally important but rarely seen. Good healthy roots are essential to healthy plants. In this genus roots may be massive in some species (several produce powerful tap-roots) or quite feeble in others. The tap-rooted species such as *G. andreae* do not, however, require specially deep pots; indeed, they will grow perfectly well in quite shallow containers, the large root simply coiling itself in the base of the container.

The stems, as mentioned earlier, are more or less globular, at least in young plants. Some species remain very flattened in appearance (*G. ragonesei*), while others become almost spherical or even somewhat columnar (*G. horridispinum*). Some branch freely, some branch occasionally and others branch only rarely or if damaged at the crown.

The flowers of *Gymnocalyciums* range in diameter from about 2 cm (*G. bruchii*) to about 7 cm (*G. multiflorum*), though larger individual flowers are reported from time to time. They are simple in structure and have smooth, scaly tubes. Double flowers occur occasionally, as in other genera of cacti. The colour can be white, yellow, red, purple-red, pink or (typically in *G. quehlianum* and its relatives) white with a red or pink centre. They are long-lasting, closing or partly closing by night and opening again by day for from five to twelve days, dependent upon weather conditions and on whether or not they have been pollinated. Very hot bright weather shortens the life of individual flowers and pollination leads to early wilting.

Flowers arise at the areoles, closely adjacent to and above the spine-clusters. Generally speaking, flowers appear at the crown or close to the crown, but exceptions are not infrequent. *G. schickendanzii*, for example, will often produce flower-buds from areoles quite low down on the stem and I have had flowers appear at ground-level areoles on an old plant of *G. friedrichii*.

The fruits of *Gymnocalyciums* can be quite colourful and attractive. Borg's statement (*Cacti*, 2nd Edn., 1951, p.296) that the fruits are "mostly red" is misleading. Blue or blue-grey fruits are far commoner in the genus and some species have fruits which are green when ripe. The fruits ripen fairly quickly and split to reveal the seeds.

Gymnocalycium seeds vary considerably in size, shape and colour from species to species. Seed shape and size are used by botanists as the basis for classifying species in this genus, as discussed on p. 4.

Identification of Plants

In this genus of over a hundred named species there are many which closely resemble one another. Moreover, nature does not manufacture plants to rigid specifications and it is quite futile to attempt an identification on the basis of a precise count of spines at areoles or stigma lobes in the flower. The number of spines at an areole can vary on one plant: *G. vatterii* for example will often have areoles with one, two or three spines on the same plant. Likewise the stigma lobe count can vary in flowers borne on the same plant. Flower colour is only slightly more reliable, since colour variants occur quite commonly. A white-flowered form of the typically red-flowered *G. baldianum* occurs in the habitat and has been known to appear among seedlings sown in cultivation. Pink-flowered forms of yellow or white-flowered species are quite common. A rather startling example of colour variation has occurred in my own collection with a plant of *G. damsii*. In successive years this produced white flowers and then pink flowers and, in a further season, white and pink flowers simultaneously!

So how can one put a name to an unlabelled plant? Frankly, quite often one cannot! However, the situation is not quite so bad as it may sound. A good many species are recognisable at a glance, due to habit of growth, spine formation and so on. *G. bruchii*, *G. multiflorum*, *G. horridispinum*, *G. friedrichii*, *G. denudatum* and *G. gibbosum* are among the species which can be fairly reliably identified from their general appearance, without recourse to flower-dissection, seed studies or other methods.

However, it is likely that plants lacking identification will not be among the easily recognisable species, unless the owner has had very little experience of cacti. I have had many plants brought to me for identification and frequently have been unable to do more than suggest a probable name or affinity. This is to a considerable extent due to the fact that a large number of names have been ascribed to plants which are not in fact distinctly different from one another, and that where genuine differences exist these are often very subtle.

An unknown plant can often be placed in its correct subgenus or series on inspection. The subgenera have been listed on pages 5-6 but it may be noted that two of them in particular are made up of quite similar plants which have distinctive features in common. Thus in the subgenus *Muscosemineum*, which includes *G. mihanovichii*,

one finds that most species show some evidence of reddish pigmentation, especially when dormant, have fruits which are red when ripe, rather similar spine formations and often quite sharply angled ribs. In this group flowering tends to be later in the year than for other *Gymnocalycium*s and the flowers are usually white or pink. On the other hand, in the subgenus *Trichomosemineum*, which includes *G. quehlianum*, the plants have rounded ribs, rather weak, short spines in most cases, often grey or grey-brown bodies and quite large white or whitish flowers with red or pink centres which appear in early summer.

To add to the identification problem is the fact that there are not a few hybrids in circulation. Some of these have been produced deliberately and their ancestry is known. Others have come, with invented names, from certain European nurseries. And some come from private collections, casually passed on as "*Gymnocalycium* species" without further information. One can only cultivate and observe such plants and compare them with plants whose identity is known. If they are indeed hybrids they may be worth keeping, if they have some unusually attractive characteristics. If they are not hybrids, only patient observation and comparison will establish their true identity. The more correctly identified plants one is able to see, at shows, in collections and nurseries or illustrated in reliable literature, the more certainly can one eventually identify the unknowns.

Names

Getting the right name on a plant of any genus in the cactus family can be remarkably difficult. The right name can only be the internationally accepted one which has been given to the plant in a proper manner according to the rules of the international botanical code. Unfortunately large numbers of names exist which are not correct under this code. There are also errors of identification, misspelt names and other sources of confusion. I have attempted here to give notes on as many as possible of the names, right or wrong, which are likely to be found on *Gymnocalycium*s, but it is very nearly a certainty that the reader will look for names not mentioned in this booklet. To deal with such "mystery" names one can first consider whether they are only misspellings. The generic name *Gymnocalycium* itself is quite often misspelt (and mispronounced) as "*Gymnocalcium*". Other common spelling errors include "*hypobleurum*" for *hybopleurum*, "*asterias*" for *asterium* and "*stenogosa*" for *stenogonum*. The second part of the name of a species, known to botanists as the *specific epithet*, is often followed by a *variatal epithet*. For example *Gymnocalycium gibbosum* has a variety whose full name is *Gymnocalycium gibbosum* var. *nobile*. It is quite com-

mon for such varietal epithets to be used incorrectly, so that one may find this particular plant labelled as "*Gymnocalycium nobile*".

Another quite common error is the confusion of *Gymnocalycium* with the North American cactus genus *Gymnocactus*. Many plants of *Gymnocactus knuthianus* can be found labelled as *Gymnocalyciums* and even entered in cactus shows as such.

Note on the Botanical Nomenclature Code

Since completing the writing of this booklet it has been drawn to my attention that the international Code of Nomenclature now requires all plant names that formerly ended in *-erii* and *-erianus* to be changed to that they end in *-eri* or *-eranus*. *Gymnocalycium moserianum* thus becomes *G. moseranus* under the new rule. I have not made this alteration to the names in this booklet but a note has been added wherever appropriate.

Literature

The most up-to-date work in English covering the genus *Gymnocalycium* is the revised and translated edition of Curt Backeberg's *Cactus Lexicon* which gives notes on the validly named species and has 26 photographs of *Gymnocalyciums*.

The principal reference books are as follows:

- | | |
|-------------------------------------|---|
| C. Backeberg | <i>Die Cactaceae</i> Vol. III (1959).* |
| | <i>The Cactus Lexicon</i> (English edition, Blandford Press, 1978). |
| N. L. Britton and J. N. Rose | <i>The Cactaceae</i> , Vol. III (1920). |
| J. Borg | <i>Cacti</i> (2nd edition, 1951). |
| | * in German |

Many important articles appear in cactus journals, especially the journals of the American, Czechoslovak, Dutch and German cactus societies and three British journals; the *Cactus & Succulent Journal of Great Britain*, the *National Cactus & Succulent Journal* and *The Chileans*. Those interested in the classification of *Gymnocalyciums* through their seed forms should consult the article by Dr Bohumil Schütz in the *National Cactus & Succulent Journal*, **24**, 73 (December 1969). A further work, regrettably out of print, was my own *Synonymy of the Genus Gymnocalycium 1845-1967*, published by the Succulent Plant Institute. This was updated by Dr Schütz in a limited edition in the Czech language in 1974, also now out of print, but we hope to produce jointly a further fully up-to-date edition in due course.

Species

In this section I have tried to list all the names likely to turn up in commercial plant lists and seed lists or to be found in cactus literature, but only the plants with valid botanical names are described in any detail. It is unfortunately not possible to provide photographs of all the plants, but as many photographs as possible have been included.

The subgenera to which the species belong are indicated, where known as follows:—

- G: Gymnocalycium (*Macrosemineum*)
- Mic: Microsemineum
- Mus: Muscosemineum
- Ov: Ovatisemineum
- Tr: Trichomosemineum

G. achirasense. A recent catalogue name for a plant in the *G. multiflorum*-*G. horridispinum* complex. (Mic.)

G. albispinum Backbg. A close relation of *G. bruchii* with dense spination. Differs from *G. bruchii* in the spines standing out from the stem, not appressed. (Ov.)

G. andreae (Böd.) Backbg. A very fine species, easily raised from seed and brought into flower as seedlings at three or four years old. A clumping species of very rounded appearance in which the skin is dark green or often almost black. The spines are short and weak, whitish with brown at the base. Usually seven spines arranged radially and up to three centrals. The flowers are large, lustrous yellow, up to 5 cm in diameter. From Córdoba, Argentina, (Ov.) Two varieties have been described: *G. andreae* var. *grandiflorum* and *G. andreae* var. *svecianum*.

G. anisitsii (K.Schum.) Br. & R. This species has been known for over seventy years. It is a free-flowering member of the Muscosemineum subgenus which is very easy to raise from seed and easy to bring into flower at an early age. The flower is almost pure white. The fruits are dusky red. A smallish species whose stems tend to become columnar with age, reaching about 10 cm in length. From Paraguay. (Mus.)

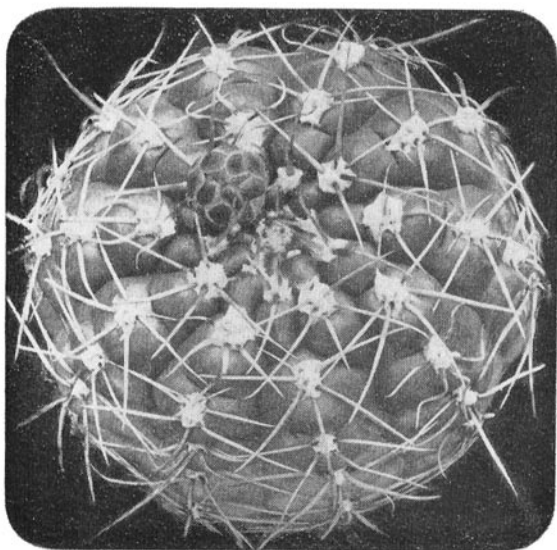


Fig. 1. GYMNOCALYCIUM ARTIGAS Herter

G. antherosacos. This name appeared in Friedrich Ritter's reports a good many years ago and corresponds to FR 964. I do not know the plant at all and have not seen it described.

G. antherostele. This is FR 963 and the same remarks apply to it as for *G. antherosacos*.

G. artigas Herter. This is a typical member of the Uruguayan group of species having large seeds (subgenus *Gymnocalycium*). The stem is dark green and the ribs are rounded. It is close to *G. uruguayense* in all respects and might well be regarded as a variety of that species. The flowers are yellow with brownish yellow outer petals. Habitat: Uruguay (G).

G. asterium. See *G. stellatum*.

G. baldianum (Speg.) Speg. One of the most attractive members of the genus when flowering, *G. baldianum* is a plant to be recommended strongly to all cactophiles. It flowers readily from an early age and offers no cultivation difficulties. The flowers are substantial, up

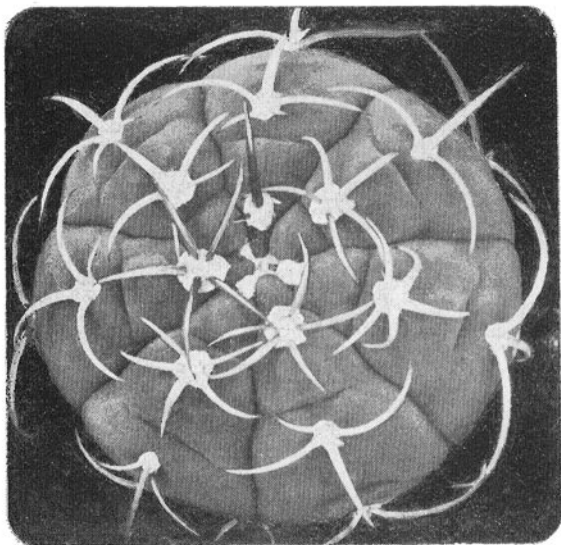


Fig. 2. GYMNOCALYCIUM BAYRIANUM Till

to 4 cm in length, and are commonly of a most rich purple-red colour. The stem, described by Backeberg as "greyish blue-green" is rather variable in colour in cultivation and in some specimens is almost blue-black. A white-flowered variant has been reported from the habitat and some years ago I myself saw white-flowering seedlings of this species among a large batch of normal seedlings.

Backeberg comments that this species is self-fertile, but in view of the ease with which it hybridises with other *Gymnocalyciums*, notably *G. andreae*, I am a little doubtful about this and suspect he may have been mistaken. Few if any *Gymnocalyciums* seem to be self-fertile in my experience.

This species may be listed under the names *G. venturianum* or *G. sanguiniflorum*. Habitat : Catamarca, Argentina (Ov.).

***G. bayrianum* Till.** This recently named species was collected in Tucuman Province, Argentina, by Schickendantz and distributed as "*Gymnocalycium* sp. from Cerro Medina". It is a handsome plant with strong curving spines whose formation has given rise to the name 'Buffalo horns *Gymnocalycium*'. It is clearly a close relative of *G. cardenasianum* and *G. spegazzinii* and is placed by Schütz

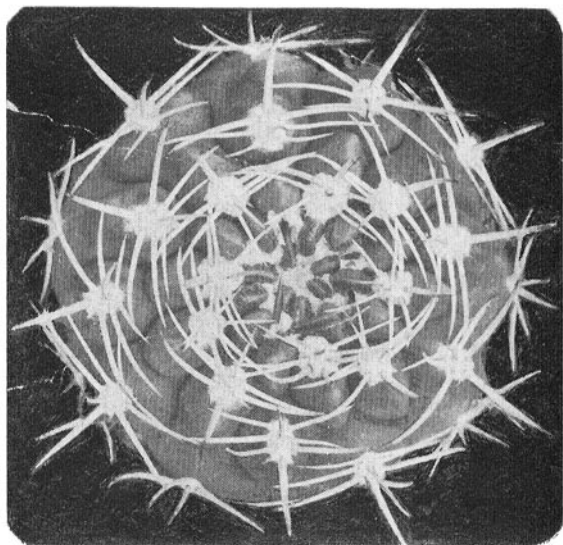


Fig: 3. GYMNOCALYCIUM BICOLOR Schütz

in his Section Loricata of the subgenus *Microsemineum*. The flower is white with a reddish flush in the throat.

The plant is available as seed and gives no problems in cultivation. Habitat: Tucuman, Argentina (*Mic.*).

G. bicolor Schütz. A species with very distinctive spination, from which it gets its name. There is one central spine which is strong and blue-grey, while two or three radial spines of similar colour and thickness point downwards but curve somewhat outwards from the stem. The remaining radial spines, three or more, are thinner, weaker and whitish in colour. Typically the flower is white, but my own plant has pink flowers. This kind of flower colour variation is not uncommon in *Gymnocalyciums*.

G. bicolor falls in Schütz's Section *Hybopleura* of the subgenus *Microsemineum*. Habitat: Córdoba (*Mic.*).

G. blossfeldii, also as *G. blossfeldiorum*. A strongly spined species, probably akin to *G. hybopleurum*, but as yet not validly described.

G. bodenbenderianum (Hoss.) Berg. A good many dubious, possibly hybrid, plants are in collections under this name. It is in any case a matter of opinion as to whether this is a "good" species, for it is very close to *G. stellatum* and *G. quehlianum* and has been regarded as virtually synonymous with one or the other by some authors. It is described as being a very flat plant with 11-14 low, broad ribs divided by sharply defined "chins" into trapezoid tubercles. In all main respects it is barely distinguishable from *G. stellatum*. The flower is large and white with a rosy throat. Habitat : Córdoba and La Rioja (Tr.).

(N.B. According to the most recent version of the International Code of Nomenclature, the name of this species should be spelt **bodenbenderanum**).

G. bolivianum. An invalid name for a form of *G. pflanzii*.

G. borthii Koop is a newly described species closely related to *G. gibbosum*. The description appears in *Kakteen und andere Sukkulente*, February 1976. The flower is white with a pink throat. Habitat: San Luis, Argentina (Ov.).

G. bozsingianum Schütz. First described in the Czech journal *Kaktusy* in 1977 (*Kaktusy* XIII, 6, pp 124-126), this plant first appeared in the catalogue of the firm of Uhlig in Germany in 1961 under the designation "Gymnocalycium Chep. V", which was in fact an abbreviation of Chepes Viejo, the locality where it had been collected. This species belongs to the subgenus *Microsemineum* and seems to be closely related to *G. hossei*.

I have not grown *G. bozsingianum* myself. Dr Schütz describes it as solitary, non-branching, with 12 ribs, areoles with five (or, rarely, three) radial spines. Usually no central spines though very rarely one. Flower pink with red throat, petals olive-brown on the outside. A photograph of a seed-raised plant in flower shows strong similarity to *G. hossei*.

Habitat: Chepes Viejo, La Rioja, Argentina (Mic.).

G. brachyanthum (Guerke) Br. & R. is very similar to *G. monvillei*, of which Backeberg regarded it as only a form. See *G. monvillei*.

G. brachypetalum Speg. is very close to *G. gibbosum* and *G. chubutense*. Habitat: Rio Negro, Argentina (Ov.).

G. brevispinum=*G. leeanum* v. *brevispinum*.

G. brevistylum is another of the names published in Friedrich Ritter's list (FR 1133) which has not, to my knowledge, been made valid. I do not know this plant.

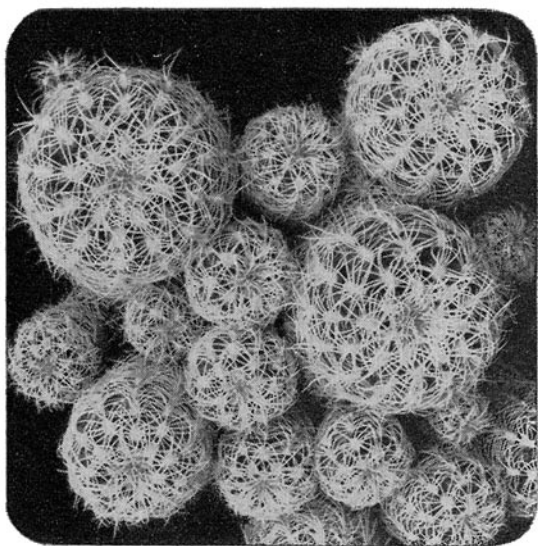


Fig. 4. GYMNOCALYCIUM BRUCHII (Speg.) Hoss.

G. bruchii (Speg.) Hoss. A very well-known and attractive species which is easily recognised. Although very variable, all the forms are similar in growing as tight clumps of small heads. The spines are white or whitish and may vary from being short and appressed to long and outstanding. They are very numerous (up to 25 per areole) and in some forms cover the stems so completely that the plants look white. In other forms the dark bluish-green stems show through the spines.

This species is very easy to propagate as side-shoots can be detached readily and often already have roots.

The flower is usually whitish with a slight violet or pink tinge but more strongly coloured flowers occur on some plants. One of my own has flowers of a very attractive deep pink. I have not been able to confirm the existence of a yellow flowered form.

Flowering begins very early in my collection, often in the first week of April.

G. albispinum in my opinion is only a form of *G. bruchii* with longer and more outstanding spines than the type.

G. lafaldense is an invalid name in common use for forms of *G. bruchii*. Habitat: Córdoba, Argentine (Ov.).

G. buenekeri (Buin.) Swales. This plant was first described in 1970 as *Gymnocalycium horstii* v. *buenekeri*. Albert Buining and Leopoldo Horst found it at Sao Francisco de Assis, about 120 miles from the habitat of *G. horstii* in Rio Grande do Sul, Brazil. It resembles *G. horstii* in general appearance; Buining noted it as differing in having stouter spines, a darker green epidermis and a deep pink flower.

Geoff Swales has concluded from a study of the seed and fruit that *G. buenekeri* is a quite distinct species from *G. horstii*. (See *The Chileans*, No. 30, p. 150).

A distinction between *G. horstii* and *G. buenekeri* is that the epidermis of the latter is not merely darker in colour than that of *G. horstii* but is matt and almost velvety in appearance as against the smooth, glossy skin of *G. horstii*. It seems to be a perfectly easy species to cultivate though I do not find it very ready to flower. Habitat: Rio Grande do Sul, Brazil.

G. caespitosum. Name used incorrectly for both *G. gibbosum* v. *caespitosum* and *G. quehlianum* v. *caespitosum*.

G. calochlorum (Böd.) Y. Ito. This species and its variety, *G. calochlorum* v. *proliferum*, are both to be found under the name *G. proliferum* in nurseries and collections. It is a strongly caespitose plant, quickly forming many-headed clumps of rather flattened, sub-globose stems.

Backeberg distinguishes the variety *proliferum* from the type by the latter having a darker epidermis, much larger flowers, which can be brownish white or pure white with pink throat, and minor differences of spination and areoles. This species grows rapidly and flowers well. It is very easy to propagate by splitting up the clumps. Habitat given as Argentina for the type species and the variety, the precise locality being unknown. Belongs in Schütz's Section Calochlora of the subgenus Microsemineum. (*Mic.*)

G. capillaense (Schick.) Backbg. A member of a rather confused group of species which include *G. sigelianum* and *G. sutterianum*. *G. capillaense* is a small species with weak spination and is notable for its large shell-pink flower which can be up to 7 cm long and 6 cm broad. The fruits are light blue when ripe. Schütz classes it as a member of his Section Calochlora. Habitat: Córdoba, Argentina (*Mic.*).

G. cardenasianum Ritter. A popular and attractive species closely related to *G. spegazzinii* and *G. bayrianum*. The stems are flattened globose, light or dark grey. The spines are strong, numerous and

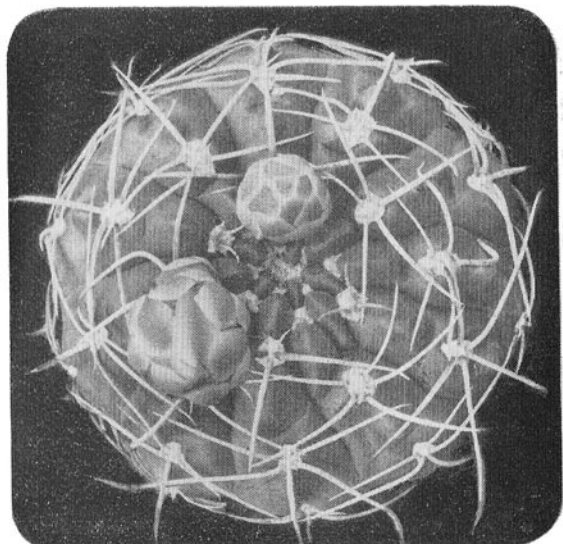


Fig. 5. *GYMNOCALYCIUM CAPILLAENSE* (Schick.) Backbg.

somewhat variable in shape. Mostly they curve back towards the stem but in some plants they are straight and outstanding. The flowers are pink and often fail to open fully, due to being impeded by the spines. In my experience this species, like *G. spegazzinii*, does not flower readily at an early age. Habitat: Tarija, Bolivia (Mic.).

G. carminanthum Borth & Koop. First described in 1976, this striking red-flowered species appears to be an outlying member of the *hybopleurum*—*mostii*—*multiflorum* group which are mostly found in Córdoba. At the time of writing, I have not seen this plant at all and can only rely on the description and excellent colour photograph given in *Kakteen und andere Sukkulente*, 27, 4, where the authors also give monochrome photographs of eight collected plants showing considerable variation in spine formation. The spines are powerful, resembling those of *G. hybopleurum* or *G. multiflorum*, mostly curving back over the body. Occasional specimens have erect central spines. The body is matt green with 6-11 rounded ribs. The large flowers are carmine-red. Habitat: Catamarca, Argentina (Mic.).

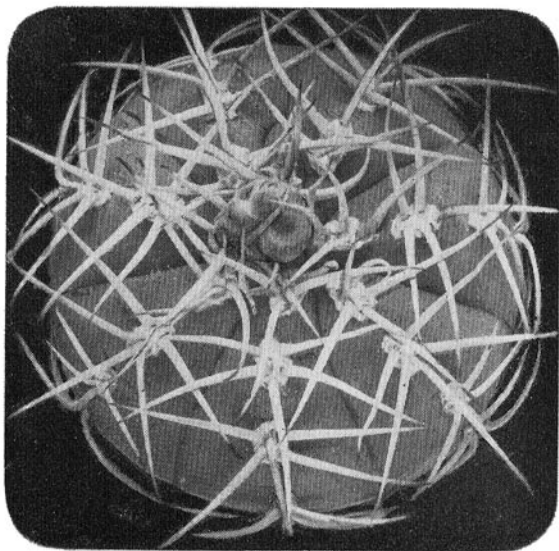


Fig. 6. *GYMNOCALYCIUM CARDENASIANUM* Ritter

G. castellanosi Backbg. This attractive species is quite common in cultivation. Young and small plants flower readily. The flowers are white or slightly pinkish, with a pinkish flush deep in the throat. The plant belongs in Schütz's Section *Mazanensia* of the subgenus *Microsemineum* and is rather less well-spined than its relatives in this Section. There are 5-7 shortish white spines, often dark at the tips, arranged radially at each areole, with one white central spine at most. The ribs are numerous (10-12) and are well rounded. The epidermis is dull matt or bluish green. Habitat: Córdoba, Argentina (*Mic.*).

G. centeterium = *G. valnicekianum*

G. chiquitanum Card. The northernmost member of the Section *Mazanensia*, from Santa Cruz, Bolivia. This species is not very common in cultivation and is one of the few members of the genus that I have not grown. It is a green-skinned plant with plump, well-rounded ribs and 5-6 thin curving spines per areole. The flower is

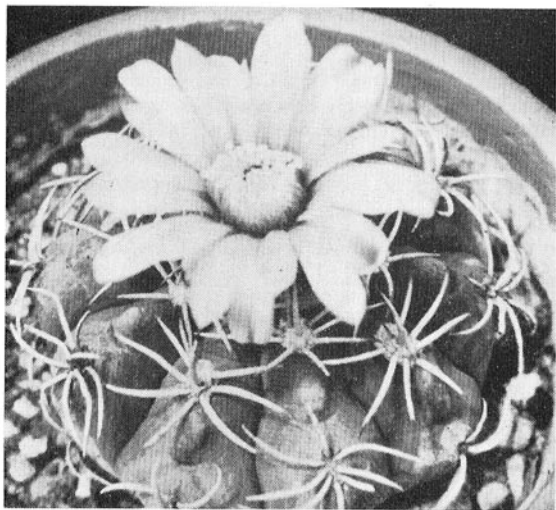


Fig. 7. GYMNOCALYCIUM CASTELLANOSII Backbg.

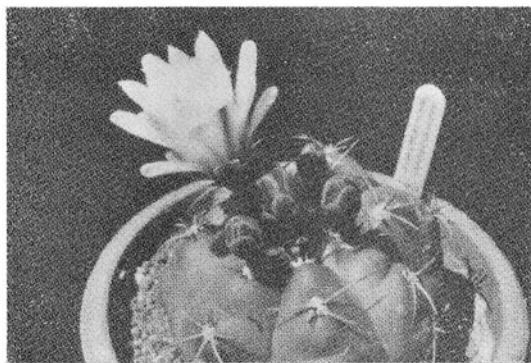


Fig. 8. GYMNOCALYCIUM CHIQUITANUM Card.

pinkish to lilac-pink with a red throat. Geoff Swales finds that it dislikes too much sun and will stop growing and turn brown if too hot or dry. Habitat: Santa Cruz, Bolivia (*Mic.*).

G. chloranthum. This is an obscure name of unknown origin. I have plants under this name which have a distinctive appearance and flower readily but which seem to have no obvious affinities with other species. I suspect that this may be a hybrid.

G. chlorostictum FR 1181. This as yet undescribed plant from the Paraguayan Chaco (the name is a *nomen nudum*) appears to be another of the many forms of *G. mihanovichii*. The specific name refers, I believe, to green speckling on the epidermis, although my own plants do not show this feature. (*Mus.*)

G. chubutense (Speg.) Speg. Not common in cultivation, this is truly a dwarf form of *G. gibbosum* from the southern end of its range in Argentina. The spines are shorter than in the typical *G. gibbosum* and the plant is smaller and is slow-growing. It was originally described as a variety of *G. gibbosum* and this seems more acceptable than regarding it as a separate species. The flower is white. Habitat: Chubut, Argentina (*Ov.*)

G. chuquisacanum Card.=*G. pflanzii* v. *izozogsii* fa. *chuquisacanum*.

G. cintiensis (Card.) Hutch=*Weingartia cintiensis* Card.
(This is one of the *Weingartias* reclassified as *Gymnocalycium* by the American taxonomist Paul Hutchison.)

G. comarapense Backbg.=*G. pflanzii* v. *zegarrae*.

G. cumingii (Br. & R.) Hutch.=*Weingartia cumingii* (Hopff.) Werd.

G. curvispinum Fric=*G. valnicekianum*.

G. damsii (K.Sch.) Br. & R. An attractive species from northern Paraguay, easily raised from seed to flowering in three years (sometimes two years). Seedlings are delightfully patterned with bright green and dark red when very young. Flower colour is variable, typically white but quite often pink. This is a plump species with somewhat rounded ribs. It appreciates a little more warmth in winter than is needed by the Argentinian *Gymnocalycium*s. The skin colour often varies seasonally from green to coppery brown. Like other species of the subgenus *Muscosemineum*, *G. damsii* has a high proportion of a red pigment (betanin) in the epidermis.

Backeberg named four varieties of *G. damsii* (vars. *centrispinum*, *rotundulum*, *torulosum* and *tucavocense*). There seems to be very

little justification for the first three (plants of var. *centrispinum* from seed often lack central spines whereas some plants of *torulosum* have them!). The var. *tucavocense* seems to differ in being remarkably prolific in branching and in its very precocious flowering. Tiny seedlings will branch and flower sometimes when only 1.5 cms in diameter.

Backeberg's *G. griseo-pallidum* from the salt-pan desert area on the Bolivia-Paraguay borders may well be another variety or local form of *G. damsii* which has become adapted to the peculiar local conditions of that region. Habitat: N. Paraguay (*Mus.*).

G. deeszanum Döhl is a dark-green skinned plant with 6-8 thin off-white or yellowish spines at each areole. The flower is creamy or brownish-white, very similar to that of *G. gibbosum*. Although not a specially striking species, it flowers readily and is quite common in cultivation. Habitat: probably Córdoba, Argentina (*Ov.*).

G. delaetii=*G. schickendantzii* v. *de-laetii*.

G. denudatum (Link & Otto) Pfeiffer. This very well-known species is common in cultivation. It has been called the Spider Cactus because of the weak spines which seem to cling to the stem. The spines are thin and yellowish, arranged mostly in clusters of five, all radial. The plant has broad well-rounded ribs and the epidermis is green. The flowers, produced very freely, are usually pure white and have long tubes, though pink flowers occur quite frequently. This species is very easily raised from seed and flowers well as a young plant.

G. denudatum occurs in a very large area of north-eastern Argentina and south-eastern Brazil. It has been said to occur in Uruguay too but there is doubt about this. Over its very large habitat it shows some variation and there are local forms showing variations in spination and stems. Some twenty-six varieties have been named at various times and a few of these names still turn up in collections, though in most cases the distinctions between the varieties are slight and unimportant—several were based upon the number of ribs, which can vary from five to eight. Even Backeberg rejected the plethora of "varieties" and noted that *G. denudatum* v. *backebergii*, one of those seen quite often in collections today, is only a juvenile form of the type which later becomes indistinguishable from it. Habitat: Misiones, Argentina and Rio Grande do Sul, Brazil. (*G.*)

G. eluhilton. A catalogue misspelling of *G. euchlorum*.

G. espostoa. A mystery name which keeps reappearing. Probably *G. gibbosum* v. *gerardii*.

G. euchlorum=*G. hybopleurum* v. *euchlorum*.

G. eurypleurum, FR 1178. One of the *G. mihanovichii*—*G. friedrichii* group of species from Paraguay. (*Mus.*)

G. eytianum=*G. pflanzii* v. *eytianum* (Card.) Donald.

G. fidaianum=*Weingartia fidaiana* (Backbg.) Werd.

G. fleischerianum Backbg. This is an attractive and interesting species from Paraguay which is very variable in form and spination. It is a very green-looking plant, often with a glossy appearance, with prominent rounded ribs. It can have up to 20 spines per areole and these are usually fairly long ($2\frac{1}{2}$ cm) and more outstanding from the body than in *G. denudatum*, to which it is related. The flower is white or slightly flushed with pink and has a deep pink flush in the throat. Well worth growing, it is easily raised from seed and comes into flower when quite young. Three former varieties of *G. denudatum*, vars. *andersohnianum*, *heuschkelianum* and *meiklejohnianum*, have been renamed as varieties of *G. fleischerianum* by Dr Schütz. Habitat: Paraguay (*G.*).

(*N.B.* In accordance with the recent ruling of the International Code of Nomenclature, the name of this species should now be spelt *fleischeranum*.)

G. fricianum Plesnik. A member of the subgenus *Muscosemineum* from Paraguay. Closely related to *G. tudaе*. (*Mus.*)

G. friedrichii Pazout. This well-known and very beautiful species was originally described as a variety of *G. mihanovichii*, to which it is undoubtedly very closely related. The body is reddish-brown, with sharply angled ribs and a distinctive horizontal banding of parallel markings. This species and others in the subgenus *Muscosemineum* do best when grown in a compost containing some peat or leafmould in my experience, and prefer a little extra winter warmth if possible.

The flower is pink and small plants flower freely. *G. friedrichii* and the related Paraguayan species of the subgenus *Muscosemineum* are quite easily raised from seed but for best results the seedlings need winter warmth and a little moisture in their first year or two, otherwise growth can be exceedingly slow and winter losses may occur.

The famous "Red Cap" *Gymnocalycium*, which is found under various names but should strictly be called *Gymnocalycium* cv Hibotan, is a cultivar of *G. friedrichii*. Notes on this plant will be found under 'Cultivars and Hybrids' on p. 63.

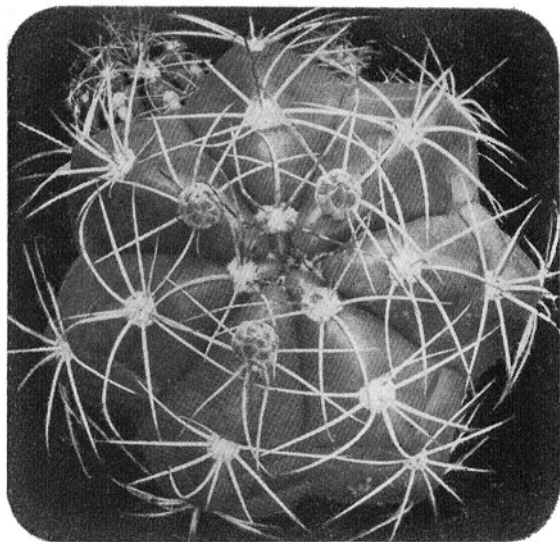


Fig 9. GYMNOCALYCIUM FLEISCHERIANUM Backbg.

The habitat of *Gymnocalycium friedrichii* is the Paraguayan Chaco. (Mus.)

Gymnocalycium friedrichii v. *moserianum* Pazout is a variant from Yrendague, Paraguay. This plant is sometimes confused with *Gymnocalycium moserianum*, a member of the subgenus *Trichomosemineum*.

Gymnocalycium friedrichii v. *pazoutianum* is another variant, from Pirareta, and was first described as *G. mihanovichii* v. *piraretaense*.

G. gerardii=*G. gibbosum* v. *gerardii*.

G. gibbosum (Haw.) Pfeiffer. This was the first plant of this genus to be brought to Europe and was described by A. H. Haworth in 1812. It is a very robust, almost indestructible species which is very common in collections. It has a very wide area of distribution in southern Argentina and shows a good deal of variation in spination and growth habit. Although typically the stems are darkish, sometimes nearly blue-black, variants with green stems are not uncommon. The spines are needle-like, standing out well from the areoles and are normally whitish with a brownish-yellow base. In the

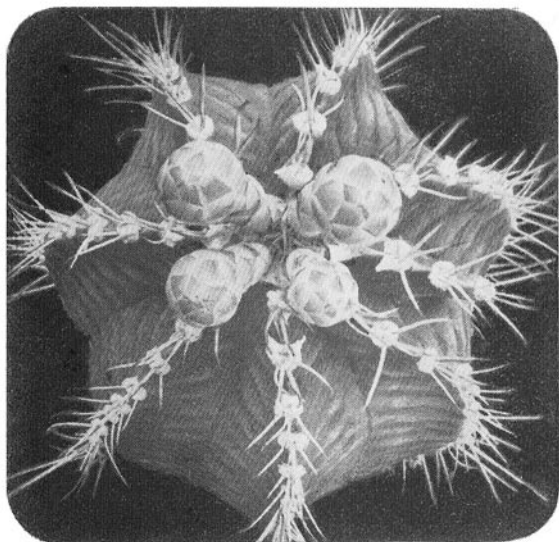


Fig. 10 GYMNOCALYCIUM FRIEDRICHII (Werd.) Pazout

variety *nigrum*, where the stem is very dark, the spines are almost jet-black. The fruits also are almost black in their early stages. The number of spines at each areole can range from eight to about eighteen and includes from one to five central spines. In the variety *nobile* the spines are more numerous than in the type-species, there usually being about twenty. The flower is large, white and lustrous, about 6 cm long.

As with *G. denudatum*, great numbers of varieties of this species have been named (Geoff Swales reports 29 varietal names in the literature!) but few of them are of any consequence. The two mentioned above, *v. nigrum* and *v. nobile*, are fairly distinctive, as also is *v. leonense*. This latter is identical with *G. chubutense*. *G. gibbosum v. gerardii* is a variant with longer and somewhat twisting spines. Habitat: Southern Argentina: Chubut, Rio Negro, Santa Cruz. (Ov.)

G. glaucum Ritter. This is one of Friedrich Ritter's discoveries (FR 961), first described in 1963. It was one of the rarest of *Gymnocalyciums* in cultivation for a long time but more plants have come in recently and seed is offered fairly frequently. It is a very grey-

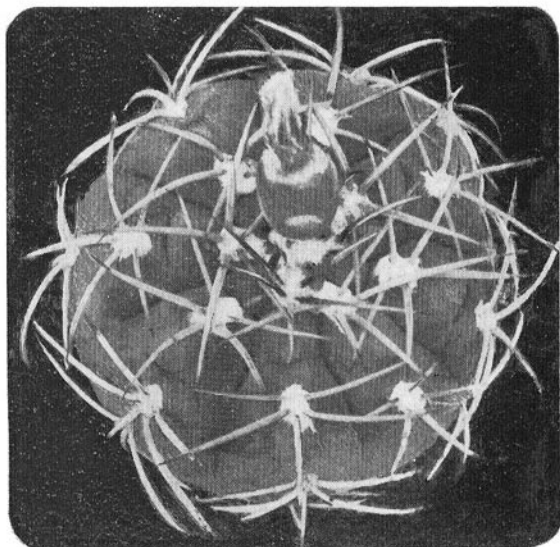


Fig. 11. GYMNOCALYCIUM GLAUCUM Ritter

skinned plant of slow growth. The flower is white with a reddish or pinkish flush in the throat. Although the seed is on the large side (about 1 mm), this species seems to be a relative of *G. mazanense* and is thus a member of the Section *Mazanensia* of the subgenus *Microsemineum*.

The only superficially similar *Acanthocalycium glaucum* was distributed as *G. glaucum* at one time. The *Acanthocalycium* has a rather bluer epidermis, its areoles are differently sited and the horizontal cleft below the areole is absent. The flower of the *Acanthocalycium* is yellow and is produced from a brown furry bud quite unlike a *Gymnocalycium* flower-bud. Habitat: Catamarca, Argentina (*Mic.*).

G. grandiflorum Backbg. This is a large-flowered member of the *G. mostii*—*G. multiflorum* group of species. Backeberg named it from plants he saw in a consignment in Buenos Aires, without exact knowledge of their origin. He considered that the very large pure white flower entitled it to be regarded as a separate species. The plant is unknown to me except in books. Habitat: N.W. Argentina (*Mic.*).

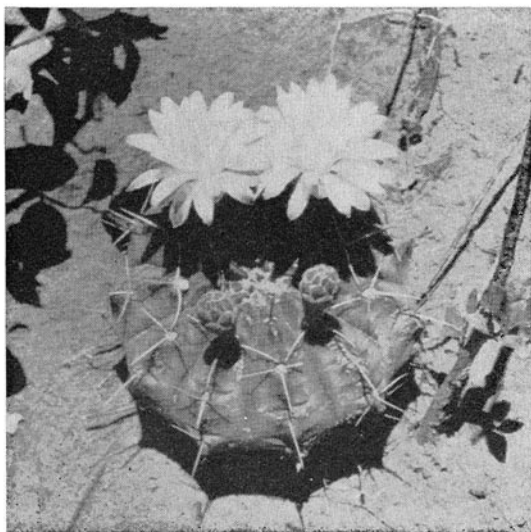


Fig. 12. GYMNOCALYCIUM GRISEO-PALLIDUM Backbg.

G. griseo-pallidum Backbg. On the borders of Bolivia and Paraguay lies an almost waterless region of thorn-scrub known as the Grey Hell. In this area there are many salt-pans and shallow brine pools known as *salinas*. Several *Gymnocalyciums* closely related to *G. damsii* have been found in this inhospitable territory and *G. griseo-pallidum* is one of these. The plants are grey-skinned, resembling *G. damsii* and *G. anisitsii* in the shape of the ribs, which show horizontal furrows on their flanks, a feature considered by Backeberg to be unique to this species. This would seem to be a distinctive race of plants derived from *G. anisitsii* or *G. damsii* or a common ancestor, which is adapted for life in this peculiarly harsh environment. Backeberg gives no flower data. My own plants have had off-white flowers resembling those of *G. damsii*. Habitat : San José Bolivia. (Mus.)

G. griseum seems to be a catalogue error for either *G. glaucum* or *G. griseo-pallidum*.

G. guanchinense Schütz is from the valley of the River Guanchin near the borders of Catamarca and La Rioja provinces in Argentina.

Backeberg considered it to be only a form of *G. weissianum* or *G. mazanense*, which it resembles closely. *G. guanchinense* v. *robustior* (also as v. *robustius*) was introduced by F. Ritter under his number FR 22b. This variety has stouter spines than the type. Both species and variety seem to be rather ill-defined to me. A plant I have as *G. guanchinense* flowers freely with pink-centred flowers. Habitat: Argentina (see above). (Mic.)

G. guerkeanum (Heese) Br. & R. is a small species which readily forms many-headed clumps, producing its "pups" from below ground-level much in the manner of *Notocactus ottonis*, which is also a native of Uruguay. The plants are matt-green with clusters of small, weak, yellowish spines which are reddish-brown at the base. The flowers are yellow. This species and the other yellow-flowering *Gymnocalycium*s from Uruguay all closely resemble *G. uruguayense*, of which they are at most surely only varieties. All are easy to cultivate and flower when young.

Many reference books, including those of Backeberg, Borg and Britton and Rose, give the habitat of *G. guerkeanum* as Bolivia. This is quite incorrect and arose from an error made as long ago as 1904. It has been confirmed in recent years that the true habitat is along the Uruguay-Brazil border. Habitat: Uruguay (G.).

G. hamatum Ritter. In the absence of a valid botanical description of this species there is some confusion over its identity. Backeberg commented (in his *Kakteenlexikon*) "Apparently still undescribed. The specimens seen by me had no hooked spines, only radial spines more or less slightly curved at the tip."

The plant has been called 'the only hooked-spine *Gymnocalycium*', as its name implies, but my own plant conforms to Backeberg's description and is without hooks. However, Geoff Swales has a plant which definitely has hooked spines, so either two different species are in cultivation under this name or the hooked-spine characteristic is only shown by some plants.

This is a strongly pigmented plant of a coppery-brown appearance (especially when dormant). It looks like a long-spined version of *G. tudaе*. Dr Schütz places it in his subgenus *Muscosemineum*. I have no information on the habitat or the flower.

G. hammerschmidii=*G. chiquitanum*.

G. hennissii, so-called, is in fact a rather undistinguished hybrid between *G. quehlianum* and *G. platense* of no great merit. The correct form of the name is *Gymnocalycium* cv *Hennissii*.

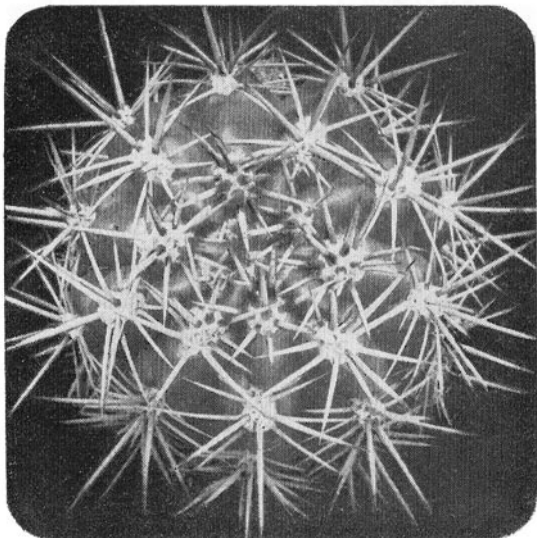


Fig. 13. GYMNOCALYCIUM HORRIDISPINUM Frank

G. heuschkelianum=*G. fleischerianum* v. *heuschkelianum*=*G. denudatum* v. *heuschkelianum*.

G. horzonthalonium=*G. spegazzinii*.

G. horridispinum Frank. A very distinctive species of recent discovery (1963). The plant has a dark green epidermis and strong, straight, outstanding spines. It is of more upright habit of growth than most *Gymnocalycium*s, the plants tending to grow columnar even when young. The strong spines are metallic grey with brownish tips. It is a very easy plant to recognise once seen. It is easily raised from seed which is usually available. The flower can be white with violet-pink edging to the petals, or wholly pink. All flowering plants I have seen have had entirely pink flowers. Related to *G. multiflorum*. Habitat: Córdoba, Argentina (*Mic.*).

G. horstii Buining. This is another recent discovery (1970). It is a very green-looking plant with about 4-6 well-rounded ribs, looking rather similar to *G. denudatum*. Like *G. denudatum*, it branches readily to form clumps, but the resemblance is otherwise superficial.

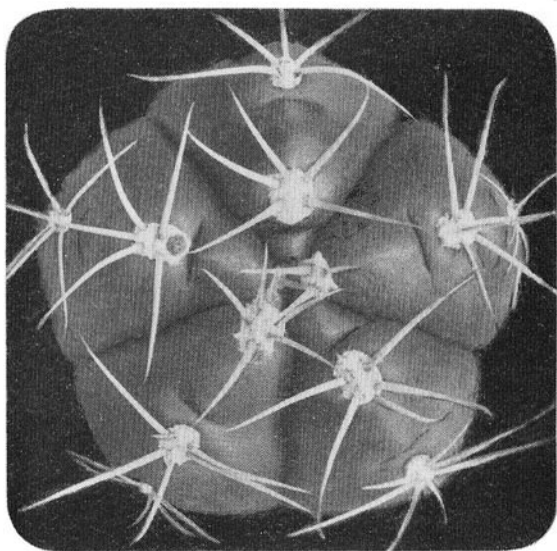


Fig. 14. GYMNOCALYCIUM HORSTII Buining

and the species is more nearly related to *G. mostii* and *G. multiflorum*. It differs in spination, having quite strong spines which are horn-coloured and about $2\frac{1}{2}$ cm long, standing out from the areoles. There may be five or six spines per areole, one of which may be a central spine (one of my plants has central spines at two areoles only). A very striking feature is the large club-shaped flower-bud which opens to give a large white flower having an unusually thick tube $1\frac{1}{2}$ cm in diameter.

G. horstii was found by Horst at Cacapava in Rio Grande do Sul, Brazil. At another location about 120 miles away Horst and Buining found a similar plant which Buining named as *G. horstii* v. *buenekeri*. From seed and flower studies Geoff Swales has concluded that this plant is a distinct species which he has renamed *G. buenekeri*.

G. horstii grows quickly from seed but my own plants did not start to flower until they were 8 cm in diameter and six years old. Habitat: Brazil (Mic.).

G. hossei (Haage jr.) Berg. Here we have a species about which there has been some controversy. Certainly there are many plants

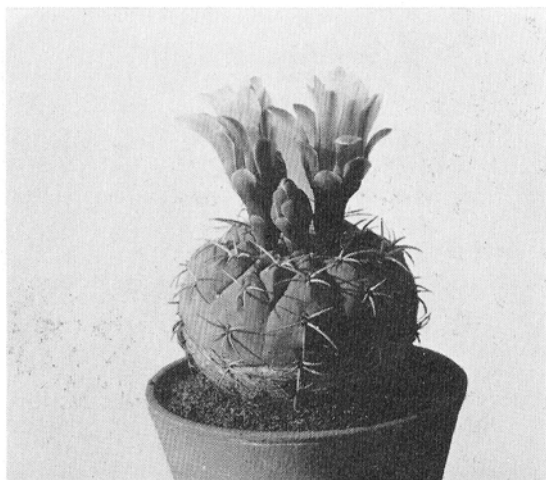


Fig. 15. GYMNOCALYCIUM HOSSEI (Haage jr.) Berg.

bearing this name in cactus collections, but it is also true that in many cases the labels are quite wrong. The original plants were collected in La Rioja, Argentina, in 1926 by Professor Hosseus and were later described by Walther Haage, who has fairly recently published a commentary on the species together with a photo of one of the original plants (see *Nat. Cact. & Succ. Journal*, **26**, 4, 104, 1971). According to Haage the true *G. hossei* has pink-brown spines, of which there are seven per areole, including one central spine reaching up to 26 mm in length. The epidermis is dull grey-green. The flower is pink. Haage notes that the plant shown as *G. hossei* in Backeberg's *Die Cactaceae* (Vol. III, fig. 1669, p. 1734) is a quite different species. *G. hossei* is notable for its attractive blue fruits. Dr Schütz classes it with *G. castellanosii*, *G. mazanense* and other species in his Section Mazanensia. Habitat: La Rioja, Argentina (*Mic.*).

See also W. Haage, *Was sieht eigentlich das echte Gymnocalycium hossei aus?* in *Kakteen-Sukkulente*, 1966, 1.

G. hybopleurum (K.Sch.) Backbg. A strongly-spined and variable species related to *G. multiflorum*. It flowers quite readily as a young seedling, the flowers being typically white though occasionally pale pink. Seven varieties have been named; vars. *breviflorum*, *centrispinum*, *euchlorum*, *ferocior*, *ferox*, *longispinum* and *robustispinum*. Of these, the variety *euchlorum* is often to be seen labelled simply as

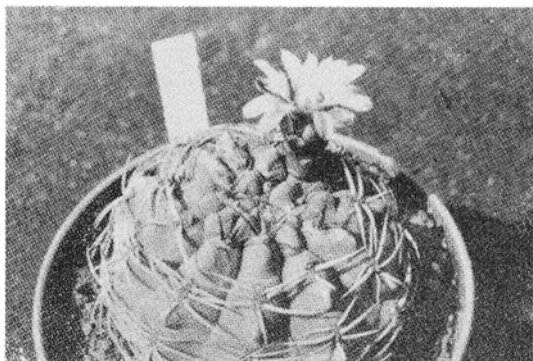
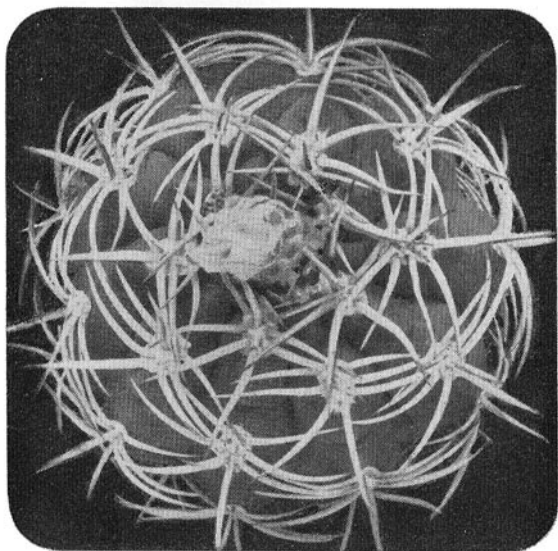


Fig. 16. *GYMNOCALYCIUM HYBOPLEURUM* (K. Sch.) Backbg.
A wild plant, collected by Fechsner in Catamarca.

Fig. 17. *GYMNOCALYCIUM HYBOPLEURUM* var. *FEROCIOR* Backbg.



G. euchlorum, the provisional name given originally by Backeberg. This variety is distinguished, according to Backeberg, by its lighter grey-green colour and shorter spines. Habitat: Córdoba, Argentina. (*Mic.*)

***G. hyptiacanthum* (Lem.) Br. & R.** This small Uruguayan *Gymnocycium* has been known for over 130 years. It is a dark-green, sometimes almost blue-black, plant with many low ribs (usually about ten) and numerous thin, weak spines, up to eight per areole. The smallish flowers are generally pale yellow, though a pink-flowered form is not uncommon. *G. hyptiacanthum* has been in cultivation for such a long time that some plants to be seen today are probably of hybrid origin. It is a very easy plant to cultivate and flowers readily when small. The varieties *citriflorum* and *eleutheracanthum* have been named. Habitat: Uruguay. (*G.*)

G. immemoratium=*G. valnicekianum*

G. intermedium is a hybrid. See 'Hybrids and Cultivars', p. 64.

***G. intertextum* Backbg.** A fairly recently named species (1966). It is strongly spined, with rather long, somewhat recurving spines, and has pronounced tubercles. Backeberg gave no flower details nor accurate habitat details. I am not familiar with this plant myself but Dr Schütz classes it with *G. quehlianum* in his subgenus *Trichomosemium*. It has been distributed under the number U 2176 and was originally collected by Fechsner. Habitat: Northern Argentina (*Tr.*).

G. izozogsii=*G. pflanzii* v. *izozogsii*.

***G. joossensianum* (Böd.) Br. & R.** Another of the Gran Chaco species, closely related to *G. damsii* and *G. mihanovichii*. The distinguishing features are the rather short flower-tube, the wine-red flower and the somewhat longer lower spines at each areole. The spines number 6-9 per areole. My own plants show quite rapid changes of skin colour from copper-red in the resting season to reddish-green when in growth. Habitat: Chaco of Paraguay and Northern Argentina. (*Mus.*)

G. karwinskyanum. Probably a form of *G. tudaе*.

G. knebelii. According to Backeberg this is a variety of *G. schickendantzii*. Dr Schütz however classifies it separately, with *G. megatae* and *G. tudaе* in his Section *Periferalia* of the subgenus *Micro-*

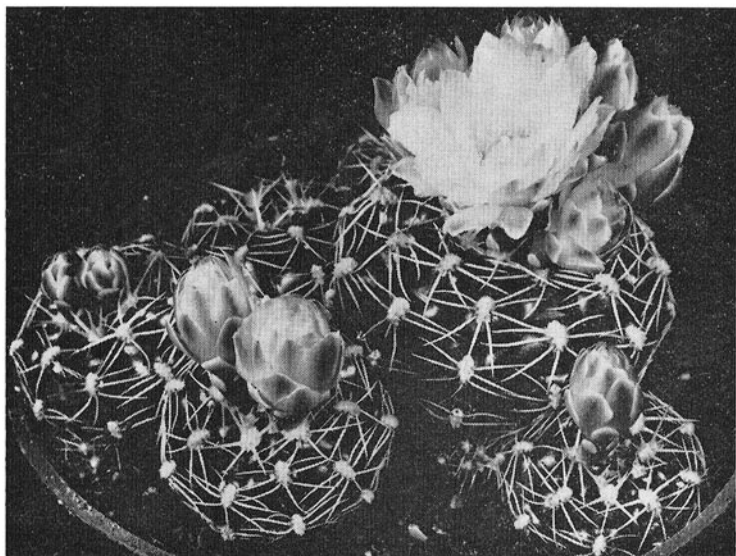


Fig. 18. GYMNOCALYCIUM LEEANUM (Hook.) Br. & R.

semineum. Although many plants are in collections under this name, it seems difficult to get any reliable description to distinguish it from other plants of this group.

G. kozelskianum Schütz. A member of the *G. quehlianum* group (subgenus *Trichomosemineum*) that is not well-known in British collections. I have had no experience of it myself. Habitat: Córdoba, Argentina (Tr.).

G. kurtzianum = *G. mostii* v. *kurtzianum*.

G. lafaldense = *G. bruchii*.

G. lagunillasense = *G. pflanzii* v. *lagunillasense*.

***G. leeanum* (Hook.) Br. & R.** A low-growing, green or dark-green bodied species with up to twelve thin spines lying close against the stem, occasionally with one upstanding central spine at each areole. This is a Uruguayan species of very easy cultivation which comes into flower early in the spring. The flower is pale yellow and quite

large. Two varieties, showing minor differences from the type, have been named: v. *brevispinum*, which has short, straight spines, and v. *netrelianum* with fewer spines (5-8) and lemon-yellow flowers. Habitat: Uruguay (*G.*).

G. lecanum v. *roseiflorum* = *G. uruguayense* v. *roseiflorum*.

G. leptanthum (Speg.) Speg. Although it is said to be rare in the habitat, *G. leptanthum* is well-known in cultivation. It is typically a dark greyish-green plant with short, weak, whitish spines lying appressed to the stem. The usual spine-count is seven per areole and there are no central spines. The distinguishing feature is the very long, slender flower-tube. The flower is white with a slight rosy flush deep in the throat. There has been some argument about the distinction between this species and *G. platense*, as to which has the longer flower-tube. Personally I am satisfied that it must be *G. leptanthum*.

Dr Schütz places this species in his Section Calochlora. Habitat: Córdoba, Argentina. (*Mic.*).

G. loricatum = *G. spagazzinii*.

G. lumberasense. This is a hitherto undescribed plant collected by Ritter (FR962). Plants I have seen under this name appear to be members of the subgenus *Muscosemineum*.

G. marayes (also as *G. marajes*) is an incorrect name derived from "*Gymnocalycium species ex Marayes*", which is a hitherto undescribed plant from N.W. Argentina which belongs to the subgenus *Muscosemineum*. It is similar to *G. schickendantzii*. My own plant has a striking flower of a violet shade. Habitat: La Rioja, Argentina (*Mus.*).

G. marquezii = *G. pflanzii*.

G. marsoneri Fric ex Ito. This is one of the large and confused group of species from the Gran Chaco. It is a red-brown or greenish brown plant which typically has seven spines per areole. The flower is whitish or yellowish white. Habitat: N. Argentina (*Mus.*).

G. matoense Buining & Brederoo. In 1974 Leopoldo Horst and the late Albert Buining found a *Gymnocalycium* growing at Porto Murinho on the Brazilian side of the River Paraguay. This was the first *Gymnocalycium* species to be found in the Brazilian Mato Grosso. The plant was described in 1975 in *Kakteen und andere Sukkulenten* (Vol. 26, No. 12, pp. 265-268). It is evidently scarce

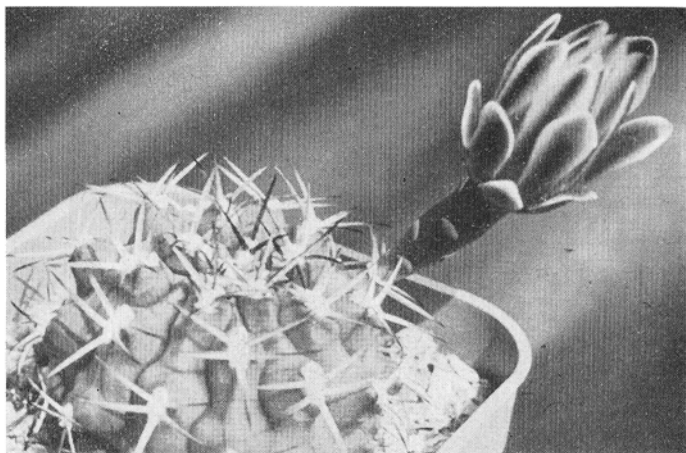


Fig. 19. GYMNOCALYCIUM SPECIES from Marayes. An interesting plant which appears to be a form of *G. schickendantzii*.

in the habitat and I do not know of any specimens in cultivation in Britain.

G. matoense is described as reaching about 15 cm in diameter and 7cm in height and having up to 21 ribs. There are nine somewhat curving radial spines at each areole and older areoles carry one upright central spine. The plant body is olive brown. The flowers are brownish on the outside, the inner petals white. The ripe fruits are light blue.

G. mazanense Backbg. This is a strongly spined and variable species which is closely related to *G. nidulans* and *G. weissianum*. The flower is pale pink to pink usually, with a deeper pink flush in the throat. The distinctions between the various species in this group of plants seem rather vague and ill-defined. Backeberg himself was not exactly helpful, saying in *Die Cactaceae*: "For the majority of the plants the following description can be formulated: very variable; body brownish to grey-toned dull green, mostly semi-globose, the body colour fairly changeable; ribs 10-12, low rounded, divided into more or less prominent tubercles with sharp transverse cleft: areoles about 2.5 cm apart, strongly white-felted; radial spines about 7, more or less curved, cream to pink coloured, becoming grey, up to 3 cm long. Central spines mostly absent, sometimes one: flower whitish to pink in all intermediate shades. Throat of flower somewhat darker. Petals often pointed." Backeberg's photograph of this

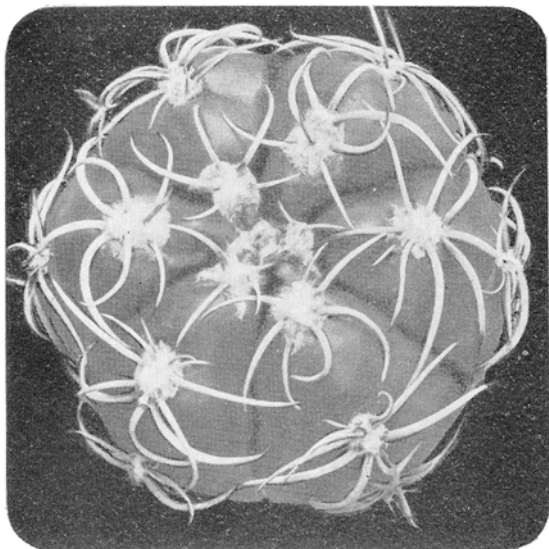


Fig. 20. GYMNOCALYCIUM MEGALOTHELOS (Sencke) Br. & R.

species (fig. 1702) actually shows little evidence of the "strongly white-felted areoles" but clearly his description has loopholes large enough to admit almost any conceivable variation!

(The example given here of a very loose description of a species which is nevertheless claimed as distinct from several other species of very similar appearance is unfortunately only too common among the Gymnocalyciums. This is why the precise identification of plants within the framework of accepted valid names is so often very difficult and sometimes practically impossible.)

Habitat: borders of La Rioja and Catamarca, Argentina. (*Mic.*)
The varieties *breviflorum* and *ferox* were named by Backeberg.

G. megalothelos (Sencke) Br. & R. This is a Paraguayan species with very pronounced tubercles and pinkish or whitish flowers. Dr Schütz classes it with *G. denudatum* in the large-seeded group of species. This species can grow quite large (up to 16 cm width). It is a very green plant, like others of the *G. denudatum* group. My own plants, which are still young, do not show very prominent tubercles as yet. It flowers readily when small. Habitat: Paraguay (*G*).
G. megalothelos v. *delaeitianum* Schütz is synonymous with *G. denudatum* v. *delaeitianum*.

G. megatae Y. Ito. The Japanese cactophile Y. Ito gave a series of specific names to some *Gymnocalycium*s from the Paraguayan Chaco on the basis of differences among them which seem to have no real basis when one takes into account the ordinary natural variations that are found in wild plant populations. In particular, Ito's *G. megatae*, *onychacanthum* and *tudae* are all large plants, growing up to about eight inches (16 cm) across as rather flattened, grey-green or reddish-brown plants with up to 13 ribs and from five to nine radial spines and having white or whitish flowers. Personally I regard all these plants as *Gymnocalycium tudae*. The distinctions claimed for *G. megatae* are that it has not more than five spines per areole and that the flower is a little longer than that of *G. tudae*. Habitat: Paraguay (*Mus.*).

G. melanocarpum (Arech.) Br. & R. This species, originally described from N.W. Uruguay by Arechavaleta in 1905, is unknown to me and was apparently unknown to Backeberg too, as he was unable to describe its flower, which was not mentioned in the original description. By the description it would seem to be one of the yellow-flowering species in the *G. uruguayense* group. Habitat: Uruguay (*G.*).

G. michoga Fric ex Ito. This strongly pigmented species from Paraguay seems to be very closely related to *G. marsoneri* in the form of its stem and ribs and in the spination, but closely resembles *G. friedrichii* in respect of its flowers, which have long tubes with attractively coloured scales in soft pastel blue-green, tipped with red. The flowers are normally pink in plants I have seen, though described as white with brownish stripe by Backeberg. There are usually seven radial spines per areole. Habitat given as Argentina, but more probably Paraguay. (*Mus.*)

G. mihanovichii (Fric & Gürke) Br. & R. This is probably the best-known species of the subgenus *Muscosemineum* in cultivation. The type and its many varieties seem to lie somewhere between *G. damsii* and *G. friedrichii*, with *G. anisitsii* also belonging in this group. *G. mihanovichii*, like the other Paraguayan *Gymnocalycium*s, is best grown under slightly warmer conditions than the Argentinian and Uruguayan species. It must have frost protection and needs to be kept rather dry in winter unless a minimum of 10°C (50°F) can be maintained. All these Paraguayan species are inclined to lose their roots if grown in soil that is too alkaline. The best soil mixtures for these species are ones containing peat or leafmould. Such mixtures are very suitable for all *Gymnocalycium*s.

G. mihanovichii is a small species, rarely reaching more than two inches in diameter in cultivation from seedlings, though wild plants

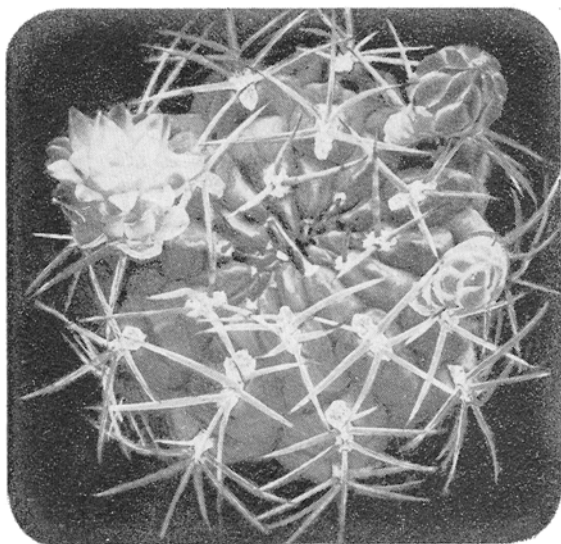


Fig. 21. GYMNOCALYCIUM MICHOGA Fric ex Ito.

can be considerably larger and become columnar with age. It has weak, whitish spines, five per areole. The stem is marked, sometimes only faintly, with lateral bands which show as lighter colour against the dark reddish-green epidermis. In the type the flower is yellowish and is often rather drab, lacking the lustre usually seen in cactus flowers. However, this is a very variable species and there are varieties with attractive pink flowers. The variety *albiflorum* has pure white flowers.

The named varieties of *G. mihanovichii* are as follows: *albiflorum* Pazout, *angusto-striatum* Pazout, *filadelfiense*. Backbg., *fleischerianum* Pazout, *melocactiforme* Pazout, *rysaneckianum* Pazout and *stenogonum* Fric ex Pazout.

The following varietal names may also be encountered: *friedrichii* (= *Gymnocalycium friedrichii*), *heesei* (a worthless, invalid name), *piraretaense* (= *G. friedrichii* v. *pazoutianum*), *roseiflorum* and *stenostriatum* (= v. *angusto-striatum*). Habitat: Western Paraguay (*Mus.*).

G. millaresii = *G. pflanzii* v. *millaresii*.

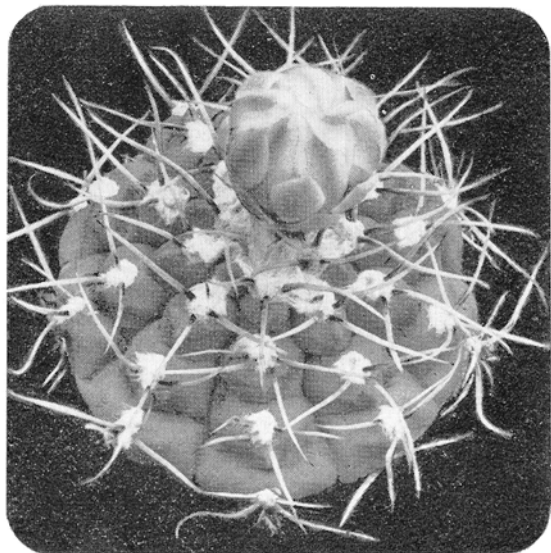


Fig. 22. GYMNOCALYCIUM MOSERIANUM Schütz

G. monvillei (Lem.) Br. & R. This is a strong-growing species with a rather bright green appearance, somewhat resembling *G. multiflorum*. The powerful spines are yellow with a reddish tinge at the base and they curve back somewhat over the plant body. The number of spines per areole varies from plant to plant; Backeberg gives the number as 7 to 13. The flowers come freely and this species is far more floriferous than its close relative *G. multiflorum*. The flower is large, white and lustrous, often with an attractive sheen of faint pink. The fruits are green when ripe. *G. brachyanthum* is very similar to this species and could be regarded as a variety of it. Habitat: Paraguay. (Mic.).

G. moserianum Schütz. A member of the *G. quehlianum* complex of species which shows a good deal of similarity to *G. triacanthum*. In *G. moserianum* there are from three to five long thin spines at each areole which are outstanding from the body of the plant and are often somewhat twisted. The spination distinguishes this species from others of the subgenus *Trichomosemineum*, *G. triacanthum* having somewhat darker spines which are recurved towards the stem.

The flower is white with a rosy red centre. The spines are

yellowish, darker at the base. The crown of the plant has rather more white wool than in *G. triacanthum*. Easily raised from seed and flowering at three years of age, it is an interesting addition to the collection. Some plant dealers have confused this plant with *G. friedrichii* v. *moserianum*, which is entirely different. Habitat: N. Argentina (Tr.).

(N.B. In accordance with the latest ruling of the Code of Nomenclature, "*moserianum*" should be changed to **moseranum**.)

G. mostii (Gürke) Br. & R. First described in 1906 and widely cultivated by cactophiles, this is a fairly large-growing species with a dark green or sometimes bluish-green matt epidermis and strong curving spines. The ribs, up to 13 in all, are well defined and divided into prominent tubercles. There are usually seven radial spines, curving back onto the plant-body, and one, or occasionally two, central spines. The spines may be yellowish or grey, with brownish tips. The large flowers are rose-pink. A handsome species and very popular, though many plants in cultivation show evidence of artificial selection caused by repeated propagation through several generations by cactophiles. However, seed from habitat plants has been distributed recently and more typical plants are becoming available. In *G. mostii* v. *kurtzianum* there are eight radial spines and a single central spine curving strongly upwards. Habitat: Córdoba, Argentina. (Mic.)

G. mucidum=*G. mazanense*.

G. multiflorum (Hook.) Br. & R. This species rarely lives up to the promise of its name in cultivation. No doubt one must excuse Hooker's choice of name, made in 1845, for he could have had very little experience of the flowering propensities of this genus.

G. multiflorum is very well-known in cultivation. It is a large-growing species, reaching a width of 12 cm and a height of 9 cm and eventually forming large clumps. The epidermis is light green and the strong spines are yellow with a reddish tinge at the base. The flower-buds are short and bullet-shaped, opening into large white flowers or, in some forms, pale pink flowers. It is closely related to *G. monvillei* and *G. brachyanthum* and is sometimes confused with them. Although this species offers no particular difficulty in cultivation, it does suffer from one drawback that, in my own experience, seems to be inevitable. Older plants acquire a yellow-brown staining of the skin, usually starting low down on the stem and tending to spread upwards. This may be a perfectly natural phenomenon in the life of a healthy plant, but it is not pleasant to the eye. I know of no cure, though I have occasionally seen large plants quite free of it. Several varietal names have appeared in the past. *G. multi-*

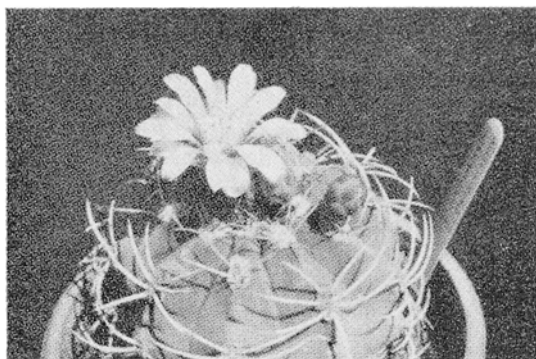


Fig. 23. GYMNOCALYCIUM NIGRIAREOLATUM Backbg.

florum v. *albispinum* and *G. multiflorum* v. *parisiense* are both white-spined variants. *G. ourselianum* is probably another variant and was regarded by Backeberg as synonymous with *G. multiflorum*. Habitat: Córdoba and San Luis, Argentina (*Mic.*).

G. neocumingii=*Weingartia neocumingii*.

G. netrelianum=*G. leeanum* v. *netrelianum*.

G. neumannianum=*Weingartia neumanniana*.

G. nidulans Backbg. A strong-growing and variable species that can reach a height of 30 cm (12 ins) and a width of 18 cm (7 ins) in cultivation according to Backeberg. Older plants form large clumps. The epidermis is smooth and dark green. The spination is very variable and there can be from seven to fifteen or more spines per areole, grey with a pink tinge, including up to six central spines which have darker tips. The flower is much like that of *G. mostii*, pure white with a reddish or pink centre. The spines are often dense and twisting, whence the specific name (*nidulans*=forming a small bird's nest). Habitat: Córdoba, Argentina (*Mic.*).

G. nigriareolatum Backbg. Older areoles on this plant are said to be characteristically black. Although I have grown several batches of seedlings under this name I have yet to find one with black areoles, so am in some ignorance in respect of this species. Backeberg describes it as having ten ribs, 7-8 pinkish-grey radial spines and

a somewhat longer central spine. The flower he gives as "shimmering porcelain white". The fruits are blue when ripe.

There is also a var. *densispinum* having up to 15 ribs.

Habitat: Catamarca, Argentina. (Mic.).

G. occultum Fric ex Schütz. This species is closely related to *G. quehlianum* and was regarded by Backeberg as being probably a variant of *G. bodenbenderianum*. It is a rather brown-coloured plant of low, depressed-globose shape having the spines, which are short, appressed to the stem. It flowers readily with a good-sized white flower with a rose-pink centre. Habitat: Córdoba (Tr.).

G. ochoterenai Backbg. This is another member of the *G. quehlianum* group. It is one of the species names given by Backeberg to plants he examined in Buenos Aires in the 1930's, which had been collected by Stuemer somewhere in the interior of Argentina. Plants raised by me from seed distributed under this name appear much like other species of *Trichomosemineum* and seem to be little more than minor variants of *G. stellatum*. The flower is white with a deep pink centre. Habitat: Unknown. (Tr.)

Backeberg also named as varieties v. *cinereum*, *polygonum*, *tenuispinum* and *variispinum*. These varietal names seem to have little merit.

G. oenanthemum Backbg. A species in the *G. hybopleurum* group. Backeberg described it in 1934, presumably from a consignment of imported plants, as he was unable to give its habitat. He describes the flower as brilliant wine-red but such plants as I have seen flowering have had pink flowers. The Lambs, in their *Illustrated Reference*, Vol. II, plate LVI, show a plant with large flowers which are pink flushed on white with a faint pink median stripe.

The plant has about 11 ribs, five pinkish-grey radial spines and no centrals. Habitat: Unknown. (Mic.)

G. onychacanthum = *G. tuda* Y. Ito.

G. ourselianum (quite often found labelled as *G. ursellianum*) has been the subject of some controversy. It is possibly best regarded as a minor variant of *G. multiflorum*.

G. paediophilum Ritter ex Schütz is a Paraguayan plant originally collected by Ritter in 1963 and provisionally named by him as *G. paediophilum*. The diagnosis and a photograph were published by Dr Schütz in 1977 in the Czech journal *Kaktusy* (Vol. XIII, No. 5, pp 100-101). Dr Schütz notes that this plant was originally distributed as FR1179, although according to my own records Ritter's field

number for it was FR1177.

I have no personal experience of this plant. The photograph with Dr Schütz's description shows a light green plant with long straight thin spines (8-12 radials and 3 centrals), carrying a large white flower which is 6 cm long. The spine clusters resemble those of *G. pungens*. Habitat: Paraguayan Chaco.

G. paraguayense (K.Sch.) Schütz. Dr Schütz separates the plants of the large *G. denudatum* complex into three species (*denudatum*, *fleischerianum* and *paraguayense*) and divides each species into a series of varieties. *G. paraguayense* he identifies with *G. denudatum golzianum*, whereas Backeberg regarded *G. paraguayense* as identical with *G. fleischerianum*.

G. paraquense is a printers' error or illiteracy for *G. paraguayense*. This error is common on labels in British collections.

G. parvulum (Speg.) Speg. Although named as a separate species, this appears to be simply a dwarf variety of *G. quehlianum*. It grows to little over an inch in diameter, a fact not unconnected with the harsh nature of its habitat in the Andes, where it is found among stony foothills in the province of San Luis, Argentina. This species is easily raised from seed and has the typical flower of *G. quehlianum*, white flushed with pink at the centre. Habitat: San Luis, Argentina (*Tr.*).

G. pflanzii (Vaupe) Werd. This is one of the largest species in the genus *Gymnocalycium*, reaching a diameter of 50 cm in the wild. It is a handsome plant of a very rounded appearance, the so-called "chins" common to *Gymnocalyciums* being practically indistinguishable, so that each areole sits upon a plump and curving tubercle. Until the recent work of J. D. Donald, a whole series of very similar and closely related plants were rated as separate species; these are now accepted as varieties and forms of *G. pflanzii*. The species and its varieties are very easy to cultivate, in fact, apart from gross mistreatment, they are almost indestructible. But it has to be admitted that they do not flower at all readily as young plants. This is no doubt due to their being able to grow very large; maturity is reached at a later stage than with the smaller *Gymnocalyciums*. Nevertheless I have seen plants of *G. pflanzii* in flower in four-inch (10 cm) pots, though more usually they need to be up to five or six-inch pot size for reliable flowering. The flowers can be whitish or pink and up to 5 cm across. The attractive spines are curved and can number from 6 to 9 per areole. The type is readily recognisable, but it is far from simple to distinguish the varieties from the type. Habitat: Pilcomayo River valley, Bolivia (*Mic.*).

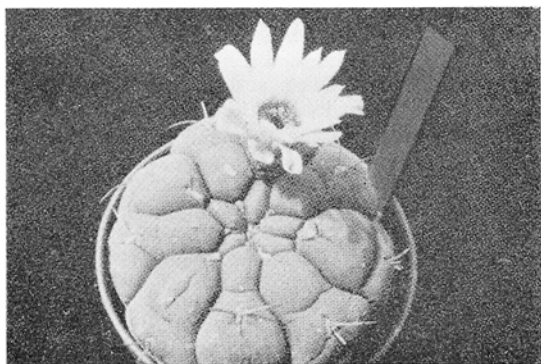


Fig 24. GYMNOCALYCIUM PFLANZII (Vaupel) Werd.
collected by Alfred Lau (Lau 946).

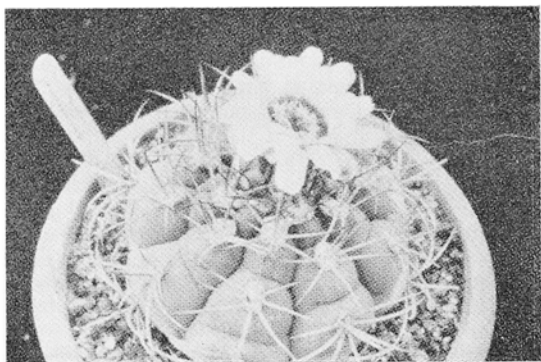


Fig. 25.—GYMNOCALYCIUM PFLANZII var. LAGUNILLASENSE.
Type plant, collected by Martin Cardenas.

The varieties of *G. pflanzii*, formerly known as separate species, all come from Southern Bolivia. These are: var. *eytianum*, var. *izozogsii*, var. *izozogsii* fa. *chuquisacanum*, var. *lagunillasense*, var. *millaresii*, var. *riograndense* and var. *zegarrae*. To these also belong *G. pflanzii* var. *albipulpa* Ritter, nom. nud. (FR 397) and *G. comarapense* Backbg. nom. nud.

G. platense (Speg.) Br. & R. Although this is a very familiar name in cactus collections, there has been some controversy about the

identity of the plant to which it belongs. This species is close to *G. leptanthum* in many ways but differs in bearing a short-tubed flower, in contrast to the very long slender-tubed flower of *G. leptanthum*. It has been said that the truth is the reverse—that it is *G. platense* which has the long flower, but I find this difficult to accept, since the very name *leptanthum* means “slender flower” and was surely conferred on the plant with good reason!

The typical form of *G. platense* has a short-tubed white flower with a red flush in the throat. A pink-flowered form is also known. The plant is easy to grow and flowers readily when young. Habitat: Buenos Aires Province, Argentina.

G. proliferum = *G. calochlorum* var. *proliferum*.

G. pseudo-malacocarpus Backbg = *G. tudaе* var. *pseudo-malacocarpus*. This is another of the *Gymnocalycium*s discovered by Father Hammerschmid in the ‘Grey Hell’ region on the borders of Bolivia and Paraguay, where it grows near salt-pans and brine-pools under very harsh conditions. The plants are a curious olive-green to grey colour as seedlings and often develop a strong coppery-red tint later, indicating the presence of the red pigment which is characteristic of most species in the subgenus *Muscosemineum*. It has been suggested that one should add salt to the compost used for this and the other ‘Grey Hell’ *Gymnocalycium*s but this is scarcely necessary: the plants grow in the wild in spite of salt in the soil rather than because of it! John Donald considers this plant to be a local variety of *G. tudaе* and has renamed it as such. The flower is white. Habitat: Bolivia-Paraguay borders. (*Mus.*)

G. pseudoragonesei nom. nud. (also as *pseudoragonesii*). This name has been attached to plants which have been widely distributed as *G. ragonesei* but are in fact not that species at all. This plant is larger than *G. ragonesei* and has a good many more ribs (16, as against 9 or 10 in *G. ragonesei*). The spine formation is different, the spines being longer and stronger than in *G. ragonesei*. The plant presents the appearance of a typical member of the very variable *G. quehlianum* group. I do not know its origin. Habitat: Unknown (*Tr.*).

G. pugionacanthum Backbg. This powerfully-spined plant was named first by Backeberg in 1966 on the basis of plants collected by Fechsner without details of the habitat. I am not a botanist myself, but I have to say that I can see no real difference between this species and *G. hybopleurum* var. *ferox*. It is a perfectly easy plant to cultivate. Habitat: Unknown. (*Mic.*)

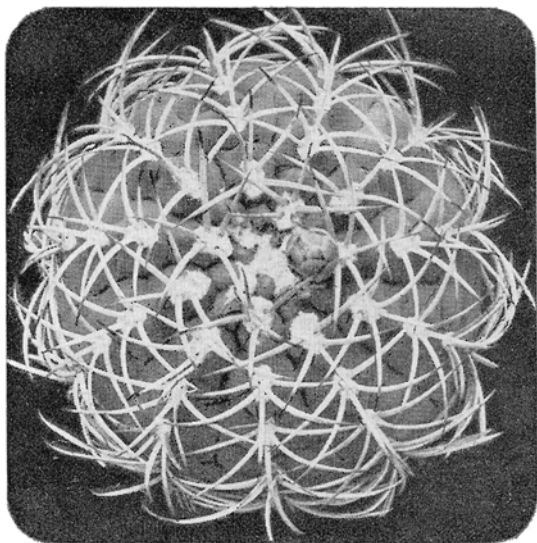


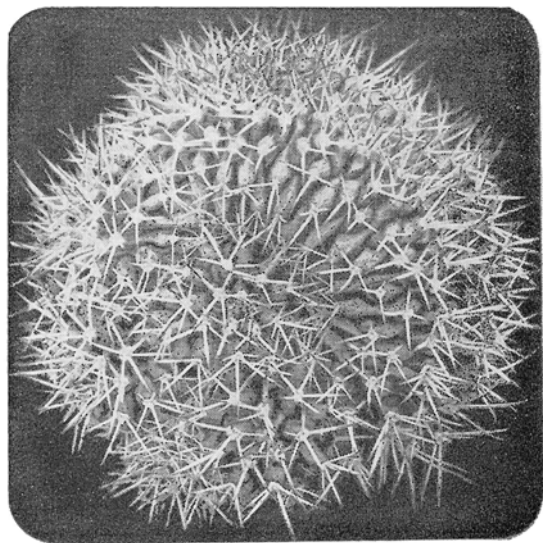
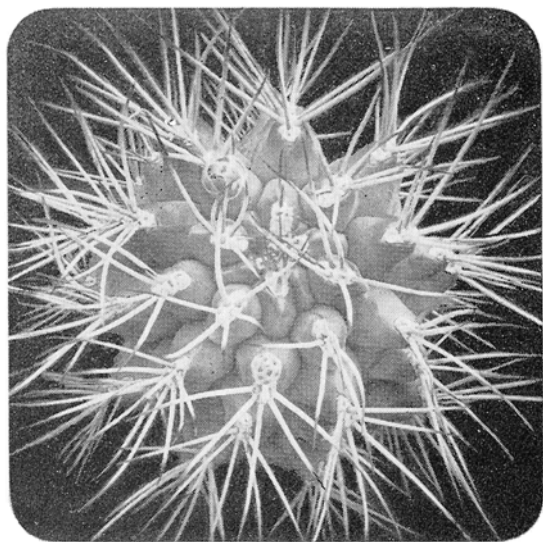
Fig. 26. GYMNOCALYCIUM PUGIONACANTHUM Backbg.

G. pungens Fleischer. This is another species of fairly recent publication whose habitat is not known. It is a striking plant that shows quite a lot of resemblances to *G. schickendantzii*. Notable are the numerous, straight, needle-sharp spines. It flowers readily, usually with a white flower, though pink flowers are not uncommon. Cristate forms of this species occur from time to time in seed-raised crops and are very attractive. One would suspect that the habitat is N.W. Argentina or Western Paraguay. (*Mus.*)

G. quehlianum (Haage jr.) Berger. There must be many thousands of plants of this species in cultivation. It is very easily grown and brought into flower at an early age. The flowers are large, lustrous, white with rosy centres and are produced in abundance even by small plants. It has been in cultivation for about fifty years now and a number of varieties have been named, viz.: var. *albispinum*, var.

Fig. 27. GYMNOCALYCIUM PUNGENS Fleischer

Fig. 28. GYMNOCALYCIUM PUNGENS, a partially cristate plant



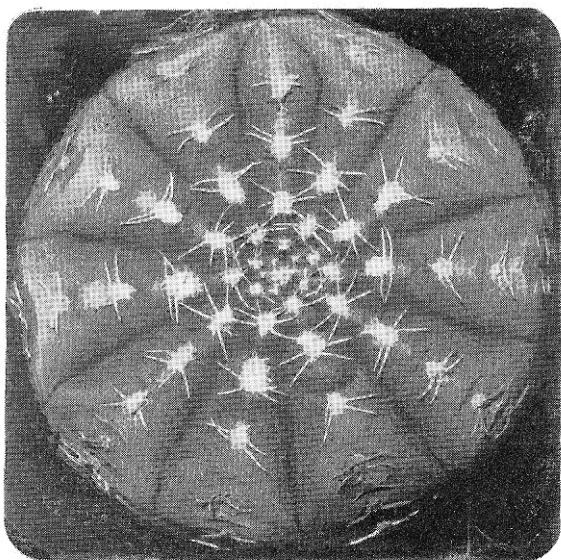


Fig. 29. GYMNOCALYCIUM RAGONESEI Castellanos.

flavispinum, var. *rolfianum* and var. *zantnerianum*. Among these, var. *albispinum* is quite a striking plant having thickish white spines. Habitat: Córdoba, Argentina (Tr.).

G. ragonesei Castellanos is the smallest species in the genus and in recent years has enjoyed great popularity. It is quite abundant in collections at present and is usually seen as small brown plants, very flattened and at first sight almost spineless. The slender flower-bud is grey and opens to a whitish flower having a rosy flush deep in the throat. The plant, apart from its small size, shows much similarity with *G. stellatum*, to which it is closely related. Habitat: Catamarca, Argentina (Tr.).

G. rhodantherum Boedeker = *G. mazanense* var. *breviflorum*.

G. riograndense Cardenas = *G. pflanzii* var. *riograndense*.

G. riojense Fric ex Pazout. This name, together with *G. occultum*, first appeared in 1929, in A. V. Fric's plant list. The plants show very strong similarities to *G. quehlianum* and *G. stellatum* and

obviously belong in this confused species complex with *G. bodenbenderianum* and *G. occultum*. Backeberg considered that *G. riojense* was the same as *G. bodenbenderianum*. All these plants seem to be minor variants of a single species. Habitat: La Rioja, Argentina (Tr.).

G. ritterianum Rausch. This species was first described in 1972 and was originally distributed as Rausch 126. It has a light green body and thin yellowish spines which curve back over the body. The flowers are large, lustrous white and have a violet-pink flush in the throat. Rausch considers that it belongs in the *G. guanchinense* complex. At the time of writing my own experience with it is limited to young seedlings which have yet to flower. Habitat: La Rioja, Argentina (Mic.).

(Note : Under the latest provisions of the International Code of Nomenclature, the name of this species should be given as *G. ritteranum*.)

G. rubriflorum. This name is found quite commonly on red-flowering *Gymnocalycium*s which may turn out to be *G. baldianum* or one or other of the many hybrids produced by certain industrious European nurseries which show a regrettable unconcern for the authenticity of the seedlings they offer. The name *G. rubriflorum* is quite valueless and invalid.

G. saglione (Cels) Br. & R. This very handsome plant, which can grow to a foot in diameter (30 cm), is common in collections and is well worth having, even though it cannot be said to flower very readily as a young plant. I would rate it as one of the easiest of all cacti to grow well and keep in good condition and its strong, handsome spines make it a great favourite. Plants may flower at the 4-inch (10 cm) pot size, though one may have to wait until they need six-inch (15 cm) pots for this. The flowers are rather bell-like, small for this genus and off-white or pink. Many varieties, most of them based on variations in the spines, have been named in the past, although none of these names has ever been validly published. Habitat: N.W. Argentina (Mic.).

G. sanguiniflorum=*G. baldianum*.

G. schickendantzii (Weber) Br. & R. This is a robust and popular species belonging to the *Muscosemineum* subgenus. The pinkish or whitish flowers tend to be produced rather later in the season than those of many *Gymnocalycium*s and it is not uncommon for plants to flower from older areoles quite low down on the stem, rather than at the crown as with most *Gymnocalycium*s. The species is

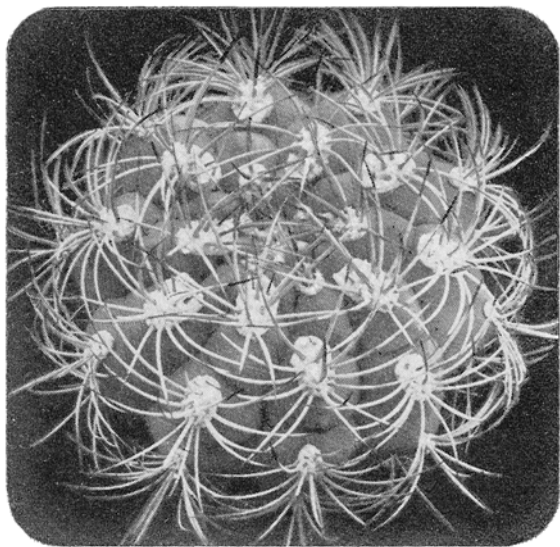


Fig. 30. GYMNOCALYCIUM SAGLIONE (Cels) Br. & R.

quite easy to recognise once one has seen specimens of it, but, as is often the case with cacti, it is by no means simple to pick out the distinguishing features in words. The tubercles are large and blunt and plants usually have a greyish-green appearance. Backeberg named a variety, *G. schickendantzii* var. *kurtzianum*, which allegedly differs from the type in having its tubercles more sharply defined, having reddish rather than greyish buds, more rounded tubercles and a somewhat lighter colour. I find it difficult to see any of these as real distinctions in such plants as I have seen. The flowers of the type and the variety are whitish or pinkish. Habitat: Southern Córdoba, Catamarca and Tucuman, Argentina. (*Mus.*)

G. schroederianum van Osten. First discovered near the western borders of Uruguay in 1922 and described by van Osten in 1923, this species was nevertheless unknown in cultivation for nearly fifty years until rediscovered by the late Albert Buining. It is a small, neat plant which flowers readily when young. The flower is pale creamy yellow and has a long slender tube. It is worth noting that in its habitat this plant grows in the wet mud of the banks of the River Uruguay! Dr Schütz regards it as a member of the *G. uruguayense*

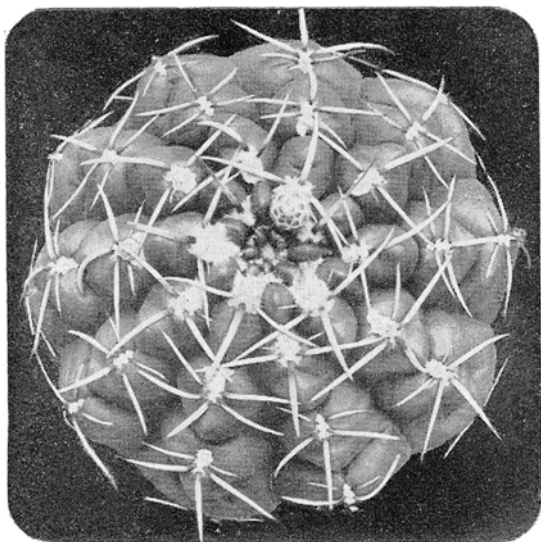


Fig. 31. GYMNOCALYCIUM SCHROEDERIANUM Van Osten

complex and hence belonging to the subgenus *Gymnocalycium*. Since its rediscovery much seed has been distributed and it is not uncommon in collections now. Habitat: Western Uruguay (*G.*).

(Note: Under the latest provisions of the International Code of Nomenclature, the name of this species should be given as *G. schroederianum*.)

G. seminudum. This is an invalid name for plants which seem to be forms of *G. tudae*.

G. sigelianum (Schick) Berger. This species forms with *G. sutterianum* and *G. capillaense* a confusing group or complex of species. All are green-bodied, rather small plants with thin and very variable spines. It is exceedingly difficult to draw any sharp distinctions between them and one may well take them to be forms of just one species.

They are all easily raised from seed, though I find seed-raised plants rather slow to start flowering. Flower whitish to pinkish, with pale brown stripe on the outer petals. Habitat: Córdoba, Argentina (*OV.*).

G. spegazzinii Br. & R. This is a fine species of handsome appearance that deserves to be much more widely grown than it is at present. The body is grey; some specimens have an attractive dark grey epidermis, others are nearer to pale grey-green. The strong spines recurve over the body, often forming such a formidable network that flower-buds have difficulty in forcing their way through. There are anything from 10 to 15 ribs in mature plants, these being low and rounded with the tubercles not at all prominent. The flowers are usually pink, though they can be whitish. Easily raised from seed, but plants need to be grown on for some years before flowering can be expected. The type is said to grow to 14 cm (5½ ins) in diameter. A larger growing form, up to 20 cm (8 ins) in diameter, was named by Backeberg as var. *major*. *G. spegazzinii* is found along river valleys in the province of Salta, Argentina, and extends into Catamarca and Tucuman (*Mic.*).

G. stellatum Spegazzini. Great has been the confusion over this name and *G. asterium* during the past fifty years. However, Richard Strong of Kew finally unravelled the tangled facts in 1975 (see *Nat. Cact. & Succ. J.*, 30/2, 49-50) and showed that the correct name of this very well-known plant is in fact *G. stellatum*, not *G. asterium*.

G. stellatum is very common in cultivation. It is closely related to *G. quehlianum*, *G. bodenbenderianum* and *G. ragonesei*, the latter in many ways appearing to be simply a dwarf race of *G. stellatum*. It is very easy to raise from seed and to bring into flower at an early age. Flowers are produced freely and are large and attractive, lustrous white with rosy pink centres. Two varieties of *G. stellatum* have been described, var. *minimum* and var. *paucispinum*. The latter is not uncommon in cultivation but I am unfamiliar with var. *minimum* myself. *G. stellatum* var. *paucispinum*, as the varietal name implies, has fewer spines than the type, commonly three rather short spines per areole.

This species can grow to a considerable size and there are some very large old specimens in some European botanical collections, notably some of the plants collected fifty years ago by A. V. Fric and now to be seen in the Prague Botanical Gardens. Habitat: Córdoba, Argentina (*Tr.*).

G. stenopleurum Ritter nom. nud. (FR1176) seems to be a form of *G. mihanovichii*.

G. striglianum Jeggle. First described in 1973 from plants collected by Walter Rausch in Mendoza Province, Argentina, it is considered to belong to the subgenus *Ovatisemineum*. The plants have dark grey or brown stems with 8-12 ribs. There are three to five black



Fig. 32. *GYMNOCALYCIUM STELLATUM* var. *PAUCISPINUM*
(Backbg.) Strong.

or very dark spines per areole. These are short and straight. The flower is described as white with a pink sheen. Habitat: Mendoza, Argentina (*Ov.*).

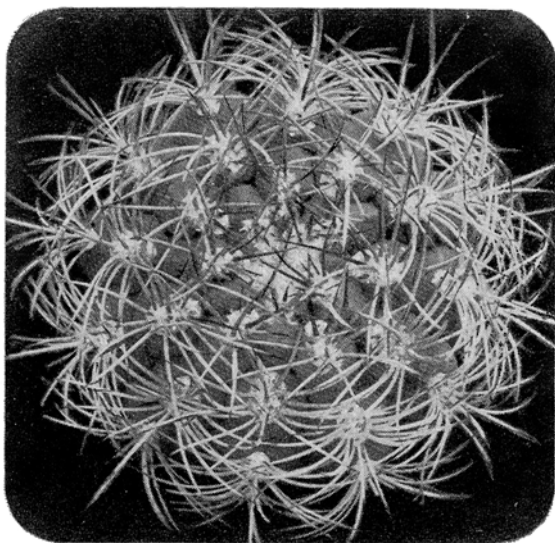


Fig. 33. GYMNOCALYCIUM TILCARENSE Schütz

G. stuckertii (Speg.) Br. & R. Although this name turns up on many cultivated plants, it cannot be easily characterised because the original description was rather vague and the habitat given was extremely wide. Recently Alfred Lau has distributed plants (Lau 439) under this name which have white flowers and which John Donald considers to be close to *G. leptanthum*. Probably these plants and Spegazzini's original plants belong to the subgenus *Ovatisemineum*, but I know of no seed studies as yet. Habitat: San Luis, Córdoba, Tucuman, Salta, Argentina (Ov.?).

G. stuckertii Fric=*G. schickendantzii*.

G. sutterianum (Schick) Berger. See notes on *G. sigelianum*. (N.B. According to the latest ruling in the International Code of Nomenclature, this name should be given as **G. sutteranum**.)

G. tilcarensense (Backbg.) Schütz. This is Backeberg's "*Brachycalycium tilcarensense*", which he first described as a variety of *G. saglione*. It is a handsome plant which can grow to a good size, reaching 20 cm diameter in the wild. It has strong curving spines and resembles

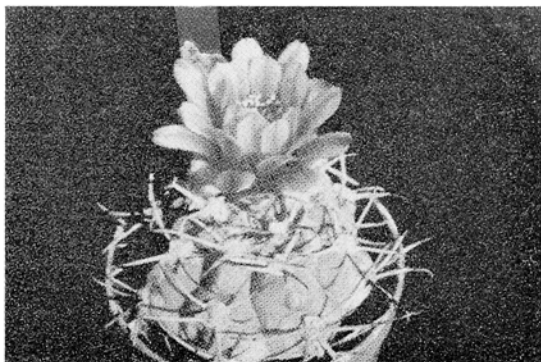


Fig. 34. GYMNOCALYCIUM TILLIANUM Rausch

G. saglione closely. Backeberg's reasons for considering it to be a new genus were the short flower-tube ("brachycalycium"=short calyx) and grooves on the tops of the tubercles. The first feature hardly distinguishes it from *G. saglione* and the second, if it really occurs, seems scarcely to warrant such importance.

The flower is white with a pinkish sheen. The plant is easily cultivated but is reluctant to flower when young and small.

Habitat: Tilcara, Tucuman Province, Argentina (*Mic.*).

***G. tillianum* Rausch.** This recently described species (1970) is noteworthy for its fine red flower. There are few *Gymnocalycium*s with truly red flowers. The plant is related to *G. oenanthemum* and *G. mazanense* apparently. Small plants flower readily and offer no difficulty. My own plant is dark green, although wild plants according to Rausch's description have bluish to grey-green stems. The spines are strong and recurved against the stem, apart from the central spines, of which there may be one or none per areole. The plant is named after Hans Till, a well-known Austrian *Gymnocalycium* specialist. Habitat: Sierra Ambato, Argentina (*Mic.*).

G. tobuschianum=*G. valnicekianum*.

G. tortuga nom. nud. is a name given by Blossfeld to a plant belonging to the *G. tudae* complex.

***G. triacanthum* Backbg.** This is another member of the *G. quehlianum* group (subgenus *Trichomosemineum*), characterised according to Backeberg by its having 12 very flattened ribs and a much

reduced flower-tube as well as the spines in triplets (this latter is also to be seen with *G. vatterii* and other species in this group). Moderately distinctive but not so common in collections as the other Trichosemineum species, it flowers easily as a small plant, with the usual bicoloured flower, white with pink centre. Habitat: Argentina (*Tr.*).

G. tudaie Ito. A whole host of species names has been generated in connection with a wide-ranging *Gymnocalycium* belonging to the *Muscosemineum* subgenus which shows some very minor variations of growth in different parts of its range. This species grows quite large as a brown or dull greenish flattened globose plant which in cultivation in Britain tends to flower in late summer or early autumn. The name *tudaie* is acceptable for the plant in all its variations over the habitat range and can be taken to include the supposedly distinct species *G. fricianum*, *G. karwinskyanum*, *G. megatae*, *G. onychacanthum*, *G. rotundicarpum*, *G. seminudum* and *G. tortuga*.

G. tudaie is easily cultivated. It flowers readily with white or off-white flowers, usually rather late in the season.

The habitat of *G. tudaie* extends across Paraguay and into south-eastern Bolivia. Backeberg's *G. pseudo-malacocarpus* from the Paraguay-Bolivia borderlands is regarded by J. Donald as a variety of *G. tudaie*. A related plant from near the Bolivia-Argentina border, found by Alfred Lau (Lau 397) has been provisionally named *G. tudaie* var. *viridis*. Habitat: Paraguay and S. Bolivia (*Mus.*).

G. uebelmannianum Rausch is a recent discovery (1972) that is still quite uncommon in collections. It is a dull greenish plant not unlike *G. denudatum* in appearance, which has chalk-white spines. My own small plant flowers readily. The flower is off-white with a rosy pink flush in the throat. In Rausch's diagnosis the plant is described as having a waxy bloom like a cabbage leaf. It grows deeply sunken in the soil and has a carrot-like root. There are 8-12 ribs and 5-7 slightly curved chalk-white radial spines with no central spines. The flowers are whitish on the outside, pale yellow inside with a pink throat. Habitat: Sierra de Velasco, Argentina.

G. uruguayense (Arech.) Br. & R. This species from Uruguay is described by Backeberg as having a white or lilac coloured flower, which I find rather surprising. He also says that the flower colour distinguishes it from *G. artigas* which it otherwise closely resembles. Undoubtedly a pinkish flowering form exists, which may be identical with *G. leeanum* v. *roseiflorum*, but the plants commonly found in cultivation have a pale yellow flower. Some tidying up of names in this group of species is long overdue. Certainly *G. artigas*, *G. leeanum* and *G. uruguayense* seem to belong to the same species and

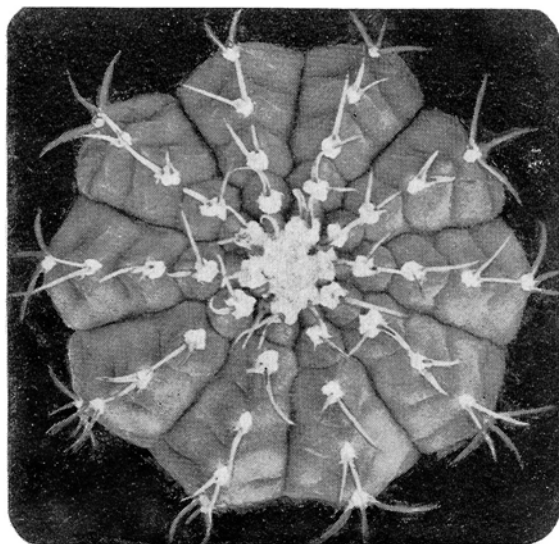


Fig. 35. GYMNOCALYCIUM VATTERI Buining

are probably only local varieties. *G. uruguayense* grows readily and flowers easily as a young plant. Habitat: Uruguay (*G.*).

G. valnicekianum Jajo is a close relative of *G. mostii*, which it strongly resembles except that the spines are thinner and usually have a rather untidy and twisted appearance. The flower appears identical with that of *G. mostii* and is large and lustrous, white with a reddish throat. I find that this plant and *G. mostii* are not over-generous with their flowers, producing only three or four per season, but this could be the result of restricted cultivation conditions. Habitat: Argentina, Córdoba (*Mic.*).

G. vatteri Buining. This distinctive member of the *G. quehlianum* group is well worth having in a collection. Characteristically the plants have from one to three spines per areole and the younger areoles often carry only one spine, which points downwards, for their first season or two. The flower is quite large, white or whitish with a pink throat. *G. vatteri* is very easily raised from seed and the plants grow rapidly and will flower at the age of two years. Habitat: Córdoba, Argentina (*Tr.*).

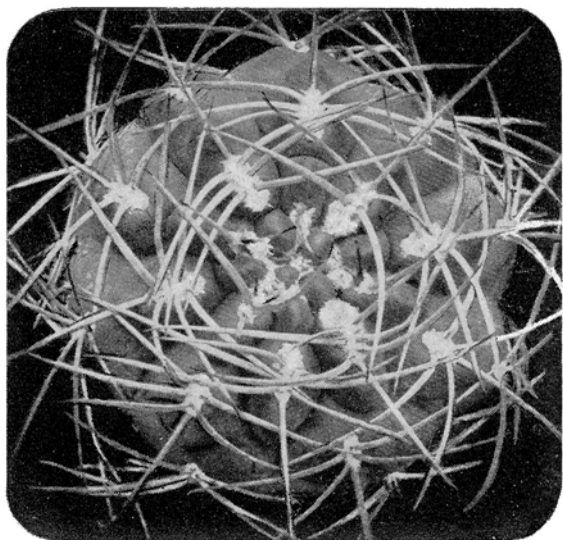


Fig. 36. GYMNOCALYCIUM WEISSIANUM Backbg.

G. venturianum=*G. baldianum*. The name *venturianum* is very common in collections and even at cactus nurseries. Because *G. baldianum* is a very variable species in its general appearance, one often hears it claimed that *G. venturianum* is a distinct species, but there is no basis for this at all.

G. weissianum Backbg. One of the less well-known species in cultivation, *G. weissianum* is near to *G. mazanense* and *G. guanchinense*. It is a fairly large-growing species well armed with spines which vary somewhat from plant to plant. My own fairly young plants have rather thin but long spines: one can also find plants with stout spines. Young plants flower easily. The flower is pinkish with a darker flush in the throat. Habitat: Catamarca, Argentina (*Mic.*). Varieties:

G. weissianum var. *atrorseum* Backbg. is said to differ from the type species in having irregular, tangled and twisted spines and a dark pink flower. *G. weissianum* var. *cinerascens* Backbg. differs from the type in having a flatter body with broader ribs and in having, in mature plants, strong silver-grey spines.

G. westii=*Weingartia westii* (Hutch.) Donald.

G. zegarrae Card.=*G. pflanzii* var. *zegarrae*.

Cultivars and Hybrids

A **cultivar** is a form or variety of plant arising in cultivation. Cultivars may be specially selected strains of plants, freak plants propagated deliberately (such as the "Red *Gymnocalycium*") or hybrids produced artificially. **Hybrids** are plants resulting from the crossing of species. Some natural hybrids are known to occur in the cactus family, e.g. between *Myrtillocactus geometrizans* and *Bergerocactus emoryi* in Mexico, but I do not know of any natural hybrids among *Gymnocalycium*s. Many artificial hybrids, both deliberate and accidental, are known. Hybridisation occurs quite easily between some *Gymnocalycium* species. Thus the yellow-flowered *G. andreae* crosses readily with the red-flowered *G. baldianum* (an indication of how closely they are related!). From such a cross I have produced plants with a range of flower colours including shades of orange and satin pink.

The following is a list of known cultivars and one or two dubious plants which are probably hybrids.

G. 'Albifructum'. A free-flowering plant obtained from Holland which I suspect is a hybrid of *G. baldianum*.

G. 'Hennisii' has been mentioned in the main list. It is said to be a hybrid of *G. quehlianum* and *G. platense*. This hybrid originated in Belgium.

G. 'Hibotan' is often met under such names as 'Redcap', *Gymnocalycium forma rubra* and even "*Gymnocalycium optima rubra*". It is not a hybrid but a freak form of *G. friedrichii* which lacks chlorophyll and is thus unable to sustain itself by photosynthesis. It is grown only as a graft for this reason, being incapable of surviving independently. It is bright red and is a popular novelty in the florist trade, often sold as "the everlasting flower" (the "flower" is of course the plant itself, sitting on its green grafting stock). In fact these plants can flower. Incipient flowering is shown by the appearance of a tiny green spot close to an areole. The flower is the normal pink bloom of *G. friedrichii*. Flowering, however, is not very common with these plants.

The original plants were produced by E. Watanabe in Japan. Sowings of some thousands of seeds of *G. friedrichii* yielded two bright red freak seedlings which would have died quickly had they not been grafted at once. From these have been produced literally millions of plants, distributed all over the world, by repeated grafting and cutting.

A series of multicoloured forms has also been produced, some of which have some green coloration. 'Hibotan Nishiki' is such a form, having a patchwork of colourings.

These plants are often sold grafted upon *Hylocereus undatus*. This stock has the disadvantage of requiring warm conditions and is not happy at temperatures below 10C (50F). It is easily recognised by the dark green triangular stem, resembling that of a hybrid "epiphyllum". Unless warm winter conditions can be provided, it is best to regraft the scion onto a hardier stock such as *Trichocereus spachianus*.

I find these plants keep their bright colours best if kept in semi-shade rather than in full sun.

Other bright red freak cacti are known. A red Copiapoa has been produced in Hungary and some years ago I was shown a magnificent tomato-red *Gymnocalycium damsii* found in Bolivia by the late Martin Cardenas. This plant was obviously not devoid of chlorophyll as it was of considerable size and was well-rooted.

G. 'Intermedium' is a very old name, first used by Hildmann in 1898. Plants under this name are claimed to be hybrids of *G. denudatum* with *G. multiflorum* or *G. monvillei*.

G. 'Jan Suba' is a well-known hybrid from Czechoslovakia which was produced in Prague by Frantisek Pazout by crossing *G. denudatum* v. *backebergii* with *G. baldianum*. It has a large shell-pink flower. An account of this hybrid will be found in an article by Jiri Elsner in *Nat. Cact. & Succ. J.*, 25 (2), 52 (1970).

G. "nickeri" is a plant I have from seed supplied by a Dutch nursery. The seed produced a number of rather variable plants which flower freely and appear to have some affinity with *G. quehlianum*. I suspect that this is a horticultural hybrid.

G. "vigonia" is a mystery plant given to me by Ron Ginns. It looks very like a form of *G. gibbosum* var. *nigrum* to me and may indeed be that species. The name could easily be the result of bad handwriting, "*nigrum*" being transcribed as "*vigonia*". Otherwise the plant is probably a hybrid.

Appendix

Although I have tried to include in this booklet all the named plants in the genus *Gymnocalycium* which are likely to be found in collections or at nurseries, there are certain to be omissions as so many invalid or even fictitious names are in use and little purpose would be served by listing every dubious name to be found on plant labels. However, there are some plants not in the main list because either they have as yet no proper identifications or they have names which have appeared very recently in catalogues or literature and about which I know little or nothing. A few of these are mentioned below.

G. species from Angolaya. This plant, distributed by the German firm of Uhlig as U-148, is not uncommon in collections. I find it slow-growing and my own plant has not flowered. It may be a member of the subgenus *Microsemineum*, Section *Mazanensia*, but this is only a guess at its affinity.

G. species from Marayes has often been listed under quite invalid names such as *G. marajes* or *G. marayes*. My opinion is that it is a form of *G. schickendantzii*. My plant bears striking flowers having a purplish or violet colour. This plant is mentioned in the main list as it is to be found often misleadingly labelled as a species.

G. species from Telaritos is quite a distinctive plant of striking appearance. It has straight black spines standing out from a dark grey-brown and very rounded body of which the ribs and tubercles are so low and rounded that the plant has an almost spherical shape. The flower is off-white with a brownish median stripe in the petals. I am uncertain to which subgenus this plant belongs. The habitat, Telaritos, lies on the borders of the Argentinian provinces of La Rioja and Catamarca.

G. quehlianum var. kleinianum Rausch nom. nud. is listed by Walter Rausch (WR-103b) as coming from the Sierra Chica of Córdoba. I do not know this plant.

G. schatzlianum Koop & Klein is listed by Rausch (WR-541) as coming from Balcarce, Buenos Aires Province, Argentina. I have seedlings under this name which have a bright green appearance, but they are far too young yet for me to comment on their possible relationship to other species.

Finally I offer a list of varietal epithets which are often found on plant-labels and in catalogues wrongly used as the names of species. Because plant-labels are small and botanical names are often long, this is a common and very confusing practice. Regrettably too, it seems to be used sometimes to perpetuate quite worthless names.

G. albispinum should be *G. albispinum* Backbg., a plant similar to *G. bruchii*, but this name can also be found on plants of *G. quehlianum* v. *albispinum*.

G. breviflorum may turn out to be either *G. hybopleurum* v. *breviflorum* or *G. mazanense* v. *breviflorum*.

G. caespitosum is *G. gibbosum* v. *caespitosum*.

G. delaetianum is *G. schickendantzii* v. *delaetianum*. These plants are sometimes named as *G. delaetii*, which has some claim to respectability as one of A. V. Fric's *nomina nuda*.

G. euchlorum is *G. hybopleurum* v. *euchlorum*.

G. filadelfiense is *G. mihanovichii* v. *filadelfiense*, named after its Paraguayan habitat (not Philadelphia U.S.A.!).

G. gerardii is *G. gibbosum* v. *gerardii*.

G. heuschkelianum is *G. denudatum* v. *heuschkelianum*.

G. kurtzianum is *G. mostii* v. *kurtzianum*.

G. leonense is *G. gibbosum* v. *leonense* (= *G. chubutense*).

G. nigrum is *G. gibbosum* v. *nigrum*.

G. nobile is *G. gibbosum* v. *nobile*.

G. parisiense is *G. multiflorum* v. *parisiense*.

G. stenogonum (also often "*G. stenogosa*") is *G. mihanovichii* v. *stenogonum*.

G. wagnerianum is *G. denudatum* v. *wagnerianum* (= *G. paraguayense* v. *wagnerianum* Schütz).

G. zantnerianum is *G. quehlianum* v. *zantnerianum*.

Map

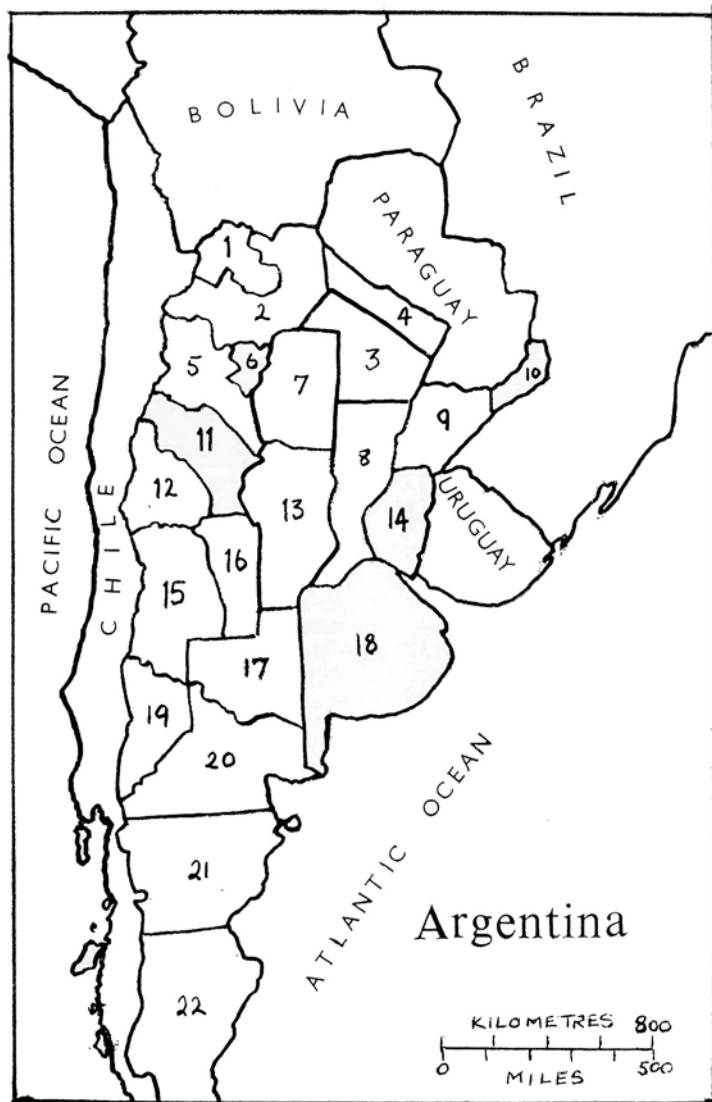
The map shown on the opposite page covers the whole of the habitat of the genus *Gymnocalycium*. It is intended only as a guide for use in conjunction with a good atlas. The Argentinian provinces shown are as follows:-

1 Jujuy	9 Corrientes	17 La Pampa
2 Salta	10 Misiones	18 Buenos Aires
3 Chaco	11 La Rioja	19 Neuquen
4 Formosa	12 San Juan	20 Rio Negro
5 Catamarca	13 Córdoba	21 Chubut
6 Tucuman	14 Entre Rios	22 Santa Cruz
7 Santiago del Estero	15 Mendoza	
8 Santa Fe	16 San Luis	

The provinces of Chaco and La Pampa were known as Presidente Peron and Eva Peron respectively during the Peron regime.

The arid region called the Gran Chaco includes most of Western Paraguay and extends into the Argentinian provinces of Formosa, Chaco and Salta.

The total area of the *Gymnocalycium* habitat is about one and a quarter million square miles, which is more than twelve times the area of the United Kingdom.



Index to Plant Names

Listed here are all the specific names and varietal names for *Gymnocalycium* referred to in this booklet, including invalid and incorrect names. A great number of varietal names which I consider to be worthless and which are no longer found outside of early cactus literature have been omitted. Many of the names listed here would also be best forgotten, but as they are unfortunately still used widely, they have to be included if this booklet is to be of use to growers.

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NOTES

NOTES

Some handy conversions

Many plastic plant pots today are sold in metric sizes. Strictly speaking, one inch is rather more than $2\frac{1}{2}$ centimetres (2.54 cm) but the following conversions are close enough for practical purposes:—

1 inch = $2\frac{1}{2}$ centimetres

2 inches = 5 centimetres

4 inches = 10 centimetres

6 inches = 15 centimetres

In measuring temperatures, the Fahrenheit scale is being replaced by the metric scale (Celsius). The following table may be found useful for comparing temperatures in the two scales:—

32° Fahrenheit = 0° C. (Freezing point of water)

41° „ = 5° C.

50° „ = 10° C.

59° „ = 15° C.

68° „ = 20° C.

77° „ = 25° C.

86° „ = 30° C.

95° „ = 35° C.

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