

Volume 41/Number 1  
February 1979

# The Cactus and Succulent Journal of Great Britain



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**Cover illustration:** *Kalanchoe beharensis*, from a linocut by Marion Wilds.

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ISSN 0007-9375

The Journal is published quarterly by the Society, price £1.

# The Cactus and Succulent Journal of Great Britain

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## Larger half-pots

Thank you for your many letters. We are in touch with B.E.F. again and will let you know the outcome.

## Status Symbols

From pots . . . to dots. Gordon Rowley (who will be one of the speakers after the A.G.M. on 24 March, by the way) launches a scheme with scientific intent to send you dotty (or spotty) on page 7, and to add 'a touch of prestige to specialist collections'.

Gordon suggests using coloured dots to indicate the status of each plant, or at least the most valuable scientifically. This is something that has been found very helpful in the Kew collections over the past decade, where red dots have been put on the labels of endangered species and dots of other colours used on material under scientific investigation. The self-adhesive, waterproof dots can be bought in strips or sheets and a suitable size is 6 mm. diameter. If you have difficulty obtaining them, ask for Brady Quik-Dots from W. G. Morley & Co. Ltd., 17 Drummmond Road, Croydon, Surrey (tel. 01-688 4919), or W. H. Brady Co., 727 W. Glendale Avenue, Milwaukee, Wisconsin 53201, U.S.A.

A few years ago, Gordon Rowley also took the initiative in compiling a preliminary 'Register of Specialist Collectors of Succulent and Allied Plants in the United Kingdom' which was published by IOS British Section in 1975. This is a 20-page listing of some 200 enthusiasts who responded to the initial questionnaire, with the

## Our New President

Mr. Arthur Boarder has accepted the invitation of Council to fill the office of President until the Annual General Meeting when, it is anticipated, he will be formally elected to the position. Our congratulations go to Mr. Boarder who has more than earned this distinction. He has been actively associated with the Society since its formation in 1931 in a great many ways and has worked untiringly on behalf of the members. It is difficult to pinpoint any of his many services as being of greater merit than the others but if there has to be a choice it must surely be his series of cultural articles in the Journal which ran for a period of twenty-eight years. They were always a source of sound advice and many of us were not only put on the right path as beginners but also kept on the straight and narrow by his words of wisdom. The Presidency is by no means a sinecure, as the late Mrs. Shurly demonstrated, and we are sure that Mr. Boarder will bring to it that touch of originality and enterprise which is his hallmark.

W.F.M.

entries arranged alphabetically and by specialities. Copies are still available from IOS, c/o 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA, price 60p post free. An up-dated and extended edition is in mind but unlikely to appear for a year or two yet.

## New Style Red Data Book

Specialist collectors have a potentially vital role in ensuring the survival of rare and endangered species, provided they keep good records of the plants they grow, know which are at risk, and achieve continuity via propagation and distribution—and via suitable arrangements should the plants outlive their owner. Status symbols and the IOS Register are both relevant here, but which *are* the species at risk?

Lists of rare and endangered species in various areas, including the U.S.A. and Europe\* have now been published. Coverage is being extended world-wide as rapidly as possible under the auspices of IUCN (International Union for Conservation of Nature and Natural Resources) and its Threatened Plants Committee founded in 1974 and based at Kew. Bulletins covering particular groups, including cacti, cycads and palms, are also planned, and the committee is continuing the pioneer work of Dr. Ronald Melville, who compiled the first Red Data Book for flowering plants (published in loose-leaf form in 1970-1), with more Red Data Sheets for individual species. 250 of these, plus some general chapters of introduction, have just been published in the new IUCN Red Data Book for Plants.† These are case-histories selected to illustrate the various types of threats, habitats, distributions, plant groups and protective measures, and include species of *Aeonium*, *Agave*, *Aichryson*, *Aloe*, *Ancistrocactus*, *Ariocarpus*, *Caralluma*, *Cereus (Pilosocereus)*, *Dudleya*, *Euphorbia*, *Obregonia* and *Pediocactus*.

Threats to plants, as to animals, usually involve *loss of habitat or selective exploitation*. Particularly vulnerable in the first category are the narrow endemics of the Canary Islands, the Florida Keys, and other areas where localities are small and natural vegetation is disappearing fast. In the second category, uprooting by collectors for collectors is still the chief exploitation suffered by succulents, and might not be so bad if fewer plants perished *en route* and those successfully re-established were carefully documented and propagated.

\* **E. S. Ayensu & R. A. DeFilipps.** *Endangered and Threatened Plants of the United States*. Pp. xv + 403. Published jointly by the Smithsonian Institution and the World Wildlife Fund Inc., Washington, D.C. 1978.

**IUCN Threatened Plants Committee.** *List of rare, threatened and endemic plants in Europe*. Nature and Environment Series no. 14. Council of Europe, Strasbourg. 1977.

Lists of endangered plants have also been published for Britain, East Germany (DDR), West Germany (BRD), U.S.S.R. and New Zealand.

† **G. Lucas & H. Synge** (compilers). *The IUCN Plant Red Data Book. Comprising Red Data Sheets on 250 selected plants threatened on a world scale*. Pp. 540. Published by IUCN, Morges, Switzerland, and available from the Secretariat of the Threatened Plants Committee, c/o The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, price £10 or \$20 U.S. currency, post free.

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## ANNUAL GENERAL MEETING, 24 MARCH

**The Society's Annual General Meeting will be held on Saturday 24 March at the Atkins Building, Queen Elizabeth College, Campden Hill, Kensington, London W8 7AH, commencing at 2.30 p.m.**

Following the business meeting, and light refreshments, there will be two illustrated talks. These will be given by **Gordon Rowley**, on the biology of succulents, and **David Minnion**, on Arizona.

*Directions.* Campden Hill is a turning off Campden Hill Road, which connects Notting Hill Gate and Kensington High Street, both of which are served by Underground, Greenline and buses (ten minutes walk). The entrance to our meeting-place is at the SE. corner of the Atkins Building. The building has its own car park off Campden Hill.

*Proposed Rule Changes.* Council will be seeking A.G.M. approval for minor rule changes prior to reprinting the rules in a form which will serve in lieu of a membership card. The aim of the changes is greater flexibility in the management of the Society and its Branches.

## CSSGB/IOS British Section Joint Meeting

Our late President, Mrs. Shurly, much enjoyed the Society's 40th Anniversary weekend at Knuston Hall in 1971, and she bequeathed £50 to the Society to be put towards the cost of organizing a similar venture. In view of Mr. & Mrs. Shurly's close association with IOS from its inception, and the British Section's intention of holding an Open Meeting this year, it has been decided to arrange a meeting under joint auspices. This is now fixed for the weekend of **20-21 October 1979** at the **Dolphin & Anchor Hotel, Chichester, Sussex**, and will incorporate the Society's Annual Dinner on the evening of 20 October. The theme of the lectures will be **'Succulents in the Seventies'**, and it is hoped that several leading personalities will be taking part.

The meeting will begin on Saturday morning at 10.00 a.m. and end before lunch on Sunday. For those wishing to stay at the hotel, which is a Trust House, there is an inclusive rate of £24 per person covering Saturday lunch and dinner, room and breakfast. Please contact Mrs. Maddams (26 Glenfield Road, Banstead, Surrey, tel. no. Banstead 54036) for more details. It is hoped to send programme details and a booking form to all members with the May issue of the Journal.

## SPT Convention at Croydon, 21 April

The Succulent Plant Trust is holding a Convention on Saturday 21 April at Elmhurst School, 46 South Park Hill Road, South Croydon. The meeting will take place in the afternoon and early evening. Lectures will be given by Tom Jenkins, on the Cacti of Brazil, by Bill Keen on 'The Genus *Huernia*' and by Dr. Peter Brandham on 'The Kew Expedition to Kenya, 1977'.

The meeting is open to everyone interested. The admission fee is £1 and includes a light meal at about 5 p.m. Bookings to be made in advance, please, with remittance, to Mrs. P. W. Putnam, 72 Church Lane Avenue, Hooley, Coulsdon, Surrey CR3 3RT. Full details will be sent to all applicants.

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## Shurly Memorial Fund

As announced in the November issue, a Fund has been opened to provide a memorial to our late and much-loved President. The Fund will remain open this year, and members' contributions are invited.

## Two new species of Aloe from Kenya

by Susan Carter and Peter Brandham

Royal Botanic Gardens, Kew,  
Richmond, Surrey

**Summary.** A new diploid species of *Aloe*, *A. morijensis*, is described from south-west Kenya. It occurs at the centre of distribution of the tetraploid shrubby species of East Africa, and the possibility that it is the ancestor of the group is discussed. A further tetraploid species, *A. cheranganiensis*, is described from the Mount Moropus region of the Cherangani Hills in western Kenya.

***Aloe morijensis* S. Carter & P. Brandham sp. nov.;**  
*affinis A. kedongensi* Reynolds, *sed habitu humilior, foliis minoribus minute fibrosis, inflorescentia pauciramulosa, bracteis majoribus, pedicellis et perianthiis brevioribus differt.* Holotypus: Kenya, Bally 17021 (K).

*Planta succulenta, fruticosa, foliosa, usque 60 cm. alta, e basi et superne ramosa; caulibus ramisque sub-erectis, patentibus, dense foliatis usque 1 m. longis, 1.5 cm. crassis. Folia patentia, recurvula, amplexicaulia, anguste ovato-attenuata, usque 17 cm. longa; basi 3 cm. lata, striata, fibrosa; dentibus marginalibus deltatis, viridibus vel brunneolis; dentibus 2-5 mm. longis, 5-15 mm. distantibus. Internodia striata, usque 2 cm. longa. Folia supra plus minusve concava, virentia, maculata; subtus convexa, virentia, distincte et valde maculata.*

*Inflorescentia simplex, 1- vel 2-ramosa, usque 50 cm. alta. Pedunculus usque 30 cm. longus, basi compressus, usque 8 mm. latus, bracteis sterilibus infra racemos ornatus. Racemi erecti, conico-acuminati, usque 20 cm. longi, 6 cm. diametro, floribus suberectis mox nutantibus. Bractee ovato-deltaeae, aristatae, usque 15 mm. longae, 8 mm. latae, scariosae, 7-9-nervatae, nervis brunneolis. Pedicelli usque 2 cm. longi. Perianthium stipitatum, aurantiaco-coccineum, floribus inapertis apice viridibus, cylindricum, 2.8 cm. longum, basi truncatum 6 mm. latum, media parte paulo angustiore, fauce usque 7 mm. expanso; segmenta apice rotundata, nervis obscuris 7, marginibus lutescentibus, exteriora per 7 mm. libera. Antherae et stigma vix exsertae. Capsula et semina haud visa.*

**DESCRIPTION.** Leafy succulent shrub to 60 cm. high, branching mostly from the base; stems and branches densely leafy, suberect and spreading to 1 m. long and 1.5 cm. thick. Leaves spreading or recurved, narrowly ovate-attenuate, to 17 cm. long and 3 cm. wide at the base, with green to brownish marginal teeth 2-5 mm. long and 5-15 mm. distant; leaf-bases sheathing, striate, slightly fibrous; internodes to 2 cm. long; upper leaf-surface more or less concave, bright green with a few longitudinally-elongated spots; lower surface convex, a darker green and much more heavily and distinctly spotted, the whole leaf becoming bronzed when desiccated. Inflorescence simple or sometimes with 1 or 2 branches, to 50 cm. high; peduncle to 30 cm. long, flattened at base, to about 8 mm. wide and with a few sterile bracts below the raceme. Raceme erect, conical-acuminate, to 20 cm. long, 6 cm. wide. Bracts ovate-deltoid, aristate, to 15 mm. long and 8 mm. wide at the base, scariosus with 7-9 brown nerves. Pedicels to 2 cm. long. Buds erect, orange-scarlet with green tips; open flowers pendent, stipitate, cylindrical, 2.8 cm. long, base truncate, 6 mm. in diam., bright orange-scarlet fading to yellow at the tips; tube slightly constricted above the base and enlarging at the mouth to 7 mm. in diam; segments with rounded apices, obscurely

7-nerved, outer segments free for 7 mm. Anthers and stigma hardly exserted. Capsule and seeds not seen.

**TYPE.** Cult. Kenya, Nairobi, Dec. 1976 Bally 17021, (K,holo), originally from Kenya: Masai Province and District, Loita Hills 8 km. south of Morijo, coll. 2 May 1970 G. Classen.

This small shrubby species of *Aloe* was discovered in a non-flowering state by Mr. George Classen in the Loita hills just south of Morijo. Plants from this collection have been in cultivation since 1970, both in this



*Aloe morijensis*; plant in 5 inch pot.

country and in Nairobi. However, it was not until December 1976 that the large plant in Dr. Peter Bally's Nairobi garden produced any flowers, thus allowing specimens to be made and a description drawn up.

The nearest ally of this species appears to be *A. kedongensis* Reynolds, from which it differs by its smaller size, its more slender and weaker sprawling branches, its smaller leaves and shorter internodes, its less branched, often simple inflorescence of smaller flowers and its larger bracts. The perianth colour is more or less the same orange-red.

The flowering in Nairobi at a higher altitude and in colder conditions than the plant's natural habitat seems to have been exceptional and flowering in this country has not yet occurred even though reasonably large plants have developed.

There are three specimens in the Kew Herbarium from the Ngare Nairobi North River Gorge on the western slopes of Kilimanjaro in Tanzania named as a form of *A. kedongensis* by Reynolds (cf. Reynolds, *Aloes of Tropical Africa*, p.377). These have very large bracts and are clearly not *A. kedongensis*. Two of them (Greenway 7844, Reynolds 8793) most closely resemble *A. fibrosa*. The other (Greenway 7843) may possibly be *A. morijensis* because the description given by Greenway of its habit agrees very closely, especially with regard to its being procumbent with ascending tips to the stems. Until plants in this locality can be investigated more thoroughly in the field a final identification must remain uncertain.

In cultivation *A. morijensis* grows readily and rapidly from cuttings, the illustrated specimen having grown in 12 months from a single unbranched cutting about 30 cm. long. The low habit and abundant basal branching make *A. morijensis* one of the more attractive of the shrubby aloes for cultivation, the other species growing too large too quickly.

This species and the other shrubby species from East Africa have been studied in depth at Kew for several years in order to clarify the taxonomic and evolutionary interrelationships of the group. To date our researches have found that in this group *Aloe dawei*, *A. elgonica*, *A. kedongensis*, *A. nyeriensis* and *A. ngobitensis* are all closely related tetraploids with  $2n=28$  chromosomes. Other shrubby species (*A. fibrosa*, *A. babatiensis*, *A. wilsonii*, *A. rabatiensis* and *A. yavellana*) are diploids with  $2n=14$  chromosomes. The plant of *A. morijensis* in cultivation at Kew was found to be also a diploid (Kew accession no. 084-76.00603, cytology no. 76-545).

The large bracts of *A. morijensis* suggest that there might be some affinity with *A. fibrosa* and *A. babatiensis* which have even larger ones, but there are notable differences. *A. morijensis* is much smaller in all its parts than these two species and has a less branched inflorescence. It also differs from *A. babatiensis* in flower-colour and leaf-form, the latter species having pink

flowers and unspotted leaves.

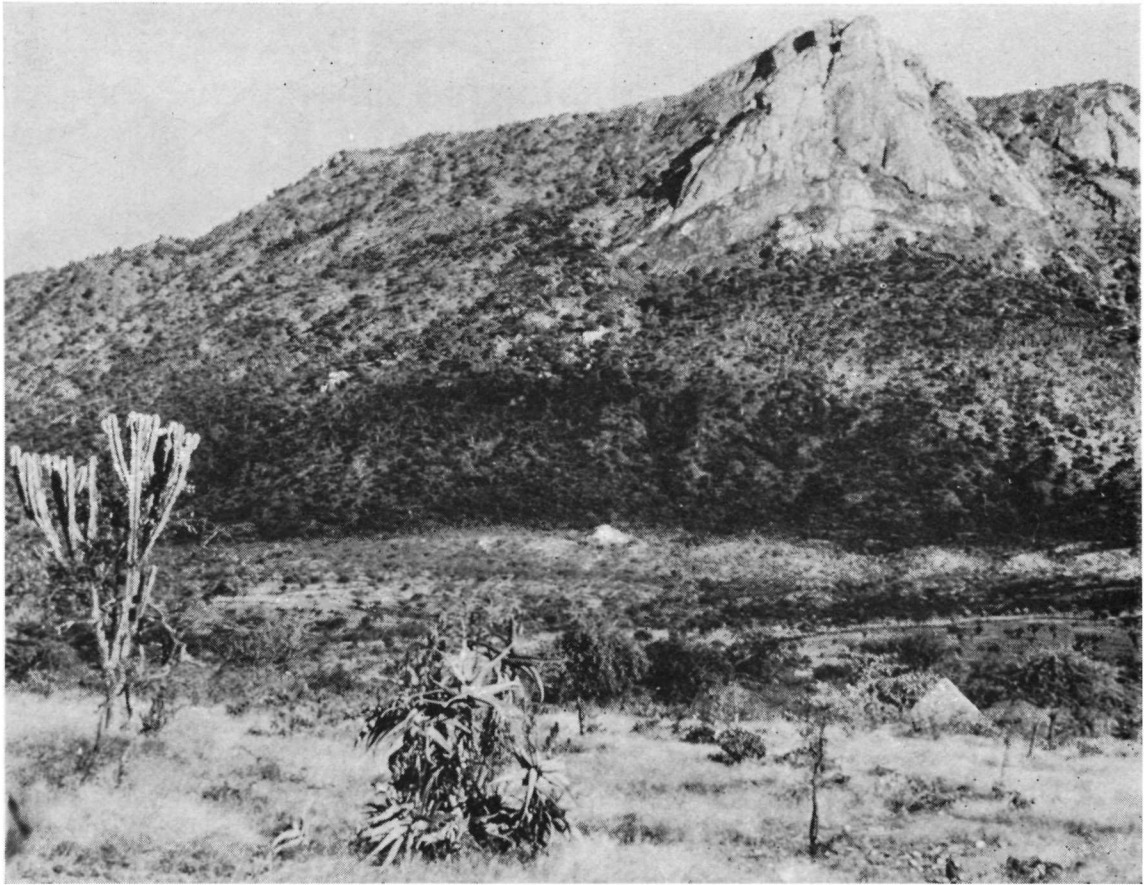
In a survey of the epidermal structure and ornamentation of the entire shrubby group, both diploids and tetraploids, our colleague Dr. David Cutler has found a remarkable similarity between the epidermis of *A. morijensis* and that of the tetraploids, especially *A. kedongensis*. The major morphological differences between *A. morijensis* and this species are almost exclusively quantitative and are quite consistent with a direct diploid/autotetraploid affinity between the two species. Furthermore, of the tetraploid species *A. kedongensis* is geographically the nearest to *A. morijensis*, extending south to an area only 80 miles (130 km.) north of Morijo in the Rift Valley near Lake Naivasha.

We intend to develop this idea further in another paper and demonstrate that *A. morijensis* is quite probably the diploid ancestor of the entire group of East African tetraploid shrubby aloes.

***Aloe cheranganiensis* S. Carter & P. Brandham, sp. nov.;** *affinis A. ngobitensi* Reynolds, *sed inflorescentia brevior pauciramulosa, perianthiis brevioribus dilatatis, segmentis exterioribus per spatium longius liberis, apice sursum recurvis, antheris et stigmatibus valde exsertis differt.* Holotypus: Kenya, Brandham 1727 (K).

*Planta succulenta, fruticosa, foliosa, usque 2 m. alta, e basi ramosa; caulibus erectis, dense foliatis, usque 4 cm. crassis. Folia patentia, recurvula, amplexicaulia, anguste ovate-attenuata, usque 40 cm. longa, basi usque 5 cm. lata; internodia 1.5-2 cm. longa, striata; folia supra planiuscula, subtus convexa; folia glaucoviridia maculata, junioribus valde maculatis; dentibus marginalibus 3 mm. longis, 8-13 mm. inter se distantibus, viridibus apice brunneis. Inflorescentia 2-ramosa, erecta, usque 60 cm. alta. Racemi cylindrico-acuminati, usque 20 cm. longi, 7 cm. diametro, floribus erectis mox nutantibus. Bractee ovato-acuminatae, usque 7 mm. longae, 3 mm. latae, scariosae, 3-nervatae. Pedicelli usque 15 mm. longi. Perianthium stipitatum, cylindrico-trigonum, lateraliter compressum, aurantiacum, apice resimum, 27-29 mm. longum, 6.5-7.5 mm. latum, fauce usque 9 mm. expanso; segmenta exteriora apice rotundata, reflexa, lutescentia, per 22 mm. libera, interiora apice brunnea. Antherae 8 mm. et stigma 10 mm. exsertae. Capsula et semina haud visa.*

**DESCRIPTION.** Leafy succulent shrub to 2 m. high, branching from the base, very glaucous when desiccated. Stems and branches erect, to 4 cm. thick, densely leafy. Leaves spreading, recurved towards the tips, narrowly ovate-attenuate, to 40 cm. long, 5 cm. wide at the base; leaf-bases sheathing, striate; internodes 1.5-2 cm. long. Upper leaf-surface more or less flat; lower surface rounded; both surfaces glaucous-green, spotted, heavily so on young shoots, especially below, leaves of older shoots almost unspotted; marginal teeth green with brown tips, 3 mm. long, 8-13 mm. apart. Inflorescence usually with 2 lateral branches, erect, to 60 cm. high. Peduncle green below, bronzed above, 20 cm. long to lowest branch, sterile bracts absent. Branches to about 30 cm. long. Raceme cylindrico-acuminate, about 20 cm. long, 7 cm. wide. Bracts ovate-acuminate, 5-7 mm. long, 3 mm. wide at base, scarios, 3-nerved. Pedicels to 15 mm. long. Flowers erect in bud, becoming pendent when open. Perianth shortly stipitate, cylindric-trigonous, laterally compressed, the vertical axis 7.5-9 mm., the horizontal axis 6.5 mm., bright orange, yellow at the mouth with inner segments brown-tipped, apex up-curved, especially in bud; segments reflexed at the tips when fully open, especially



The North face of Mount Moropus, Kenya, with *Aloe cheranganiensis* and *Euphorbia candelabrum* in the foreground.

the outer; dorsal segments 27 mm. long; ventral and inner segments 29 mm. long; outer segments free to within 5 mm. of base, very slightly divergent. Stamens exserted 8 mm., the filaments yellow; anthers brown. Stigma exserted 10 mm.

KENYA: West Suk District, Cherangani Hills, north of Mt. Moropus, March 1944, Tweedie 646 (K); *ibid.*, Tweedie in Christian 1290, cult. Ewanrigg, Rhodesia, 1 June 1954 (K); *ibid.*, Oct. 1974, Brandham 1727, cult. Hort. Kew., Nov. 1978 (K, holotype, EAH, isotype); *ibid.*, 10 Nov. 1977, Carter & Stannard 311 (K). Cherangani Hills, 18.8 km. NE. of Makutano on Cheperaria Road, Oct. 1974, Brandham 1716, cult. Hort. Kew. Nov. 1978 (K).

The Cherangani Hills comprise part of the western escarpment of the Great African Rift Valley and run north-south for a considerable distance in western Kenya. North-east of Kitale the Cheranganis end and the Rift Valley wall continues northwards as the Suk mountains. Between the two ranges of hills there is a high pass. The main road to Lodwar and Lake Rudolf runs north eastwards from Kitale to Kapenguria and thence over the summit of the pass to Cheperaria.

It passes close to the north of a prominent peak, Mount Moropus, and descends through Ortum and the spectacular Marich Ravine to the Weiwei Plains on the Rift Valley floor.

The country on either side of the road is rich in euphorbias and other succulents, and also three species of *Aloe*, particularly in the region immediately north and west of Mount Moropus. Two of these are well-known rosette species, *A. lateritia* and part of the *A. secundiflora*—*A. tweediae* cline, but the third is a new species which is shrubby and is distinct from the rest of the shrubby species of East Africa. It was first found in 1944 by Mrs. E. M. Tweedie, who recognised it to be a new species.

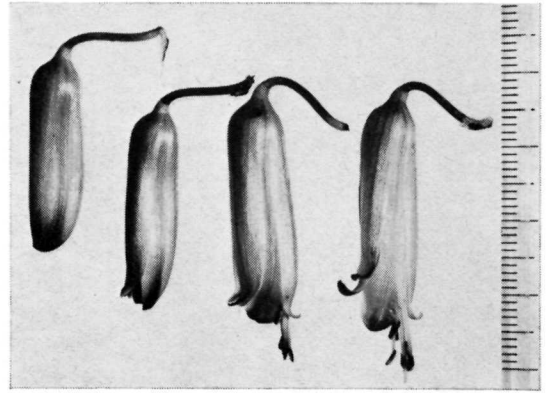
Several plants were collected on the Kew East African Expeditions in 1974 and 1977, and are currently in cultivation at Kew. All of these, including the one from which the type specimen was prepared, are tetraploids ( $2n=28$ ), which places the species in the group containing *A. dawei*, *A. elgonica*, *A. nyeriensis*, *A. ngobitensis* and *A. kedongensis*. It can be distinguished



*Aloe cheranganiensis* at the type locality, flowering in the dry season, October 1974. Note the dried, deeply channelled leaves.

easily from these species by its much smaller flowers which are never more than 30 mm. long compared with the 33-40 mm. of those of the other five species and by their shape which differs markedly. Flowers of the rest of the group are cylindrical or slightly trigonous and are more or less straight, but in the Cherangani plant they are strongly compressed laterally and curve towards the peduncle when in bud. As they open the orientation of the flowers changes from erect to pendent and the curvature of the open flowers, although unchanged, now appears to be away from the peduncle. The curvature is slight but is obvious and quite consistent. The outer petals are free almost to the base and recurve at the tips, especially the dorsal or adaxial ones. They also diverge very slightly to give a full-blown appearance unusual in this group of aloes.

Because of this distinct flower morphology which does not appear to grade into that of any other known species we are confident that it is a hitherto undescribed species of *Aloe*, and in keeping with the majority of its close relatives we are giving it a name derived



Flowers of *A. cheranganiensis*, natural size, showing the curvature of bud and open flower.

from the region to which it appears to be restricted—the Cherangani Hills.

Vegetatively *Aloe cheranganiensis* is very similar to *A. ngobitensis*. When it grows in moderate or dense scrub the plants are up to 2 metres tall and straggling with long internodes, but in the open they are shorter and more robust. The leaves are spotted on both surfaces in young shoots, with more on the underside, but those on fully grown branches are almost unspotted except for a few spots on the underside of the leaf near the base. This type of spot distribution with more on juvenile shoots appears in many other species of *Aloe*, both shrubby and non-shrubby.

The response of *A. cheranganiensis* to variations in climatic conditions is quite noticeable. When we saw it in the Cherangani Hills in October 1977 the short rains had been well under way for several weeks and all plants were bright grey-green with turgid leaves, but in October 1974 the rains had not started when the plants were found and the leaves at that time were deeply channelled and leathery. Furthermore, they had become extremely glaucous, a characteristic shared by only *A. elgonica* in this particular group of aloes.

*Aloe cheranganiensis* is not common and plants are scattered sparingly on either side of the road from Cheperaria eastwards to a point almost exactly north of Mount Moropus. Because it is easier to find precisely and because the plants there are growing in the open and are readily seen the latter locality has been chosen as the one from which the holotype is described.

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The next issue of the Journal will contain a further paper by Susan Carter and Peter Brandham entitled 'The identity of *Aloe juvenna*'.



## Status Symbols for Succulents in Cultivation

by G. D. Rowley

Plant Sciences, The University, Reading, Berkshire

At the I.O.S. British Section meeting at Matlock Bath in 1977 David Hunt drew attention to the merits of plants of known habitat origin (Hunt, 1978b). Their value in collections is bound to increase as fresh imports dwindle, and the onus is on us to do all we can to preserve them and to draw attention to them in a mixed collection. One of the many enigmas of human nature is our reverence for pedigrees in the animal kingdom, but indifference where plants are concerned. Pure-bred dogs carry snob appeal and change hands at high prices. Why not plants as well?

A very few collectors revere the species and reject hybrids, check their labels and keep looseleaf files or card indexes of where their plants come from. Most people accept any succulent that takes their eye, and not a few throw away the labels. Their motives in collecting are different and we must respect their attitude, but here I am concerned only with the more botanically-minded who feel, quite justifiably, that having spent money, time and effort in bringing together a collection it is worth a little extra work to ensure its perpetuity and to make it more useful to the taxonomist and conservationist.

### What gives a plant status?

But which plants are worth preserving, and which not? Certainly not just the largest, prettiest or most eligible for the show bench. Lasting value attaches to those specimens that come closest to representing the species as it was originally conceived. We often hear, for example, lamentations that everything grown today as *Rebutia hypothetica* is quite unlike that species as originally described—due, no doubt, to chance hybridization or some fateful switching of labels. If only type material had been preserved! There may be a gap of decades of uncertainty before the species is recollected in the type locality, by which time collectors have become used to the impostor and are thoroughly confused when confronted with two different plants under the same name (*Lobivia famatimensis* is a classic example).

It has become a cliché to lament the confusion of names and classifications in succulents and the shortage of reliable, conservative monographs. One reason for this muddle is the failure of standard two-dimensional herbarium techniques to cope with ever-so-three-dimensional plants like succulents. This means that

botanists must turn more to the study of living specimens in the wild and in cultivation. This in turn raises the subject of documenting living plants in the same detail as herbarium specimens are labelled. A history of art would be little value if based on all pictures, without distinguishing originals from copies. Likewise the taxonomist needs to be selective in choosing those plants on which his ideas of species can be formed. Maximum value comes to fall on specimens of known wild provenance, that is, those whose labels bear their location in the wild or a collector's number from which similar information can be traced in the literature. Collectors pledged to help the cause should therefore never discard a collector's number, even when the name of the species is established beyond reasonable doubt, and never trust a label by itself, but keep a file or index card with the same data in case the wording on the label becomes obscured.

### Status symbols

To encourage this recording, I would like to suggest a scheme whereby plants in cultivation can be graded in such a way as to emphasize how closely they relate to the species as it exists in nature. Each collector can then label his plants accordingly and ensure that the right material is preserved and propagated. The status symbol can be written on the label, in the record file, or indicated by a coloured dot, as shown in the table on the next page.

I am aware that my four categories represent an over-simplification and leave a few loose ends unclarified. It is easy to create any number of more elaborate schemes taking into account breeding system (self-compatibility or -incompatibility) and other features in the quest for greater precision. However, the simpler the scheme, the more likely it is to find acceptance, so I hope that the purists will forgive these concessions. At this point I would like to thank Prof. W. T. Stearn, David Hunt, Charles Jarvis and others who have kindly read the text and aided in its many transmutations.

### Some Notes on the Categories

1. It would be wrong to suppose that the only plants worth preserving are those that are 'true to type'. The emphasis lies not there but on documentation: a knowledge of where a particular specimen came from

Received as plants	Raised from seed	Main value	Status symbol	Numerical index	Colour code
<b>Clonotype.</b> Vegetatively propagated from the actual plant designated as type by the publishing author.		Anchor for the name; replacement of TYPE specimen in the event of loss.	A	10	Red
<b>Topotype.</b> Plant collected in the type locality, and clonal propagations from it.	Seed from type locality, or from hand-pollination of Status A/B plants.	REVALUATION of old and confused species for which no type is known.	B	8	Blue
<b>Indigen.</b> Plant of recorded wild provenance (field data or collector's field number).	Seed from specified wild habitat, or from hand-pollination of Status C plants.	Assessment of species VARIATION IN THE WILD.	C	6	Yellow
<b>Cultigen.</b> Plant lacking field data or a collector's number.	Seed from unrecorded source, lacking habitat data, or from open-pollination.	Assessment of species VARIATION IN CULTIVATION.	D	4	Black
Unlabelled plants of any kind.		HORTICULTURAL only.	—	—	—

and how much faith one can place in it as representing one facet of the variation of the whole species. In this context, an unnamed specimen with a collector's number such as 'FR789' can be more value than something with only a fancy name invented by the finder or vendor: the former can be traced back to source.

2. It would be equally wrong to suppose that Status D plants—the huge majority in most collections—are without merit through lack of a pedigree. Provided that they have been checked for correct naming they serve the botanist as depicting the spectrum of variation as found in cultivation. Sometimes, indeed, they may be all that he has to work on. There are succulents common in cultivation that have not been freshly collected in the wild for many decades, and where no type specimen can be traced, they are known only from cultigens.

3. Although unlabelled plants score 0 initially and are excluded from the scheme, as soon as they have been identified and labelled they can at least attain Status D.

4. Hybrids require special consideration. All that has been said so far applies to species. A naturally occurring hybrid is of interest to the writers of floras and monographs, and for the light that it throws on species relationships. Plants of known habitat origin, or clonally propagated from such a specimen, could be rated in the same way as wild species. The number of authenticated cases in succulents is very few. Examples are  $\times$  *Myrtgerocactus*,  $\times$  *Pachgerocactus*, *Senecio longiflorus*  $\times$  *stapeliiformis* and  $\times$  *Muiriogibbaeum muirioides*. Any seedlings from these, being genetically diverse, are of horticultural interest only and best scored as 4. The same rating would apply to hybrids of garden

origin, while recognising that they can have considerably interest to the geneticist, cytologist and evolutionist as well as to the florist.

#### Exceptions and Limitations

The four classes cover nearly all plants in collections so far as I have tested them. But there are exceptions. There are always exceptions. In dealing with living organisms we get used to finding 'misfits' to any man-made categories, and a classification is not automatically invalidated because its efficiency is less than one hundred per cent.

Rarity, extreme localization and endemism are not covered. In the improbable event of *Dendrosicyos socotrana* or *Pelargonium cotyledonis* turning up in a jumble sale, the purchaser would have to score it D (4), although the chances are that a rating of B (8) would be more applicable. Conservationists have their own scheme for grading species as extinct, endangered, depleted and so on, and it has not been found practicable to combine both into one. The answer here would seem to lie in compiling a list of species names, of the type that has been begun in the IUCN Red Data Book.

Open-pollinated seed from *Ariocarpus*, *Lophophora*, *Melocactus*, *Anacampteros* and some other genera, including of course those that are cleistogamous (*Frailea*), can be relied upon for botanical purposes to breed true, whereas obligate outbreeders, like some species of *Discocactus*, *Rebutia* and all dioecious succulents, clearly invite hybridization if seed sets at all. The serious-minded collector will I feel sure, be aware of these factors and draw attention to them in his record files.

### How to score your collection

The type locality (*locus classicus*) of a species is the place in which it was first discovered, or from which the plant selected as type specimen (holotype) originated. It is, or should be, cited along with the first description of the species, and is subsequently quoted in monographs and some more comprehensive floras. In earlier times some 'species' were described from cultigens, and for others the type locality is omitted or too vague: 'Mexico: San Luis Potosi', for example. For these the field can sometimes be narrowed down by retracing the route, if known, of the original collector. The great value to botanists of plants collected at the type locality (topotypes) above those collected elsewhere in the country of origin is that they give the best picture of the species as known to the publishing author, and are hence indispensable in helping to pin down dubious names. Where a first description is scrappy and no herbarium specimens were preserved, a return to the type locality may be the only means of clearing up the status of the name.

The procedure, therefore, in grading the plants in your collection is as follows:-

1. Reject unlabelled specimens or, better, check out their names and label them to qualify as D Status plants.
2. For those with labels, score as D all those lacking wild provenance.
3. Score the remainder as C, unless records show the plant to have come from the type locality (B) or from the type plant itself (A). This may take time to do, but it is better to downgrade initially and change later than guess at too high a rating.

For guidance on how to keep a record of plants in cultivation, see L. E. Newton in S.P.I. Newsletter No.4, 1964.

### Some examples: how it works in practice

1. *Talinum guadalupense* Dudl. Endemic to the small islands constituting Guadalupe off the coast of California, this species could reasonably score 8 at Status B on any plants or seeds received from habitat. No clonotype is known to exist.
2. *Euphorbia stellispina* Haw. Although widely distributed in the Cape, Haworth's original material came from near Springbok in 1822, from a small population close to where the Hester Malan Wild Flower Reserve is today. Hence only material direct from this source qualifies for Status B, 8 points. Although a few clonotypes of succulents from Haworth's day survive, *E. stellispina* is not among them.
3. *Senecio rowleyanus* Jacobs. Until recently, all plants in captivity automatically scored Status A, being vegetatively propagated from the one original introduction. This scores 10, despite the provenance being unknown. A recent re-introduction by John Lavranos establishes the locality as Kleinpoort, Steytlerville

Karoo. Although this is precisely documented, it does not replace the clonotype which remains as anchor for the name, and scores 6 in Status C.

### Advantages and Uses

Botanical gardens now usually indicate whether seed is of known or unknown wild origin in their seedlists and some—notably Kew and The University of California—employ numerical ratings on their plant accession cards on rather similar lines to the above (cf. Hunt, 1978a).

Apart from adding a touch of prestige to specialist collections, the recording of status symbols would have certain real and practical value. The aid to taxonomists and conservationists has already been referred to and is self-evident. If the collector dies suddenly, it would be apparent from the labels which of his plants are elite and most worthy of saving, irrespective of size and condition. In the compilation of source-books like the I.O.S. Register of Specialist Collectors one could record the percentage of Status A, B and C plants in each collection, and add up the numerical equivalents to obtain an overall average. A total approaching 10 would then be the botanical equivalent of a shelf full of trophies to the person who grows succulents primarily for exhibition.

So far as obtaining high-status plants is concerned, all praise is due to organizations like the I.S.I. for their efforts to make authenticated material generally available.

So I offer the scheme in the hopes that it might prove acceptable in its present form, and provide just that little spice of superiority to stimulate not only the already converted but also others who up to now have never considered their plants as more than *objets d'art*. In a world of vanishing wild life, ownership of Status A, B and C plants should be regarded not as a right bought for cash, but as a privilege. Their preservation should be planned as seriously as that of family heirlooms.

### References

- HUNT, D. R. (1978a). The Living Collections Records File. In Kew Bull. 33(1): 7-14.  
——— (1978b). The Value of Documented Plants. In N.C.S.S. Zone 3 Compendium 3: 17.

### Repertorium Plantarum Succulentarum XXVII

The twenty-seventh annual issue of this Index of New Names of Succulent Plants, compiled by Gordon Rowley and published by IOS, has just been published. Copies are available from IOS, 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA, price £1.90 (\$4.00 U.S.) post free.

## Orbea back in Orbit

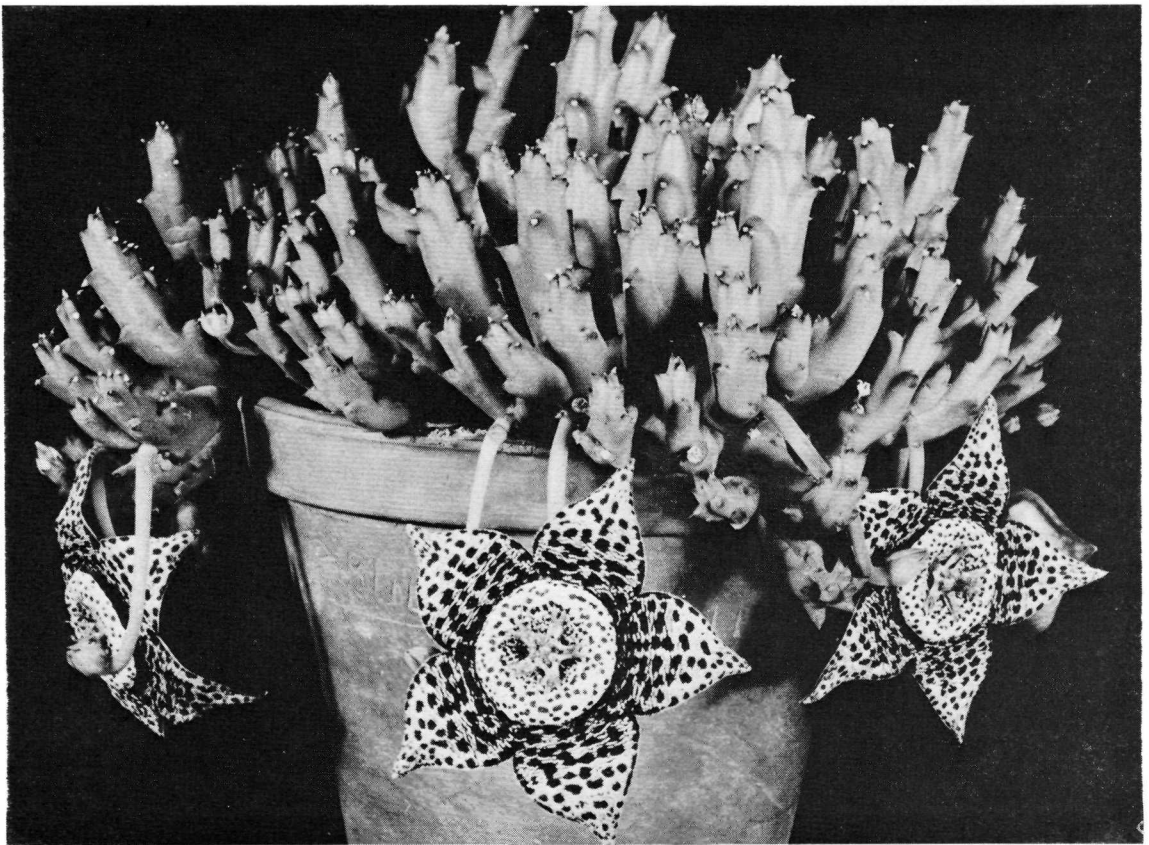
by David Hunt

If asked to name one *Stapelia*, most of us would probably say '*S. variegata*', and this popular association is currently sanctioned by the International Code of Botanical Nomenclature, which cites *S. variegata* as the type of the genus. But it does not take a taxonomist to see that *S. variegata* and other common stapelias, like *S. hirsuta* for instance, are very dissimilar.

*S. variegata* and *S. hirsuta* were in fact the only two species known to Linnaeus and included by him in *Stapelia*. By 1812, a further 80 or so had been discovered and Haworth proposed a new classification, accepting three genera already proposed by Robert Brown (*Huernia*, *Piранthus* and *Caralluma*), and adding a further seven new genera. *S. hirsuta* remained with the largest group, totalling 31 species, in *Stapelia* itself, whilst *S. variegata* was transferred to *Orbea* Haw. Later authors, however, thought Haworth's segregates would be better as sections, not separate genera, and so *S. hirsuta* and *S. variegata* have remained together in an uneasy alliance.

Four years ago proceedings were reopened: Larry Leach, Honorary Botanist at the National Herbarium, Salisbury, Rhodesia, published a paper (in *Kirkia* 10: 287-291, 1975) pointing out that Haworth had implicitly taken *S. hirsuta*, not *S. variegata*, as the type of the genus, when he proposed *Orbea*. On this basis Leach reinstated *Orbea* for *S. variegata* and its relatives (including the genus *Stultitia*).

On the face of it, the resurrection of *Orbea* certainly seems the lesser of two evils if *S. hirsuta* and *S. variegata* are to be divorced, as they probably must be. The alternative of making a new genus for *S. hirsuta* and all the members of the *S. grandiflora* group is practically unthinkable. Nomenclatural pundits may feel, however, that 'correcting' the International Code of Botanical Nomenclature to make *S. hirsuta* the type of *Stapelia* will be difficult to justify. There is evidence in Linnaeus's own writings which may make *S. variegata* the indisputable type of *Stapelia* Linn. This was not fully reviewed by Leach and to uphold his treatment it may be necessary to indulge in the nomenclatural jiggery-pokery of conserving *Stapelia* sensu Haworth against *Stapelia* Linn.



*Orbea variegata*

(photo: Margaret Martin)

All this aside, I believe that specialist collectors may favour the reinstatement of *Orbea* on purely taxonomic grounds. Why has no one resurrected it before? In the preliminaries to a new review of the genus\*, Leach suggests that generic concepts in the *Stapelieae* have depended too exclusively on floral criteria. Students in the present century, coming under the influence of Dr N. E. Brown, have dismissed or under-rated the value of vegetative characters. Difficulties in delimiting genera have been caused, at least in part, by failure to take advantage of clear correlations between flower and stem features, like those which divide *Orbea* from other groups in *Stapelia*.

As understood by Leach, *Orbea* now contains 20 species of which two are new. He subdivides the genus into two sections, *Orbea* and *Stultitia*, and each of these into subsections. He provides identification keys and a fully illustrated synopsis of the species.

As so often happens in taxonomy, the recognition of one segregate genus also brings nearby critical groups into sharper focus. In the present case, the next phase of Leach's study has concerned (i) the *Caralluma lutea* group, including a number of species which have been shunted between *Stapelia* and *Caralluma*; (ii) the *Caralluma keithii* group; and (iii) two aberrant species of *Stultitia*. These Leach regards as close allies of *Orbea* but sufficiently distinct either florally (the *Caralluma* spp.) or vegetatively (the *Stultitia* spp.) to merit separate genera: (i) *Orbeopsis* Leach (10 species), (ii) *Paracymbium* Leach (2 species) and (iii) *Orbeanthus* Leach (2 species). The latter part of Leach's paper contains descriptions of these and an enumeration of the component species.

Larry Leach's contribution occupies the first of a new taxonomic series of 'Excelsa', the annual journal of the Aloe, Cactus and Succulent Society of Rhodesia. It is similar in format and produced to the same very high standard of excellence as 'Excelsa' itself.

\*Leach, L. C. *A contribution towards a new classification of Stapelieae (Asclepiadaceae) with a preliminary review of Orbea Haw. and descriptions of three new genera.* Pp. 75, 39 half-tones and text figs, 4 maps. Excelsa Taxonomic Series no. 1. Aloe, Cactus & Succulent Society of Rhodesia, 1978. Price £5, from P.O. Box 8514, Causeway, Salisbury, Rhodesia.

#### ECHEVERIA AGAVOIDES var. CORDEROYI

Mr. Van Keppel is not altogether correct in saying (November issue) that this plant has been consistently misidentified (as var. *agavoides*). There is an illustration of the true var. *corderoyi*, captioned 'Urbinia species, probably *U. corderoyi*' in Scott Haselton's *Succulents for the Amateur*, p. 103, fig. 177 (1939). The text rightly distinguishes *corderoyi* from *agavoides* by its larger number of paler green leaves. Also, in my experience, var. *corderoyi* is not as difficult to propagate as Mr. Van Keppel suggests. A normal, single-headed specimen that I had in my collection in North London for about five years produced three basal offsets in that time.



*Stapelia ambigua* var. *fulva*, closely allied to *S. hirsuta*  
(photo: Peter Chapman)

The plant was given adequate root room in a 9 inch (23 cm) diameter plastic pan and the offsets appeared from between the lowermost healthy leaves of the rosette. This plant was also propagated from seeds and appeared to be self-compatible.

N. P. TAYLOR

#### Types at Berlin: Corrigendum

The table accompanying Dr. Leuenberger's paper 'Type specimens of Cactaceae in the Berlin-Dahlem Herbarium (CSJGB 40(4): 101-4. 1978) contains an error for which we apologise. Under *Echinocactus*, the 'Present genus' for nos. 47 and 48 has been accidentally transposed. *E. molendensis* (Weberbauer 1506) is referable to *Islaya* and *E. myriacanthus* (Weberbauer 4272) to *Arequipa*. The latter species was placed in *Arequipa* by Britton & Rose and later in *Maticana* by Buxbaum.



*Mammillaria guelzowiana*

(photo: Jackie Panter)

## Connoisseurs' Cacti

Chosen by Jackie Panter and Bill Maddams

### 1. *Mammillaria guelzowiana*

Although it resembles *M. bocasana* (so much so, apparently, that one well-known continental garden sells a coloured postcard of it captioned as *M. bocasana*!) this is a much sought-after plant on account of its flowers, which are amongst the largest in the genus. They are about 2–2½ inches (5–6.5 cm.) across and 2 inches (5 cm.) long, the sepals silvery with a brown mid-stripe and the petals an intense deep magenta—a magnificent sight when several blooms are open at once.

It was a surprise to me to find that this plant has been around for fifty-odd years, for after much searching I finally obtained the one shown in 1974; it then measured 1 inch across and now fills a 3½ inch pot. In fact I purchased two at the same time. The other was called *Mammillaria guelzowiana* var. *splendens* (a *nomen nudum*);

it is identical except for the colour of the hooked central spine, yellow instead of brownish-orange. Though grown under identical conditions it is considerably slower than the brown spined one and only just fills a 2¾ inch pot; it flowered for the first time last year.

The original description says that *Mammillaria guelzowiana* eventually forms a clump but one mostly sees large single-headed plants in 5 inch pots, which after a year or so of reaching this size are no more, tending, according to their owners, to rot off suddenly at the base. It seems therefore that this is one of those plants which should be given less water on reaching maturity and as an extra precaution a thickish layer of gravel or small chippings around the base will ensure that moisture does not linger there. Further advice would be to keep it in a sunny position and to make sure that it is absolutely dry before watering, and also not to water too early or too late in the season.

J.P.

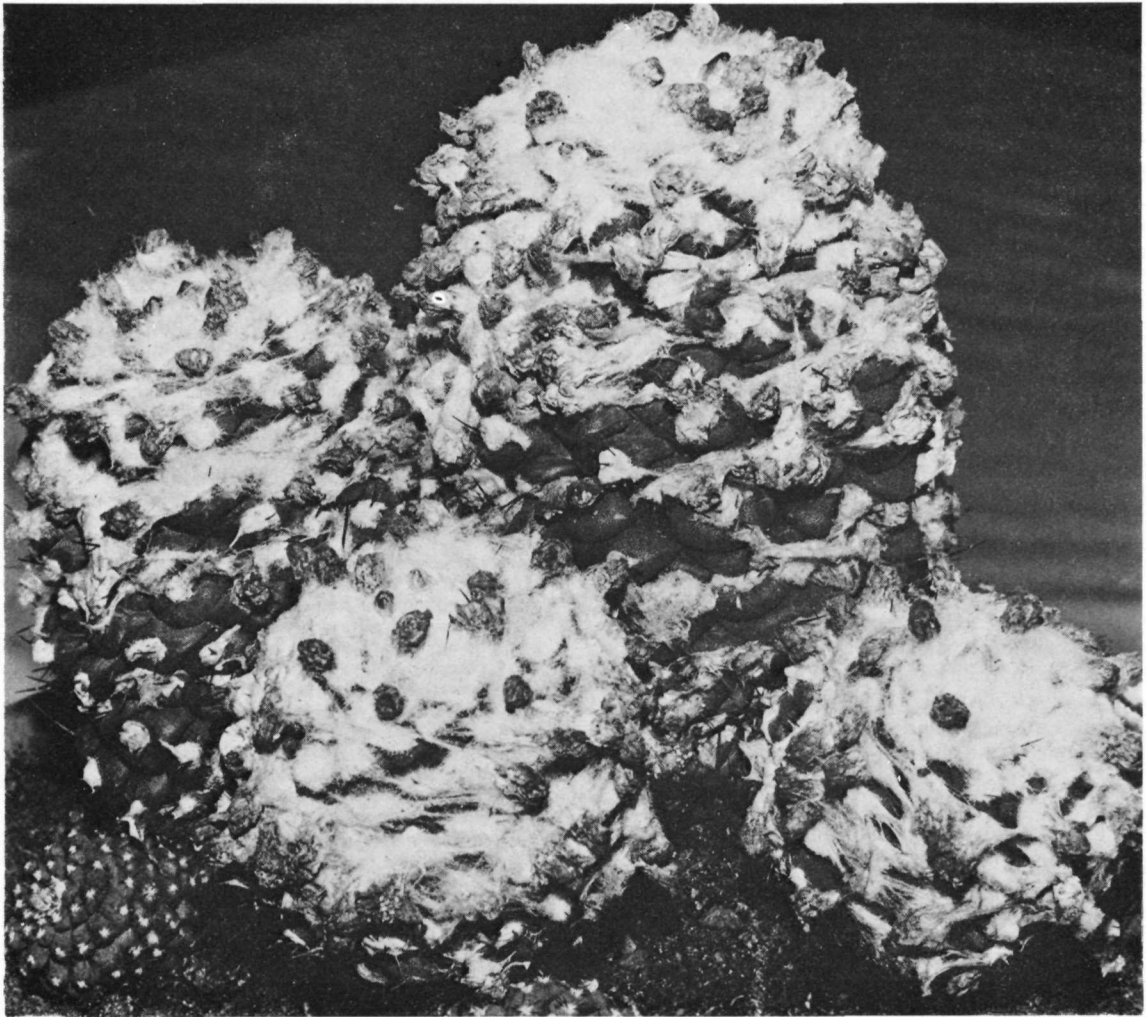
## 2. *Copiapoa hypogaea*

All too often beginners, and even some collectors of rather wider experience, are under the impression that the genus *Copiapoa* consists of large, slow growing plants with greyish green bodies and rather strong spines, which are unlikely to flower in British conditions. This image may have been fostered by the fact that ten to fifteen years ago, most specimens in cultivation were of this type and were imported plants. Interesting though these plants are they do not show the genus at its best as far as the ordinary collector is concerned because there are available several smaller-growing species, readily raised from seed, which will bloom consistently from the age of three or four years.

These species, which often form clumps of comparatively small heads when mature, have dark green bodies which become an attractive bronze shade during the

summer. The yellowish flowers, which appear in appreciable numbers during the approximate period May to September, are interesting because the stamens are very loosely arranged, unlike many of the *Cactaceae* where they form a compact circle around the stigma. This group includes *Copiapoa barquitenis*, *C. humilis*, *C. mollicula*, *C. montana*, *C. tenuissima* and *C. hypogaea*, the last-named being the subject of the illustration. The plant depicted, raised from seed in 1965 and now in a nine-inch container, is probably reaching maturity. It is clearly one of the larger-growing species of the group and *C. tenuissima*, for example, is unlikely to attain this size. It has bloomed consistently, prolifically and for much of the summer from three years of age. Another attractive feature of this group of species is their tendency to produce abundant white wool on heads of flowering size.

W.F.M.



*Copiapoa hypogaea*

(photo: Mark Eban)

# Cactus Genera in Cultivation

by Gordon Rowley

In 1977 a questionnaire was put out (see Vol. 39, page 106) listing 23 of the least familiar of the genera of Cactaceae (as recognised by Backeberg) and asking for information on which, if any, are in cultivation. None of the remaining Backebergian genera gave me any doubt as to whether or not they were represented in cultivation. The enquiry arose from efforts to make a new key to the genera of cacti in cultivation; there is no point in complicating a key with names that nobody is ever likely to encounter. Knowing that collectors are usually forthcoming when invited to name their rarities, I was a little disappointed to receive only 15 answers, but since these included some of our most experienced growers the result would seem to be worth publicizing.

Each of the 23 genera found at least one champion who grew it or at least knew of plants in cultivation in Great Britain. The actual scores of positive votes were: *Austrocactus* 13, *Armatocereus* 11, *Micropuntia* 10, *Rodentiphila* 9, *Samaipaticereus* 8, *Acanthocereus* and *Brasilicereus* 7 each, *Neocardenasia* 6, *Gymnocereus*, *Neodawsonia* and *Roseocereus* 5 each, *Anisocereus*, *Brachycereus*, *Jasminocereus*, *Philippicereus* and *Rauhocereus* 4 each, *Eccremocactus*, *Leocereus* and *Wilmattea* 3 each, *Leptocereus* 2 and, tying for top place for rarity with only one sighting each: *Castellanosia*, *Dendrocereus* and *Neoabbottia*. The questionnaire further invited people to indicate "F" for any genus they considered to be frequent in cultivation. Only 1 genus, *Armatocereus*, received 2 "F's"; *Roseocereus* and *Samaipaticereus* were scored at 1½ each and *Anisocereus*, *Brasilicereus*, *Neocardenasia*, *Philippicereus*, *Rauhocereus* and *Rodentiphila* achieved 1 "F" each.

So we may conclude that there is no Backebergian genus of Cactaceae completely unrepresented in captivity somewhere in Great Britain, although about a score of them qualify as rare and confined to a handful of specialist collections. Why are they so rare? Two reasons spring to mind: weediness and difficulty of cultivation. Rank growers with tiny flowers like *Leptocereus*, *Armatocereus* and *Neoabbottia* do not endear themselves to collectors except the select few content with a seedling so that they can claim to have every genus. Incidentally, does anyone make this claim, I wonder? Others, like *Jasminocereus*, have been available as seed but the seedlings are reported not to thrive.

None of the above genera, so far as I know, is yet in danger of extinction, so the shortage of fans need not worry the conservationists unduly. But, if nothing else, the list might draw attention to the least conserved of living cacti.

# Notes on the 1979 Seed Distribution

by Terry Smale

All seed offered has been freshly purchased for this distribution and is available while stocks last only. Please order promptly to avoid disappointment, and follow the instructions on the Order Form (accompanying the Journal) carefully.

The names given below are as received from the wholesalers and given on the packets. Species offered under unpublished or incorrect names are indicated by *italics* after the order number.

The seeds under KK numbers originate from Karel Knize of Lima, Peru. Each number refers to an individual wild population but it is not known whether the seeds were harvested in the wild or in cultivation in Peru.

**131. *Austrocactus patagonicus*.** Member of a small genus whose relationships are not well-defined. Cylindric stems to 50 cm. long covered with a mixture of light and dark spines, some hooked. Flowers produced near the apex whitish with violet stigmas. Seeds are large and difficult to germinate. From cool areas of Patagonia in S. Argentina.

**132. *Cereus dayamii*.** Seed from garden of Pinya de Rosa. Quick-growing, tall columnar plant with 6-ribbed stems, about 10 cm. diameter, and weak spines. Long-tubed white flowers on large plants. Argentina (Chaco). The *Cereus* spp. listed here would make suitable grafting stock.

**133. *Cereus hexagonus*.** From Pinya de Rosa. Freely branching, tree-like species with 4-6 angled stems, blue-green in colour and carrying weak spines. Venezuela, Guyana and Surinam.

**134. *Cereus jamacaru*.** From Pinya de Rosa. Another quick growing, branching cactus with 7-8 ribs and strong yellowish spines. Brazil.

**135. *Copiapoa coquimbana* KK 1388.** Form with reddish-yellow flowers from a locality called Mine Pablo in Chile. In age it produces large groups of 10 cm. diameter globular heads, which have tuberculate ribs and straight black spines.

**136. *Copiapoa dura* KK 607.** Medium-sized globular plant, which is usually solitary and has a brownish epidermis. The low straight ribs have large, white-felted areoles and short, very thick, black spines. Typical yellow *Copiapoa* flowers, with spreading stamens, are not readily produced. Chile (Totoral).

**137. *Coryphantha longicornis*.** Solitary globular species, which grows to about 10 cm. diameter, with large upwards-pointing tubercles. Radial spines are thin and pale, whereas the 3 centrals are brown and stouter; the lower ones being down-curved. Flowers are yellow. Mexico (Durango).

**138. *Echinocactus grusonii*.** From Pinya de Rosa. The 'golden barrel' cactus, which forms 1 metre diameter plants in age. These are completely covered with sharp yellow spines. Now rare in habitat in Cent. Mexico.

**139. *Echinocereus hancockii*.** Uncommon species, which forms clumps of elongated stems, that are about 6 cm. diameter. These are densely covered with long thick straight spines, which are pink on new growth. The large flowers are yellow, fading to salmon. Mexico (Baja California, Bahia San Hipolito).

**140. *Echinocereus russanthus*.** Member of the *E. chloranthus* group with freely produced reddish-green flowers. Small elongated stems, which are densely covered with purple-tipped spines. Mexico.

**141. *Erdisia ayacuchensis* KK 1274.** Undescribed species from Central Peru. *Erdisias* are slender cereoid plants, which rarely grow to more than 1 metre long. They produce yellow to red, short-tubed flowers from near the tip.



- 142. *Eriosyce* sp.** KK 1324. Originates from Rivadavia in Central Chile, at an altitude of 1200 m. *Eriosyces* are large globular plants with strong spination, that can vary from yellow to black in colour. Related to *Neoporteria*.
- 143. *Eulychnia procumbens*** KK 1284. Low-growing cactus, clumping and semi-prostrate. It has about 10 ribs, with large grey areoles and very long straight spines. Cent. Chile.
- 144. *Ferocactus chrysacanthus*.** Attractive, medium sized species with a mature stem diameter of about 30 cm. Radial spines are thin and white, but the central spines are thick, long and curved and yellow or red in colour. Mexico (Baja California).
- 145. *Frailea magnifica*.** Distinctive species, which is still undescribed. The very small elongate stem is completely covered with short golden-yellow spines. Flower buds are produced in the crown on very young plants, but only occasionally develop to produce the yellow flowers.
- 146. *Frailea phaeodisca*.** Often listed as a variety of *F. pygmaea* but possibly distinct. Small red-tinted, globular body with a crescent marking just below each brown areole. Spines are white and very small. Uruguay.
- 147. *Gymnocalycium gibbosum* var. *nobile*.** Large spherical species with a dull green skin. Each areole can produce up to 30 long straight spines, which are whitish in colour. Flowers are 6 cm. long, usually white and very beautiful. S. Argentina.
- 148. *Gymnocalycium kozelskyanum*.** Flattened plant which has an unusual coppery-brown body colour. Ribs and tubercles are barely obvious and each areole carries 3 spines. Flowers are rose pink, deepening to purple in the centre. Argentina (Cordoba).
- 149. *Haageocereus* spp.,** mixed. Small to medium sized cerei with colourful spination, in a mixture of species supplied by Knize. Peru.
- 150. *Lobivia lateritia*** R 490. This is the form sometimes known as *L. camatquiensis*. Globular, solitary, grey-green plant, which has many long brown spines from each areole. The 4 cm. diameter flowers are crimson and produced near the crown. Appearance of this species is such that when Knize first saw plants in the field, he identified them as *Pyrrhocacti!* S. Bolivia.
- 151. *Lobivia winterana*.** Smallish, somewhat elongate plant with low straight ribs and usually only radial spines, which are short and light brown. It produces glorious flowers, which are wider than the plant body, carmine with a white centre. Rausch regards it as a variety of *L. backebergii*. Peru (Huancavelica).
- 152. *Mammillaria baumii*.** Small clustering species covered with fine white spines. The sulphur yellow flowers, which are freely produced, are 3 cm. across and have a strong lemon scent. Member of the *Dolichothele* group from Mexico (Tamaulipas).
- 153. *Mammillaria beneckeii*.** Variable species, usually offsetting and not very large. It has white radial spines and brown hooked centrals. Yellow flowers, 4 cm. in diameter, are seldom produced. Choice species with very large seeds from which it quickly grows, but needs extra heat in winter. It has a subgenus *Oehmea* to itself. Mexico.
- 154. *Mammillaria centraliplumosa*.** Member of the *M. spinosissima* group, which was described in 1971. Slender cylindrical plant with many whitish radial spines. Red central spines are straight or hooked and slightly feathery. Flowers purplish pink, freely produced. Mexico (State of Mexico).
- 155. *Mammillaria microcarpa* var. *auricarpa*.** Attractive but difficult plant, which is up to 6 cm. diameter, elongate and often offsetting. Stems covered by many pale, radiating spines and with solitary hooked yellow centrals. Flowers are 4 cm. diameter, pink, and are followed by elongate golden yellow berries. U.S.A. (Arizona).
- 156. *Mammillaria multisetata*.** Solitary, globose to shortly cylindrical species with woolly axils which produce many long white bristles. The few spines are about 8 mm. long, white with dark tips. Mexico.
- 157. *Mammillaria schiedeana*.** Variable in its body form; can be solitary or freely clumping and usually has a thick root. Tubercles are close together, long and thin, each one tipped by many short, hair-like, yellow spines. Whitish flowers are hidden among the tubercles and are often produced in the winter. Mexico (Hidalgo).
- 158. *Mammillaria yucatanensis*.** Rare species from S. Mexico (Yucatan) and therefore one that would probably appreciate more warmth. Shortly cylindrical and eventually caespitose species, with woolly axils and dense, short, yellow spines. Produces small pinkish flowers.
- 159. *Mammillaria* sp.** Lau 044. Seed from cultivated plants, originally from Isla Magdalena (Baja California).
- 160. *Matucana aureiflora*** KK 777. Very flattened plant with many ribs, divided into rounded tubercles. Areoles elongate with radiating spines which are light brown at the tip and black at the base. Flowers yellow, and unlike other *Matucanas* are short-tubed and regular in shape. N. Peru.
- 161. *Melocactus peruvianus* var. *minimus*** KK 1357. Small-growing form of a variable species. Acute ribs with strong spination. At maturity the plants form a cephalium with white hair and red bristles. Cent. Peru.
- 162. *Mila cereoides*** KK 1404. Cylindric cactus growing to 30 cm. tall and sparingly offsetting from base. Stem is totally covered with white to brownish spines and occasionally bears small yellow flowers near the apex. Cent. Peru (Fortaleza valley).
- 163. *Neoporteria atroviridis*** KK 652. (*N. tuberisulcata* var. *atroviridis*) *Horridocactus* group. Hemispherical body is dark grey-green in colour and the spines are long and black. The 5 cm. long flowers have carmine petals with a light border. N. Chile (Vallenar).
- 164. *Neoporteria gerocephala*** KK 96. One of the most attractive forms in the *N. multicolor* group. Spherical body is completely covered with soft interwoven snow-white spines. Bright pink flowers are tubular and 5 cm. long, with the inner petals hardly opening. Cent. Chile.
- 165. *Neoporteria islayensis* var. *nigra*** KK 1340. *Islaya* group. Small solitary species with about 20 low ribs. It has many short radial spines and about 4 longer black centrals. Flowers small, yellow. From the coastal desert of southern Peru.
- 166. *Neoporteria kunzei*** KK 59. *Nichelia* group. Stout plant, somewhat elongate in age and well armed with long stiff, upward-curving, yellow spines. Flowers yellowish-white. Grows in central Chile (Coquimbo) but strongly resembles plants in the *Pyrrhocactus* group from the other side of the Andes.
- 167. *Neoporteria transitensis*** KK 1167. *Nichelia* group. Tap-rooted species reaching 11 cm. diameter with grey-green stem. Very large areoles with many 3 cm. long, inward-curving, brown spines. Flowers pale yellow. From N. Chile at an altitude of 2800 m.
- 168. *Neowerdermannia* sp.** KK 1449. This was collected in N. Chile and is therefore probably a form of *N. chilensis*.
- 169. *Notocactus bommeljei*.** Nothing is known about this, except that Ritter gave this name to his collection FR 1267.
- 170. *Notocactus graessneri*.** *Brasilicactus* group. Medium-sized plant, which is slightly flattened, and almost completely hidden by the thin, straight yellow spines. Flowers small and yellow to green in colour. S. Brazil (Rio Grande do Sul).
- 171. *Notocactus haselbergii*.** *Brasilicactus* group. Larger than the preceding, to about 15 cm. diameter and covered with fine white spines. Flowers small, tomato-red in colour and very long lasting, produced in a cluster at the apex. S. Brazil (Rio Grande do Sul).
- 172. *Notocactus rutilans*.** Small-growing and slightly elongate in age, with short, stiff, brownish spines. Beautiful flowers with translucent petals, pink shading to yellow in the centre. Uruguay.

- 173. *Notocactus* sp.** This has been distributed by De Herdt and is a globular plant with short, straight, thin, snow-white spines. Unlike most *Notocacti*, the stigma is yellow. May be related to *N. scopia*, but is distinct. Brazil.
- 174. *Obregonia denegrii*.** Choice slow-growing globular cactus, with a very woolly crown. Tubercles have a curious scale-like appearance and the few spines are very weak. Flowers white. Mexico (Tamaulipas). In spite of comments to the contrary in the 'Cactus Lexicon', this species can be grafted and I have a nice young plant that was grafted on *Bolivivereus* stock at a few weeks old.
- 175. *Oroya peruviana* var. *depressa*.** Very flattened body, growing slowly to 20 cm. across. Ribs are divided into broad, low tubercles with elongate areoles, which carry many strong spines, curving around the body. The small flowers have inward-curving petals and are a mixture of red and yellow in colour. From high altitudes in Cent. Peru.
- 176. *Parodia cardenasii*.** Spherical body to 8 cm. across, with closely set areoles on small tubercles. Spines are short, white with a brown tip to the centrals. Yellow flowers are freely produced in a group at the apex. Seeds small. Bolivia.
- 177. *Parodia weberana*.** Globular, to 10 cm. in diameter, with 21 spiralled tuberculate ribs and areoles close together. Radiating yellowish-white spines and 4 brownish centrals, one of them hooked. Golden yellow flowers and small seeds. One of Brandt's species, published in 1969. N. Argentina.
- 178. *Parodia* sp. KK 967.** Collected at Pazna, Cent. Bolivia.
- 179. *Pediocactus simpsonii*.** Medium sized globular cactus, which is uncommon in cultivation. Body has low tubercles carrying very woolly areoles. White radial spines surround the body and contrast with the straight red-brown centrals. Flowers 3 cm. diameter, yellow, pink or white. Difficult species which comes from cold areas in the western part of the U.S.A., as far north as Washington State and Montana.
- 180. *Pseudobolivia cardenasiana* KK 1457. (*Echinopsis cardenasiana*).** This belongs to the *E. ancistrophora* group. Flattened body with straight, dark-tipped whitish spines. It freely produces very showy, long-tubed flowers, with magenta petals. From S. Bolivia (Tarija), near the musically famed 'El Condor Pasa'.
- 181. *Rebutia ithyacantha* R 67.** Member of the *Aylostera* group, first described in 1972, and related to *R. fiebrigii*. Smallish offsetting stems, with white radial spines and long, thin, brown centrals. Flowers orange-red. Bolivia (Sucre).
- 182. *Rebutia minuscula*.** The type of the genus. Small, green, clustering heads and short, white spines. Bright red flowers are born in rings on plants from 2 years old. N. Argentina (Tucuman).
- 183. *Rebutia violaciflora*.** Related to previous species but with larger heads. Spines up to 15 mm. long and yellow-brown. Very attractive bright violet-pink flowers. N. Argentina (Salta).
- 184. *Thelocactus conothele* var. *argenteus*.** Solitary globular stem is totally masked by silvery-white spines, which shed on old plants. Pink to purple flowers are produced from the centre. This variety, which grows in Mexico (Nuevo Leon), was described by Glass & Foster in 1972.
- 185. *Thelocactus tulensis*.** Dark green body is about 12 cm. across, with plump tubercles and long, grey-brown spines. straight or slightly curved. Flowers pink with darker mid-stripes. Mexico (Tamaulipas).
- 186. *Trichocereus pachanoi*.** From Pinya de Rosa. Tree-like branching species of which the stems are blue-green, 6-8 ribbed and almost spineless. Excellent grafting stock. Ecuador.
- 187. *Trichocereus spachianoides*.** From Pinya de Rosa. Undescribed species, first introduced by Ritter as FR 980.
- 188. *Turbincarpus klikeranus*.** Choice dwarf plant, with a woolly crown. The ribs are divided into spiralled tubercles and each areole bears 3 soft upward-curved spines. Small white flowers are produced in the crown. Mexico (San Luis Potosi).
- 960. *Agave parviflora*.** *Agavaceae*. One of the most beautiful of the genus. Forms a 15 cm. diameter rosette of thick, stiff leaves, which are about 12 mm. across near the base. These are dark green, terminating in a spine, and have areas of white membranous tissue applied to the surface. This tissue shreds off along the leaf margins. Produces a tall terminal flower-spike after about 7 years. N. Mexico and SW. U.S.A.
- 961. *Agave victoria-reginae*.** *Agavaceae*. Another most desirable *Agave*, particularly in that we are offering a very compact form. Dense cluster of leaves, which are broader than in the above species and have rounded tips. The dark green leaves have distinct white, irregular lines on them. Mexico (Coahuila).
- 962. *Aloe ferox*.** *Liliaceae*. From Pinya de Rosa. Eventually a tall unbranched plant, with a rosette of large leaves at the top of the stem. Leaves taper to a point and have reddish teeth along the margin. South Africa.
- 963. *Alainopsis setifera*.** *Mesembryanthemaceae*. Clustered small heads each composed of 2-3 leaf pairs. Thick leaves are blue-green, 20 mm. long, 5 mm. across, with a broadened tip, and have small teeth. Flowers 25 mm. diameter, yellow to pink. South Africa (Little Namaqualand).
- 964. *Cephalophyllum subulatoides*.** *Mesembryanthemaceae*. Mat-forming, stemless species with semi-cylindrical, upward-curved leaves. These are grey-green and up to 7 cm. long and 1 cm. across. Flowers 4 cm. diameter, purple-red. South Africa (Cape Province).
- 965. *Cheiridopsis peculiaris*.** *Mesembryanthemaceae*. This has two types of grey-green leaves. During the growing season there is a pair of wide 5 cm. long leaves, which rest on the soil and are flat on the upper surface. The resting leaf pair is upright and united. Flowers 35 mm. diameter, yellow. South Africa (Little Namaqualand).
- 966. *Dactyloopsis digitata*.** *Mesembryanthemaceae*. Forms clusters of shoots, which when not actively growing, are composed of a single long, thick, finger-like leaf. This is soft and grey-green in colour. New leaves and the small, white, long-lasting flowers are produced from slits towards the base of the old leaf. Difficult plant, which should probably never be allowed to go completely dry in cultivation. South Africa (Van Rhynsdorp).
- 967. *Didymaotus lapidiformis*.** *Mesembryanthemaceae*. Highly succulent, mimicry plant, with usually two pairs of leaves, which have rough, light-grey surfaces. Upper leaf-surface is flat and the lower rounded with a keel; young leaves being pressed together. Unlike most mesems, the white, red-centred flowers are produced from each side of the plant from old leaf axils. South Africa (Ceres Karroo).
- 968. *Huernia keniensis*.** *Asclepiadaceae*. Freely clustering green stems, which are upright growing and about 10 cm. long. They are rounded and have small teeth. Flowers are very freely produced from the base over a long period; corolla bell-shaped, rough textured and deep purple in colour. Kenya.
- 969. *Juttadinteria albata*.** *Mesembryanthemaceae*. Short-stemmed species with clustered, smooth, whitish leaves, which are very succulent and 25 mm. long by 10 mm. broad. Flowers 25 mm. across, white. South Africa (Little Namaqualand).
- 970. *Oophytum oviforme*.** *Mesembryanthemaceae*. Resembles a *Conophytum*, with clusters of 12 mm. diameter, ovoid bodies, which are olive green going to red in strong sun. The 22 mm. diameter flowers are white in the centre and deep pink on the outside, and are produced from a fissure in the top of the bodies. South Africa (Van Rhynsdorp).
- 971. *Vanheerdea primosii*.** *Mesembryanthemaceae*. Like a bilobed *Conophytum*, with each body 35 mm. tall with a gaping fissure. It is pale violet in colour, with pale green windows on the truncate leaf tips. Flowers yellow, 25 mm. diameter. South Africa (Bushmanland).

## Further notes on *Escobaria* B. & R.

by N. P. Taylor

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### Introduction

Below will be found a few notes with amendments to my earlier 'Review' of *Escobaria* (in CSJGB 40: 31-37, 1978) together with an amplified description and comments on the systematic position of the genus. A key to principal species and their groups, a distribution map, and an annotated list of accepted species are also provided. Our understanding of this genus is still in an early stage, and much further study with emphasis on fieldwork is required.

### Recent developments

Since my earlier contribution on this genus a few more facts have come to light. Seed of *E. chihuahuensis* has been examined and appears closely to resemble the seed illustrated by Glass & Foster for their *E. henricksonii* (see CSJA 49: 195, 1977). This seed type can hardly be described as pitted and thus I hesitate to include these taxa in *Escobaria* at present.

The undescribed plant known to Backeberg as '*E. rigida*' has been mentioned by Glass & Foster (see CSJA 50: 19, 1978) as having been found SE. of General Cepeda, Coahuila, and is now frequently seen in cultivation. However, until seed and grooved tubercles for this species have been recorded, its generic affinity will remain uncertain.\*

Overlooked in the 'Review' was Prof. Lyman Benson's designation (under *Coryphantha*) of neotypes for *E. vivipara* and *E. missouriensis* (in CSJA 49: 8, 1977). They are as follows: *E. vivipara*, 12 miles east of Ft. Mandan, McLean Co., N. Dakota, June 1971, *Mitich* (POM 317, 948), and *E. missouriensis*, 3 miles west of Baldwin turnoff, 1.3 miles east of the Missouri River, Burleigh Co., N. Dakota, June 1970, *Mitich* (POM 317, 949).

Further examination of living material of *E. asperispina* leads me to suggest that this plant is merely a southern extension of the widespread and variable *E. missouriensis*. However, *E. zilziana*, which was included under *E. asperispina* in the 'Review', is perhaps best retained as a distinct taxon, pending its rediscovery in the wild.

Living material of *Cochiseia robbinsorum* Earle has been examined, and justification for the earlier transfer of this

species to *Escobaria* has been confirmed. One correction to the 'Review' (p.32) is required: of the illustrations listed for *E. dasyacantha* var. *varicolor*, only plate 37 in Weniger (1969) is this variety; plates 34 and 35 are of var. *dasyacantha*.

### Amplified description of *Escobaria* B. & R.

*Plants* solitary or caespitose; *stems* depressed-globose to cylindrical, 2-6(-10)cm in diam., sometimes to 20cm long, tuberculate, not ribbed. *Tubercles* spirally arranged, with an axillary groove on the upper surface at maturity; *groove* woolly or glabrous, running the length of the tubercle, not glandular. *Flowers* arising from the base of the axillary groove, 1-3(-6)cm in diam.; *outer perianth-segments* fimbriate (rarely entire); *inner perianth-segments* linear-lanceolate to spatulate, whitish-pink, brownish, red, purple, yellow or greenish-yellow, with darker midstripes; *tube* very short; *ovary* naked; *stigmas* 3-10, green, greenish-yellow or whitish. *Fruit* indehiscent, globose, ovoid, clavate or cylindrical, 3-2.5mm long, red, green or yellowish-green, occasionally with a few small scales near the apex; *seed* 0.5-2.5mm long, pale brown to black, with distinct intracellular pits. *Type*: *E. strobiliformis* Scheer ex Boed. [*E. tuberculosa* (Engelm.) B. & R.]. About 17 spp. in N. Mexico, Cuba, USA & S. Canada.

The combination of seeds with intracellular pits and grooved tubercles at present separates *Escobaria* from most other N. American genera of the family. The superficial similarity of members of this genus with species of *Coryphantha* (Engelm.) Lem. is an example of evolutionary convergence, since their respective seed forms are substantially different (see Hunt in CSJGB 40:13, 1978). By far the closest affinity is that between *Escobaria* and *Mammillaria*, the only difference being the presence of the axillary groove in the flowering tubercles of the former genus. In the monotypic *Ortegocactus* Alex. we appear to have an intermediate condition. *O. macdougallii* usually has grooved flowering tubercles but they are not always so. The species has been placed in *Neobesseyia* (= *Escobaria*) by Kladiwa.

*Escobaria* and *Mammillaria* (at least the watery sapped spp.) might be considered monophyletic, with *Mammillaria* having arisen from *Escobaria* stock through neoteny. *Mammillarias* flower when the axillary and spiniferous areoles are not connected by a groove, this being the juvenile state in *Escobarias*, which flower only when the groove has been developed. This mature state of the grooved tubercle is never reached in *Mammillaria* which therefore shows neotenic truncation of the *Escobaria* life-cycle.

\*See Postscript.

## Key to groups and principal species

1. Fruit green (sometimes tinged brownish-pink or reddish-purple), or if red then narrowly elliptic to cylindrical, and the seeds brown:
  2. Central spines 0-4; fruit 3-8mm long:
    3. Spines abruptly tapered at the apex, the centrals distinctly bulbous-based; mature stems up to 2cm in diameter, with tubercles to 3mm long; seeds very dark brown to black
      1. **E. minima**
    3. Spines gradually tapered to the apex, not bulbous-based; mature stems usually more than 2cm in diameter, with tubercles 6-12mm long; seeds brown
      2. **E. hesteri**
  2. Central spines 3-20; fruit 6-25mm long:
    4. Flower 25-50mm in diameter; fruit 10-15mm in diameter; old tubercles neither hardened nor persisting at the stem base
      3. **E. vivipara**
    4. Flower 8-30mm in diameter; fruit usually less than 10mm in diameter; old tubercles usually persistent, hardened and spineless at the stem base:
      - E. STROBILIFORMIS Group (spp. 4-9)  
(individual spp. not keyed)
1. Fruit red; seeds black, or if brown then the fruit globose to short-oblong (seeds unknown in *E. chaffeyi*):
  5. Flower pinkish, brownish-pink or cream-purplish; stem globose to cylindrical; spines more than 20 (except no. 11), smooth, not pubescent:
    6. Plants freely caespitose; fruit globose to short-oblong, c. 10mm in diameter
      10. **E. emskoetterana**
    6. Plants usually solitary; fruit clavate, narrowly elliptic or cylindrical, less than 10mm in diameter
      - E. DASYACANTHA Group (spp. 11-14)
  7. Spines 15-17 (Arizona)
    11. **E. robbinsorum**
  7. Spines 20 or more (Texas, New Mexico & N. Mexico):
    8. Perianth-segments acute:
      9. Flower 15mm long; spines 30-75; stigmas 4-5
        12. **E. duncanii**
      9. Flowers 20-25mm long; spines usually less than 32; stigmas 5-7
        13. **E. dasyacantha**
    8. Perianth-segments obtuse
      14. **E. chaffeyi**
  5. Flower greenish-yellow to yellow, or if pinkish then stems depressed-globose, and spines less than 20, pubescent
    - E. MISSOURIENSIS Group (spp. 15-17)
  10. Stems 2-3cm broad; radial spines c. 10, 3-4mm long; flowers 16mm long (Cuba)
    15. **E. cubensis**
  10. Stems 3-10cm broad; radial spines 9-22, 8-20mm long; flowers 15-40mm long (USA & Mexico):
    11. Stems short-cylindrical
      16. **E. zilziana**
    11. Stems hemispheroid to depressed-globose
      17. **E. missouriensis**

## Classified list of species and species groups

### E. MINIMA Group

The two species recognised here are characterised by their dwarf habit, very small, green fruits, and conspicuous purplish-pink flowers with spatulate inner perianth-segments. The group is endemic to NE. Brewster Co., Texas.

1. *E. minima* (syn. *E. nellieae*)
2. *E. hesteri*

E. VIVIPARA (subgenus *Pseudocoryphantha* F.Buxb.) This complex species of seven varieties as recognised by Benson, is distinguished by large flowers and large

green, ellipsoid fruits. It has the widest distribution within the genus, ranging from Sonora in N. Mexico, north to Alberta, Saskatchewan and Manitoba in S. Canada. Five of the varieties are concentrated in the SW. sector of this range in Sonora, Arizona and California.

3. *E. vivipara* (incl. 3a. var. *alversonii*, 3b. var. *arizonica*, 3c. var. *bisbeeana*, 3d. var. *deserti*, 3e. var. *radiosa* & 3f. var. *rosea*)

### E. STROBILIFORMIS Group (*Escobaria* sensu Hester)

The species comprising this complex group are the least well defined in the genus, requiring further study before the writing of a key to them will become possible. The caespitose habit, dense spination, and usually green fruits are characteristic. In this last respect *E. strobiliformis* with red fruits is something of an exception, but the brown seeds common to all this group prevent there being any confusion with the *E. dasyacantha*. The group is centred on central N. Mexico, S. New Mexico and SW. Texas.

4. *E. strobiliformis* (syn. *E. tuberculosa*)
5. *E. sneedii* (incl. 5a. var. *leci*)
6. *E. orcuttii* (incl. 6a. var. *koenigii*, 6b. var. *macraxina* & 6c. *E. albicolumnaria*)
7. *E. organensis*
8. *E. sandbergii*
9. *E. villardii*

### E. EMSKOETTERANA

The affinities of this species within the genus are uncertain at present, though the general habit, etc., suggests the *E. strobiliformis* group. Confined so far as is known to NE. Mexico and southernmost Texas.

10. *E. emskoetterana* (incl. 10a. *E. muehlbauerana* & 10b. *E. runyonii*)

### E. DASYACANTHA Group (*Escobeseya* Hester)

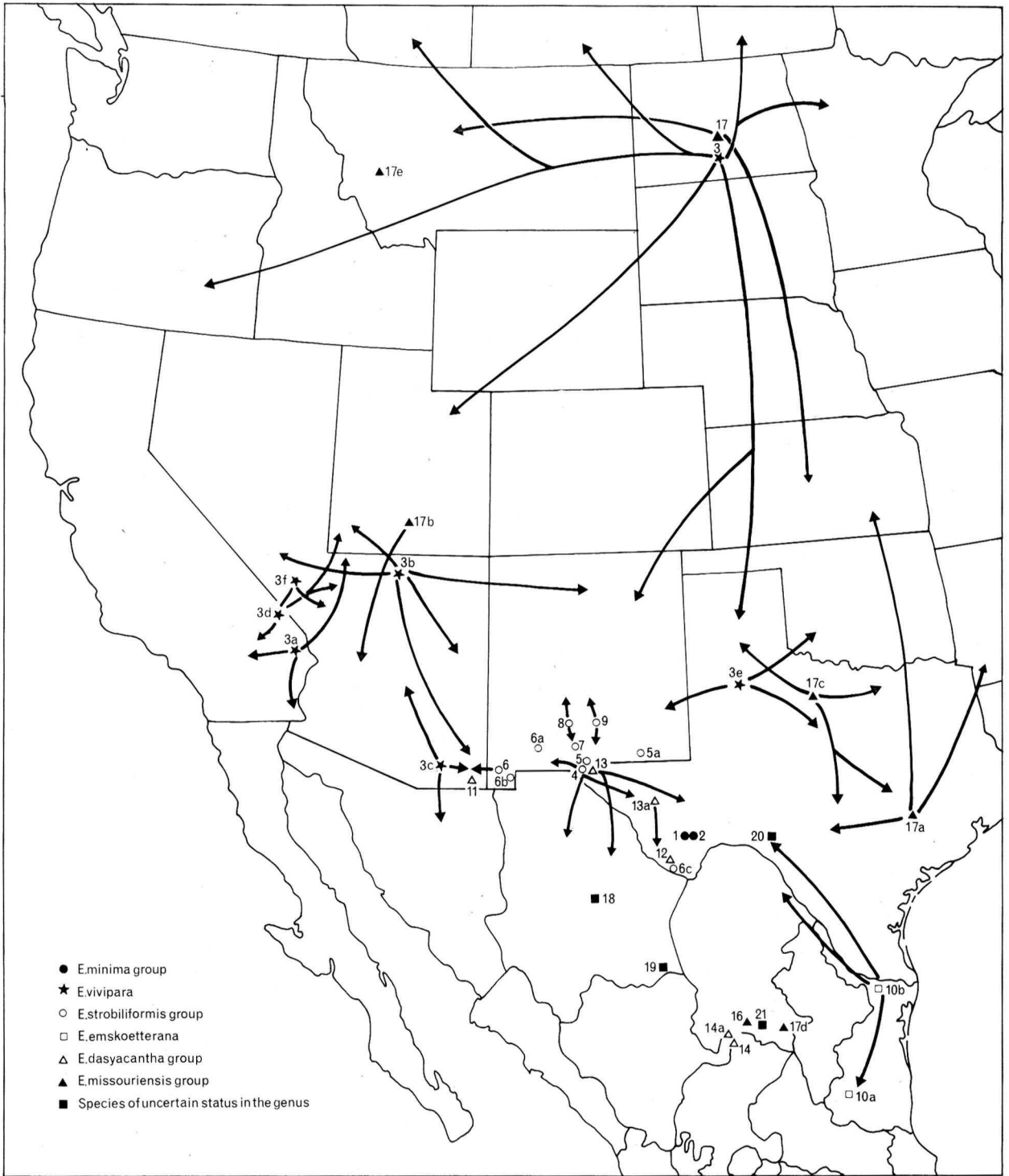
These are the black-seeded taxa that Hester called *Escobeseya*, a genus he believed to be intermediate between the brown seeded *Escobarias* and the black-seeded *Neobeseya* spp. of Britton & Rose.

These plants are also characterized by red fruits, a solitary habit, and flowers small on average for the genus. The range of the group is roughly sympatric with that of the *E. strobiliformis* group, but it is not known whether or not they come into close contact in habitat. Though at maturity this group are superficially very similar to *E. strobiliformis*, there are marked differences at the 0-1 year old seedling stage.

11. *E. robbinsorum*
12. *E. duncanii*
13. *E. dasyacantha* (incl. 13a. var. *varicolor*)
14. *E. chaffeyi* (incl. 14a. *E. lloydii*, a poorly known species)

### E. MISSOURIENSIS Group (*Neobeseya* B. & R.)

The three species here possess black seeds and red fruits like the above, but have a weak spination through



**Distribution of Escobaria.** The numbers on the map follow those used in the Classified List of species (pp. 18–20). With the exception of nos. 3e, 6, 13a and 17c, the position of the symbol marks the type locality (for no. 4, that of *E. tuberculosa*). The arrows aim to show the range of each taxon where known, but do not necessarily indicate that the plant occurs throughout the region traversed by the arrows. The map omits no. 15, *E. cubensis*, native to Cuba. (Map drawn by Christabel King.)

which the plant body can be seen, and are predominantly depressed and caespitose in habit. With the exception of the dwarf *E. cubensis*, this group has medium to large flowers for the genus, which are usually yellow in colour. This group has the widest range in the genus with *E. missouriensis* stretching from just south of the Canadian border to S. Coahuila in Mexico, and *E. cubensis* in Cuba. It may be noted that the westernmost station of the group, *E. missouriensis* var. *marstonii* is somewhat disjunct, in Utah and Arizona. The status of *E. zilziana* is uncertain at present, though it clearly belongs here.

15. *E. cubensis*

16. *E. zilziana*

17. *E. missouriensis* (incl. 17a. var. *caespitosa*, 17b. var. *marstonii*, 17c. var. *robustior*, 17d. *E. asperispina* & 17e. *Neobesseya notesteinii*)

### Species of uncertain affinity

18. *E. chilhuahuensis*

19. *E. henricksonii*

20. *E. bella*

21. '*E. rigida*' (see postscript below)

### POSTSCRIPT

Since this article went to press, Glass & Foster (in CSJA 50: 235-6.1978) have described *Coryphantha laredoi*, based on the plant from SE. of General Cepeda. They state that their new species is fairly certainly the taxon described by Backeberg as *Escobaria rigida*, but reject the latter name for lack of proper typification.

Glass & Foster's description clearly establishes the plant as an *Escobaria*, probably allied to *E. strobiliformis*, but as they now subscribe to Benson's concept of *Coryphantha*, which incorporates *Escobaria*, they have named it as a *Coryphantha*. The necessary new combination under *Escobaria* is made here: **Escobaria laredoi** (Glass & Foster) N. P. Taylor, **comb. nov.** Basionym: *Coryphantha laredoi* Glass & Foster in Cact. Succ. J. Amer. 50(5): 235 (1978).

N. P. TAYLOR

## When to pot on— and in what?

by John Pilbeam

The time to move almost any plants other than cacti and succulents is generally when they are dormant, with root action at a minimum. I am convinced that this basic gardening principle applies equally to cacti and succulents. It cannot be right to move plants when young feeding roots are active.

### Cacti

Depending on your watering habits, choose a time for potting when the compost is properly dry, and a month or more before you would normally start watering; this

usually means December to March. Using dry or nearly dry compost, pot on young plants into larger pots every year, with the minimum root disturbance, until they have reached 5 inch (12 cm.) pots. By this time, or before if the roots have not permeated the whole potful of compost, the soil can be gently shaken or eased from the roots, enabling the same sized pot to be used, unless the development demands a larger one.

### Succulents

Follow the above principles, adapting the time for succulents according to their individual growing periods. For example, repot Lithops towards the end of their rest period, in April or May, Conophytums in May or June, and any winter-growers in September or October.

If repotting is necessary for any plants at any time when growing, dry off before doing so in dryish compost, and resist the temptation to water after potting up for at least a couple of weeks.

### Compost

The choice of compost for potting cacti and succulents is a personal matter, and if you have achieved good results stick to what you are used to. But if you are not happy with your plants' growth it is worth trying a change. If you have not tried soil-less composts for cacti they are worth a try, as results are often very much better. Levington's or Arthur Bowers potting composts seem to be those most used, and can be used straight or with added gritty sand (about a third) for difficult subjects. What you must not do with these soil-less composts is to firm them down more than just a little. They will not in general need watering so often as soil-based composts either, as they are slower to dry out. But when you do dry them right out for winter, they are difficult to rewet in the spring. This can be overcome by a good soak for the first watering, when after about half an hour they will take up the moisture. A little wetting-agent, like a few drops of washing-up liquid to the gallon will help too.

Succulents seem to prefer a standard mix of John Innes No. 2 potting compost with about a third gritty sand. If you can get a good standard of J.I. compost you are lucky, as most are completely devoid of the fibrous loam they should contain, and I like to use a third each of J.I. No. 2, Arthur Bowers and gritty sand. Again remember, only lightly firm the mixture.

Top dressing with grit helps retain the moisture, prevents algae and mosses getting a foothold on the surface, and prevents the compost splashing on to the plants when watering, as well as improving the appearance of the potted plant.

### Pots

Does anyone still use clay, except for the larger plants? Of course some still do, and have learned to grow their plants accordingly. If you change to plastic beware of overwatering—they dry out a lot more slowly.

# Xerophyte physiology

by D. C. Speirs

Plants which are subject to seasonal or long term drought must adapt or perish. This statement is obvious enough but some of the plant adaptations are not so clearly seen. Easily recognized adaptations include succulent growth, leaves extant only when moisture is available (*Fouquieria splendens*), leaves with 'windows' (*Fenestraria*, *Lithops*), and geophytic behaviour (surviving as underground corms, tubers or bulbs). Less obvious adaptations involve the physiology of the plant and such things as acid sap and closed stomata (breathing pores).

*Drought endurers* are xerophytes which can survive water loss down to a level at which other plants would have long since been dead. Some arid land plants are *drought escapers*, which miss the dry seasons by becoming annuals and surviving times of water stress in the form of seeds. *Drought avoiders* are usually non-succulent perennials with deep taproots or extensive lateral roots which reach down to the water table or collect distant water. Most succulents are classed as *drought resisters*, i.e. plants which store water under a thick cuticle and which often have crassulacean acid metabolism (CAM). Since the original studies were done with species of the Crassulaceae it can be easily seen whence the C in CAM came from, but this process occurs in the Cactaceae, Euphorbiaceae and Aloineae.

Ordinary mesophytes do not have CAM but C<sub>3</sub> or C<sub>4</sub> metabolisms, so-called because their biochemical reactions involve acids with three or four carbon atoms respectively. CAM allows more efficient water use by succulents while C<sub>3</sub> and C<sub>4</sub> metabolisms are more efficient in photosynthesis but less so in water use. CAM differs from other metabolisms in that the plant stomata are open at night instead of by day. In the cool of dark, the amount of water lost is appreciably reduced (Gerwick, 1977). This behaviour does not always hold, for during an extreme drought when night-time relative humidity is low, the stomata may remain closed night and day (Gindel, 1970). CAM is not generally found in flowers, fruit, roots or etiolated organs (Bruinsma, 1958).

Another distinguishing feature of CAM plants is their cycle of cell sap acidity, with a relatively acid sap at night. The main acid involved is malic, although isocitric and others play a part (Ranson & Thomas, 1960). When the stomata are open at night, CAM plants take up CO<sub>2</sub> and convert it to acids, which are stored until daylight. During the day the acids are broken down to CO<sub>2</sub> (thus reducing cell sap acidity), which is converted to sugars and used by the plants. All this takes place without opening the stomata in the heat of day to get CO<sub>2</sub> and thereby losing water (Gerwick, 1977). During drought, CAM plants reduce their rate of metabolism and recycle the CO<sub>2</sub>, i.e. they seal themselves off from the rest of the world

and feed off their fat. In this way they can maintain a moderate energy level which allows them to respond rapidly to resumed precipitation. (Szarek & Ting, 1975).

Most succulents can shift between CAM and C<sub>3</sub> or C<sub>4</sub>, generally using the former when water stressed and one of the latter two during moist periods. Small leaf succulents are most likely to make this shift whilst large stem succulents use CAM all of the time (Mooney, Troughton & Berry, 1977). Deciduous succulents such as *Frerea indica* use CAM when leafless during the resting season and when moisture is again available the leaves break out and use the C<sub>3</sub> pathway (Lange & Zuber, 1977).

An interesting note on CAM cacti is that the organic acids have an antibiotic effect which is greatest in the early morning after a night of acid accumulation (McCleary & Walkington, 1964). So if you come down with 'strep' throat, it might be worthwhile to sacrifice one of your less valuable cacti at 6.00 a.m. on a dry summer morning!

CAM is still under intensive study and no one can claim complete knowledge of this process. It would be interesting to know, for example, what happens when a leaf is detached from a succulent in the C<sub>3</sub> stage. Since the leaf no longer has a source of water it probably goes to CAM, but if it begins to regenerate and produce a rooted plantlet it may go back to C<sub>3</sub> metabolism before dying, leaving behind its progeny. There is speculation about succulents which normally flower at the start or finish of the dry season. Does CAM initiation or cessation trigger off the inflorescence? Photoperiodism may also be involved in such cases, and it would be nice to know how.

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## For your Diary

### ANNUAL GENERAL MEETING, 24 March

For details see page 2.

### BRING & BUY, 15 May

The annual 'Bring & Buy' will be held on Tuesday evening, 15 May, at the Royal Horticultural Society's New Hall, Greycoat St., S.W.1 at 6 for 6.30 p.m. Members are invited to bring surplus plants (not more than 3 per species) for auction. 10% of the proceeds goes to Society funds.

### PIMLICO SHOW, 16 June

The Society's Summer Show will take place on 16 June at St. Saviour's Church Hall, St. George's Square, Pimlico. The schedule will be basically the same as in previous years, and should be available from the Show Secretary, Mrs. H. Hodgson, 16 The Braid, Chesham, Bucks. HP5 3LU, by the end of March. (Please send a foolscap S.A.E.). The Publicity Officer, Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG, will have Show Draw tickets available soon and hopes volunteers will come forward to donate prizes and/or sell tickets. Stewards and someone to be in full charge of catering would also be welcomed.

As in previous years, staging will take place from 9.30-10.45 a.m. on the morning of the Show, which will open at 2.00 p.m. Prize draw and presentation of awards at 5.30 p.m.

### NCSS NATIONAL SHOW, 25 August

The National Cactus & Succulent Society's National Show will be held on Saturday 25 August at the Vauxhall Motors Canteen, Luton, Beds., opening at 11 a.m.

## Society Sales

Booklet on cultivation	30p
Society Badge	out of stock
Car Sticker	30p
Ballpoint pens (black, blue or red)	10 for 60p
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Journal binders (to hold 4 vols.)	£3.00p

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Sales items are usually available at Society meetings. For bulk orders and binders please contact Mrs. Maddams beforehand.

## Branch Activities

*Items for inclusion in the next issue must reach the Editor not later than 15th March.*

### Essex

**Secretary:** F. Braun, 63 Heighams Road, East Ham, E6 2JJ.

**Meeting Place:** Room A3 (film room), Little Ilford Comprehensive School, Church Road, Manor Park, London E.12.

**Time:** 1st Saturday in month, 7 for 7.30 p.m.

Forthcoming meetings:

- 3 March Large-flowered Mammillarias (Mrs. Hodgson)
- 7 April Something Different (Roy & Les)
- 5 May (Saturday) Annual Show at East Ham Town Hall

### North London

**Secretary:** Mrs. B. Massey, 86 Auckland Road, Potters Bar, Herts.

**Meeting Place:** Capel Manor Primary School, Bullsmoor Lane, Enfield, 3rd Friday in month, 7.30 p.m.

1979 sees a change of Branch Chairman and Treasurer, both officers retiring at their own request. As a token of their long and valuable service, Ron Dale has been offered the position of Life President and Rene Dyson presented with a plaque.

Next meeting:

- 16 March Second Trip to America (Ron Dale)

### North Surrey

**Secretary:** W. F. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG.

**Meeting Place:** Adult School, Benhill Avenue, Sutton.

**Time:** 1st Tuesday in month, 7.45 p.m.

The 1978 programme ended with Len Newton's talk 'Aspects of Arabia' when a large audience saw not only the fascinating range of succulents to be found there but also the problems in reaching them. In December the members' slides showed the usual wide range of subjects and there was also a Bring & Buy sale which raised money towards paying the subscriptions of members in Socialist countries.

Future meetings:

- 6 March IOS in Monaco (Will Tjaden)
- 3 April Successful Showing
- 6 May (Sunday) Outing to Pine Ridge Cacti
- 8 May Echinocereus (Eddie Cheetham)
- 5 June Branch Restricted Competition

Members outside the Branch who would like a fixture-list are invited to write to Mr. Maddams enclosing a stamped self-addressed envelope.

### Warrington & District

**Secretary:** Mrs. D. Pritchard, 81 Birdwell Drive, Great Sankey, Warrington, tel. no. Penketh (092572) 4699.

For programme details, contact Mrs. Pritchard.

The Branch held its first meeting in September 1978, with a talk by the Chairman, Dr. Dangerfield, on seed-raising, and one on British nurseries by Daphne Pritchard. Other talks by Branch members followed in October and November, and in November the Branch also acted as host at a special meeting when Tom Jenkins talked about his trip to South Africa.

Visiting cactophiles are welcome at our meetings, and a sketch-map of the venue can be obtained from the Secretary.

### The Cactus & Succulent Journal of America

Six issues per year, fully illustrated, total on average 300 pages and catering for all levels of interest. Subscription: \$12.50. Apply direct to Box 3010, Santa Barbara, California 93105, USA.

**CSIE: Cactus & Succulent Information Exchange** (founded 1968) encourages communication and fellowship among amateur collectors. Nine issues a year. Further details from: Mrs. G. Rollerson, 5512 Clinton St., Burnaby, B.C. V5J 2L8, Canada.



# Nursery List

*Nurserymen and others who regularly offer plants or seeds for sale are listed below as a service to members, but this does NOT imply the Society's approval or recommendation of plants or other goods offered. Advertising in the list is free to growers who are members of the Society.*

## North & South Yorkshire

**Cruck Cottage Cacti** (Dorothy & Ronald Wood), Cliff Road, Wreilton, Pickering, North Yorkshire YO18 8PJ. Tel. no. Pickering (0751) 72042. Open daily except Sat. morning. No lists. Nursery in garden setting.

**Whitestone Gardens Ltd.**, The Cactus Houses, Sutton-under-Whitstonecliffe, Thirsk, North Yorkshire YO7 2PZ. Tel. no. Sutton (08456) 467. Open daylight hours every day throughout the year. Send 4 × 7p stamps (UK) or 3 international postal reply coupons for list. Everything for the cactophile; plants, seeds, books, sundries; substantial stocks and extensive collection on view.

**Oak Dene Nurseries**, 10 Back Lane West, Royston, Barnsley, Yorkshire S71 4SB. Tel. no. Royston (022670) 2253. Open every day, April–Sept. 9–6, Oct.–March 10–4 (closed for lunch 12.30–1.30). S.A.E. for list. Seed, plants, books and sundries.

## Merseyside

**Jim Bolton**, Southview, 39 Altcar Road, Formby, Liverpool L37 8DR. Tel. no. Formby (07048) 73187. Open all day Sundays, advisable to telephone for weekday visits. Large selection of seedlings, etc., all at reasonable prices. No list.

## North Wales

**Jolly's** (G. A. & M. A. Coombes), Glanrafon, Talsarnau, Gwynedd LL47 6YD. Tel. Penrhyndeudraeth (076674) 643. Open any time by appointment. No orders by post; no list. Warm welcome to holidaymakers—we are in the Snowdonia National Park.

## Derbyshire

**Abbey Brook Cactus Nursery**, Old Hackney Lane, Matlock, Derbyshire. Tel. no. Matlock (0629) 55360. Open every afternoon 2–6 except Tuesday (closed all day). List free on request, stamp appreciated. Mail order catalogue illustrated in colour lists over 1700 species of nursery-grown cacti and other succulent plants.

## Nottinghamshire

**Carlton Forest Cacti**, Carlton Forest, Blyth Road, Worksop, Notts. S81 0TP. Tel. no. Worksop (0909) 731642. Almost always open but please telephone to avoid disappointment. S.A.E. for list. Mainly cacti, very few succulents.

**Woodside Nurseries** (Stuart Dixon), 173 Main St., Burton Joyce, Notts. Tel. no. Burton Joyce (060231) 2142. Closed Mondays, open 10–4.30 other days. S.A.E. for list. Nursery-grown seedlings, specimen plants.

## South Humberside & Lincolnshire

**Southfield Nurseries** (B. Goodey), Louth Road, Holton-le-Clay, Grimsby, South Humberside DN36 5HL. Tel. no. Grimsby (0472) 822157. Open daily 10–5 (closed for lunch 12.30–1.30). Send stamp for list. Seed-grown cacti, Lithops, succulents.

**Glenhirst Cacti** (N.C. & S.A. Bell), Station Road, Swinehead, near Boston, Lincs. Tel. no. Swineshead (020582) 314. Open most days ('phone call advisable if travelling far to ensure someone available). S.A.E. for list. Lithops, Epiphyllums, Asclepiadaceae.

**Jumanery Cacti** (June & Tom Jenkins), St. Catherine's Lodge, Cranegate Road, Whaplode St. Catherine, Nr. Spalding, Lincs PE12 6SR. Tel. no. Holbeach St. Johns (040634) 373. Open 9–5 Sunday–Friday, closed Saturday. S.A.E. for list

## Norfolk

**Richard & Wendy Edginton**, The Vines, 2 Green Man Lane, Kirstead, Norwich, Norfolk NR15 1EP. Tel. no. Brooke (0508) 58113. Open most mornings and weekends. S.A.E. for list. Seedling cactus plants 35p upwards.

**Barleyfield Succulent Plant Nursery** (Victor & Heather Graham), Southburgh, Thetford, Norfolk. Tel. no. Dereham (0362) 820457. Nearly always open, but telephone call appreciated. S.A.E. for list. 'Other' succulents, handmade plant pots.

## Bedfordshire

**A. & V. Parker**, 31 Southill, Nr. Biggleswade, Beds. SG18 9HU. Tel. no. Hitchin (0462) 814022. Open evenings and weekends ('phone first). No list. Seed-raised plants.

**Southwest seeds** (Doug. Rowland), 200 Spring Road, Kempston, Bedford MK42 8ND. Tel. no. Bedford (0234) 58970. Open Sunday afternoons. S.A.E. for comprehensive seed list.

## Hertfordshire

**R. F. S. & B. R. Dale**, Thurnlea, 14 Buttodene Crescent, Old Nazeing Road, Broxbourne, Herts EN10 6RH. Tel. no. Hoddesdon 63234. Open almost any time but write or 'phone. No list. Full range B.E.F. pots, labels, top dressing, etc.

**Terry Douglas**, 28 Shephall Lane, Stevenage, Herts. SG2 8DH. Tel. no. Stevenage 53876. Telephone to arrange a visit. S.A.E. for list.

## Essex

**M. L. Fussell**, 29 The Readings, Harlow, Essex CM18 7BT. Tel. no. Harlow (0279) 23246. S.A.E. for list. Service by return of post.

**The Cactus Place** (David & Barbara Brewerton), 33 Bridge Avenue, Upminster, Essex RM14 2LX. Tel. no. Upminster 29911. No list. Open 9 till dusk, but 'phone first. Large and medium sized specimens.

**H. Guiri**, Glenholme, Nursery Road, Nazeing, Essex. Tel. no. Hoddesdon 62291. Visitors and parties welcome. A prior telephone call would be appreciated. No list.

## East & West Sussex

**Mrs. Yvonne Warrick**, 122 Barnhorn Road, Little Common, Bexhill, E. Sussex. Tel. no. Cooden (04243) 4726. Not open. S.A.E. for list. Rare succulents and Epiphytics.

**Ernest Hepworth**, Mira Mar, 133 Ambleside Avenue, Telscombe Cliffs, Sussex BN9 7LG. Tel. no. Peacehaven (07914) 3260. Open by appointment; closed Sundays. Send 9p stamp for list. Lithops, Mesems, Sempervivums.

**Holly Gate Nurseries Ltd.**, Billingshurst Lane, Ashington, Sussex RH20 3BA. Tel. no. (0903) 892439. Open 9–5 every day, incl. weekends and Bank Hols. S.A.E. for list. Colour Catalogue 35p. Reference collection, entry 25p each.

## Dorset

**Pine Ridge Cacti** (Joan & Dick Smeaton) 197 Ringwood Road, Verwood, Wimborne, Dorset BH21 6AG. Tel. no. Verwood (020123) 2796. Open 10–6, Closed Saturday and Monday. Choice and rarer 'other succulents'.

**Shires Mead Cactus Nursery** (D. W. & C. E. Sargant) Hampreston Village, Wimborne, Dorset BH21 7LX. Tel. no. Northbourne (02016) 3829. Not open Sundays and Mondays. List 9p. Plants and seeds.

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May 1979

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**Cover illustration:** *Echinocactus obvallatus* DC., from De Candolle's reproduction of Mociño & Sessé's unpublished illustration of *Cactus obvallatus*. *Echinofossulocactus obvallatus* (DC.) Lawr. is the name for the component of the *E. crispatus* complex with broad, short-tubed flowers. See pp. 35-42.

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The Journal is published quarterly by the Society, price £1.

ISSN 0007-9375

# The Cactus and Succulent Journal of Great Britain

Volume 41 Number 2 May 1979

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## †Dr. Hans Herre and †Dr. Franz Buxbaum

With the death of Hans Herre in his 84th year on 16 January 1979, and of Franz Buxbaum, who was 78, on 7 February 1979, the science and hobby of succulent plants has lost two of its most distinguished exponents. Herre, born at Dessau on 7 April 1895, was Curator of the famous botanical garden at the University of Stellenbosch, South Africa, from its infancy in 1925 until his retirement in 1960, and built up the very large collection of succulents there in the pre-war years. His book 'The Genera of the Mesembryanthemaceae' was published in 1971.

Buxbaum, whom our late President Mr. Shurly dubbed 'my friend, the enemy', approached the Cactaceae from a very different background and viewpoint from that of his contemporary and adversary Backeberg: from the inside, as it were, rather than the outside. Born at Nova Bystrice near the Czech-Austrian border on 25 February 1900 he had a botanical training and obtained his Ph.D. at Graz in 1922. For a short time he was one of Wettstein's assistants at Vienna before becoming a schoolmaster at Furstenfeld.

Buxbaum's early botanical papers included contributions on the Flora of Tunisia, but his predilection for phylogeny was soon in evidence in papers on the Liliaceae and Cactaceae. He was more interested in underlying principles and evolutionary trends to be

discerned from studies of morphology than in individual species, and his work on classification can be seen as primarily a means of expressing ideas on the phylogeny of groups of species, of genera and of groups of genera, rather than as monographic enumeration and description of all the component species. The emphasis for him was on the genus, not (as it was with Backeberg) on the species. He wrote no 'Cactus Lexicon' but his work was, in a way, complementary to Backeberg's, developing the framework into which the novelties which Backeberg enumerated will ultimately find a stable position when both genera and species are more fully understood.

If Buxbaum was primarily a theorist, he was no ivory-tower botanist. He became well-known for formulating and marketing 'Buxbaum's Health Salts' and for his original and stimulating textbook on cultivation 'Cactus Culture based on Biology' (1958) as much as for his very numerous books and papers on morphology and classification.

## Annual General Meeting, 24 March

About 40 members attended our A.G.M. at Queen Elizabeth College, Kensington, on 24 March, approved the Report of Council (pp. 48-9) and the proposed rule changes circulated prior to the meeting. The Society's Officers were re-elected unopposed and Dr. Clive Bird, Mrs. Daphne Pritchard and Mr. Paul Sherville were elected to Council.

After refreshments, Gordon Rowley and David Minnion entertained the meeting with first-class slide-lectures on 'The Biology of Succulents' and on 'Arizona' its succulents and other wildlife, respectively.

## Visitors from abroad

Dr. Roberto Kiesling, of the Instituto de Botanica 'Darwinion', Buenos Aires, specialist on the Cactaceae of Argentina, is in Europe for a year with a scholarship from the Consejo Nacional de Investigaciones Cientificas y Tecnicas. He is continuing his studies of *Trichocereus* and other South American genera, and is based at the Royal Botanic Gardens, Kew.

Sr. Hernando Sanchez-Mejorada pays us a short visit this month prior to attending a meeting of the IOS Executive Board in Nuremberg. Sr. Sanchez-Mejorada who is on the staff of the botanical garden of the University of Mexico and a leading member of the Mexican Cactological Society, has been collaborating for several years with Dra. Helia Bravo on the second edition of her monograph 'Las Cactaceas de Mexico'. The first volume covering the *Pereskioideae*, *Opuntioideae* and *Cereoideae* (tribes *Hylocereeae* and *Pachycereeae*) in Buxbaum's classification, has recently been published and will be reviewed in our next issue. Work on the second volume is also well-advanced, and it is hoped that Sr. Sanchez-Mejorada will have an opportunity during his visit to talk to the Society about his research.

Next year, IOS will hold its biennial Congress in Mexico for the first time. An exciting programme of lectures, excursions and other events is being arranged by the Organizing Committee, of which Sr. Sanchez-Mejorada is President.

### 'SUCCULENTS IN THE 'SEVENTIES'

CSSGB/IOS Meeting, October 20-21

Dolphin & Anchor Hotel, Chichester, Sussex

As we go to press, final details of the programme for the weekend meeting jointly sponsored by our Society and IOS British Section are being arranged, and we hope to send out a booking-form with this issue of the Journal. The list of speakers from abroad includes **Prof. Dr. Werner Rauh**, from Heidelberg, who will be our guest of honour, **Dr. Heidi Hartmann**, from Hamburg, **Dieter Supthut**, Director of the City Succulent Collection at Zurich, and **Dr. Roberto Kiesling** from Argentina (see 'Visitors from abroad' above). The home-grown speakers are **Keith Grantham**, **Robert Holt**, **David Hunt**, **Bill Keen**, **Tony Mace**, **Bill Maddams**, **Keith Mortimer** and **Gordon Rowley**, and between us we shall hope to say 'That Was The Decade, That Was' (and what's to come?) as we prepare to enter the Nineteen-eighties.

This promises to be a memorable meeting, but accommodation is limited (even for those planning to come on one day only) so please return the booking-form without delay.

### Red Alert: *Zanthoxylum paniculatum*

by Nigel Taylor

The succulent houses at Kew contain quite a number of plants that are there because the climate suits them rather than because they are succulent. There are tropical bulbs (which are succulent in a sense) and a variety of plants of conservation interest. One of the most remarkable of these, and certainly one of the rarest, is *Zanthoxylum paniculatum*\*, a member of the Rue or Orange Family (Rutaceae). This plant, a tree up to 9 m. tall, is restricted to Rodrigues, a small island in the Indian

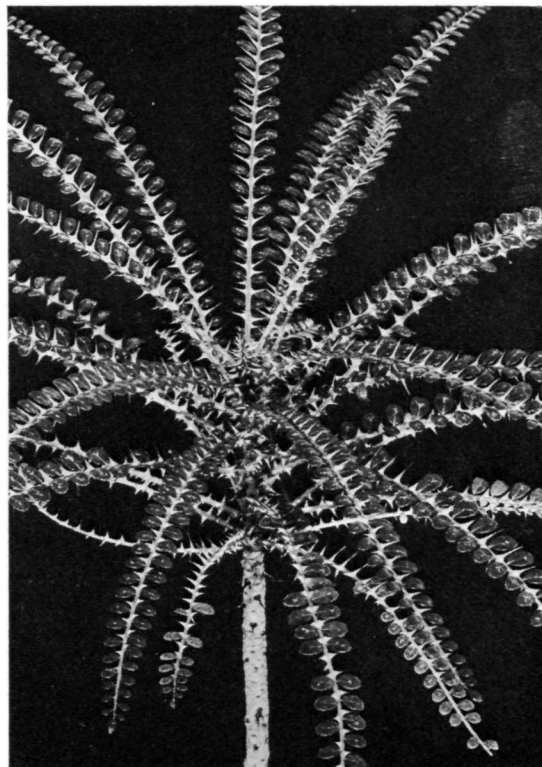
Ocean, whose vegetation has sadly declined due to Man's influence. Reduced now to perhaps only two individuals in the wild, this species is but one of 32 endemics on the island whose status is either extinct or critically endangered.

The plant illustrated is one of two seedlings raised at Kew from seed collected from one of the two remaining wild trees that are known for certain. Regeneration in the wild is prevented by the voracious grazing of goats and by competition from introduced weeds, both these pressures resulting from human interference.

The seedlings exhibit a characteristic juvenile foliage of compound leaves with many small, dark green and shiny leaflets arranged on a spiny rachis. At maturity the leaves have fewer leaflets (5-9 pairs) and these are larger (4-8 cm. long), while the trunk and thorny branches develop a smooth, dark grey bark.

The flowers of this species have never been observed, though the plants in Rodrigues evidently set fertile fruit and seed.

It is to be hoped that more plants can be raised in cultivation and nursed to a stage where they could be successfully reintroduced to their original habitat, or passed on to tropical botanic gardens for planting in the open. In the juvenile stage, the species is attractive as a greenhouse subject, but probably requires a warm winter environment.



*Zanthoxylum paniculatum* (photo: Helmut Broogh)

\*See The IUCN Plant Red Data Book, 489-90 (1978).



## The identity of *Aloe juvenna*

by Peter Brandham and Susan Carter

Royal Botanic Gardens, Kew,  
Richmond, Surrey

A very peculiar and unique plant, *Aloe juvenna* (also known as *A. juvennae* and *A. juveana*) has never been described as a species, and up to the present day its various names are non-valid nomina nuda. It is widespread in cultivation in Europe, America, Australia, Africa, and possibly elsewhere, but there is no published record of its occurrence in the wild and it has not been included in the major works by Jacobsen or Reynolds, although they were doubtless aware of its existence.

In a short note in the ASPS Bulletin (Bull. Afr. Succ. Pl. Soc. 4: 161. 1969), Gordon Rowley gave an account of the origin of the name. The plant had been cultivated in South Africa by Bernard Carp, who considered it to be a juvenile form of a species of *Aloe* and labelled it as such. Subsequently other people misread the almost illegible label and the false names *Aloe juvenna* and its variants came into being.

The plant was believed to have come originally from Kenya, but in the absence of a firm record this must remain in doubt. Rowley considered the plant to be a form of *A. squarrosa* or *A. zanzibarensis*, but these are quite clearly not close relatives of *A. juvenna*. Subse-

quently, A. W. Squire (l.c., 224) considered it to be more closely related to the South African species *A. distans* or *A. mitrifomis*, but these species are very much larger and the resemblance is only superficial.

It is hardly surprising that people have needed to look very hard at the range of types in the genus to find an ally for *A. juvenna* because it really is quite unique in morphology, and in our opinion there are no close relatives in the genus. It branches freely from the base, usually below soil level and sends out abundant short stems which are densely clothed with small leaves bearing soft spines on their margins. This leafy habit is the feature which resembles the *A. mitrifomis* group. The leaves are spotted on both sides, with more on the underneath and—a very uncommon feature in the genus—the majority of the spots have very small prickles or denticles arising from them, making the leaves very rough. This is one of the reasons why some people have considered it to be possibly allied to *A. squarrosa*. The triangular leaves are very close together in plants grown in good light conditions, but if plants are kept in the shade (under the staging, for instance) the internodes elongate and the



*Aloe juvenna*. Plant in 5 inch pot showing the typical low, multiple-stemmed habit of growth.

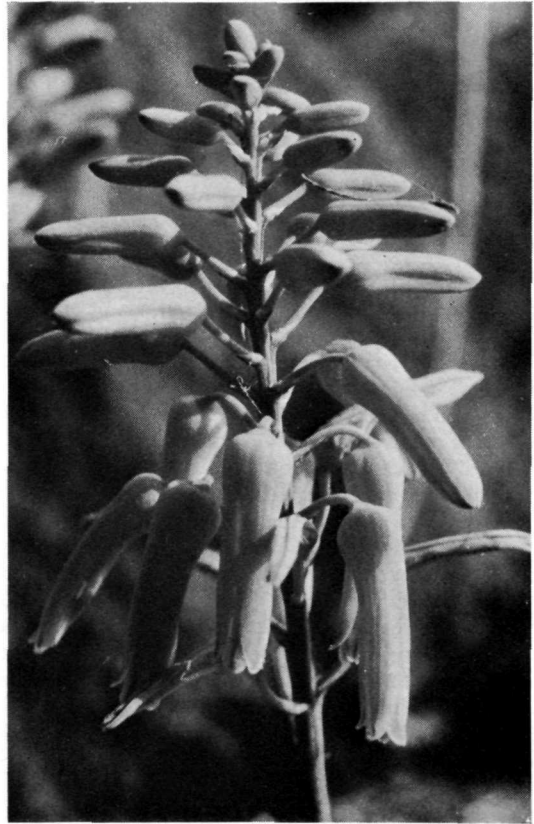
leaves become longer and thinner. In plants kept in good condition the leaves persist along the entire length of the stems and this feature, together with the closely multiple-stemmed habit, make this moderate-sized plant a valuable addition to anyone's collection.

Now that it has been established that the plant has no close relatives the question arises whether it is a good species or a hybrid. In its general habit it is so reminiscent of an *Astroloba* or a *Haworthia* (sect. *Coarctatae*) that many people have suggested that it might be a hybrid between an *Aloe* species and one of these, but this idea can be discounted for two reasons. Firstly, it is almost impossible to hybridise *Aloe* with *Haworthia* experimentally, the only known bigeneric hybrid of this type being  $\times$  *Aloworthia* 'Black Gem' (*Aloe* sp.  $\times$  *Haworthia cymbiformis*). Secondly, the flowers of *A. juvenna* are completely *Aloe*-like and there is no evidence from floral morphology of any bigeneric hybridity.

A possible hybrid origin for this plant in the complete absence of any putative parents can be tested by an investigation of its chromosomes or of its seed progeny. In a non-hybrid diploid *Aloe* the fourteen chromosomes can be matched precisely into seven pairs, the members of each pair being exactly equal in total length and in the relative lengths of the two arms. Furthermore, meiosis in the developing anthers will be regular and the pollen fertility will be high. In a hybrid plant the chromosomes will usually not match so well, and irregularities in meiosis will lower the pollen fertility to a greater or lesser extent. The progeny of a non-hybrid plant produced by self-pollination or by cross-pollination with another plant known to be true-breeding will be morphologically uniform, but if the unknown plant is a hybrid its selfed or crossed progeny will vary to some extent because of the segregation of the genes of the hybrid.

Many of these tests are difficult to do with this particular plant because flowers are produced in Britain only very rarely and we have neither been able to study its meiosis, nor have we been able to carry out hybridization experiments. Nevertheless, the late Mrs. E. Polhill gave us some seeds collected from plants of *A. juvenna* growing in her garden at Lake Naivasha, Kenya, and four of these have germinated. Unfortunately they are not yet large enough for us to assess their degree of variation.

The mitotic chromosomes of a plant of *A. juvenna* growing at Kew have been investigated (Kew accession no. 575-67-57501; Cytology Department no. 69-204). This plant is identical to specimens which we have seen in Kenya and South Africa, and is a tetraploid with  $2n = 28$  chromosomes, which is most unusual in the genus. We have found that tetraploidy in *Aloe* is restricted entirely to East African species and does not occur further south of the equator than one degree. Known tetraploids are mainly in the East African group of large shrubby species (*A. kedongensis*, *A. dawei*, *A. elgonica* and their allies). *A. jacksonii* from Ethiopia and



*A. juvenna*. Raceme, slightly enlarged.

some populations of *A. inermis* and *A. cremnophila* from Somalia are also tetraploid. This evidence of the distribution of known tetraploids in *Aloe* might support an East African origin for *A. juvenna*. The South African species *A. ciliaris* is a well-known hexaploid ( $2n = 42$ ) but this fact is not relevant to this discussion.

The chromosomes of *A. juvenna* cannot be grouped into seven sets of four identical chromosomes which would have indicated that it was an autopolyploid (i.e. the product of the spontaneous doubling of the chromosomes within a species). The evidence at present seems more to favour an allotetraploid origin for the plant (i.e. the doubling of the chromosomes of a hybrid to produce a new true-breeding species). Allotetraploidy is otherwise unknown in the Aloineae and the likelihood that the plant could have arisen in cultivation as the result of a chance doubling of the chromosomes of a hybrid is very slight. Furthermore, the necessarily smaller diploid hybrid which should have given rise to it does not seem to exist.

Although final evidence is still needed, the balance of the data available at present seems to be in favour of the plant being a true species and not a hybrid. We are

aware that descriptions of new species from plants known only in cultivation are often frowned upon but because this particular plant is so unique, so widespread and so well-known in cultivation we feel that the time has come for it to be given a valid status. We further feel that in view of the balance of evidence favouring its not being a hybrid it merits a specific epithet rather than a mere cultivar name.

Most people seem to know the plant as *A. juvenna* and we see no reason to change this name to the correct latin translation of 'juvenile' (which would be *juvenilis*) despite its being dog-latin with no meaning in its present form. Other specific epithets in *Aloe* (e.g. *A. vaombe*) are of a similar kind but are perfectly acceptable names.

The description set out below is based on some freely-flowering material which we collected in Mrs. E. Polhill's garden in October 1977, but plants seen in a variety of places are remarkably uniform, being probably a single clone.

We would like to take this opportunity to pay a tribute to Mrs. Polhill who was tragically killed in a car crash early in 1978. She was always interested in the botany of the region of Kenya where she lived and was very hospitable to visiting botanists. A great many of her paintings of local plants have been presented to Kew and they constitute a valuable addition to our knowledge of the flora of the area.

***Aloe juvenna*** P. Brandham & S. Carter, **sp. nov.**; *planta succulenta subfruticosa foliosa, e basi dense ramosa et surculosa; caulibus dense foliatis, erectis usque 25 cm. altis, caulibus longissimis procumbentibus usque 45 cm. longis, 12 mm. crassis. Folia patentia, deltoidea, usque 4 cm. longa, basi 2 cm. lata, amplexicaulia, internodia brevissima, dentibus marginalibus cartilagineis prominentibus, 2-4 mm. longis,*

*4-6 mm. inter se distantibus. Folia virentia, basi supra plana deinde concava, maculata; subtus convexa, dense maculata; maculis denticulatis. Inflorescentia simplex vel 1-ramosa, erecta usque 25 cm. alta; pedunculus usque 17 cm. altus bracteis sterilibus paucis praeditus; racemi conici usque 8 cm. longi, 6 cm. diametro, floribus patentibus mox mutantibus. Bractee deltoideae, usque 5 mm. longae, 4 mm. latae, scariosae, 3-nervatae. Pedicelli usque 18 mm. longi. Perianthium roseo-rubrum apice lutescens et ibi nervis viridibus ornatum; floribus inapertis apice viridibus; perianthium cylindricum, 2.7 cm. longum, basi expansum 8 mm. latum; segmenta apice rotundata, parum patentia, exteriora per 8 mm. libera. Antherae et stigma haud exsertae. Capsula et semina haud visa. Holotypus: Cult. Kenya, Carter & Stannard 5 (K).*

**DESCRIPTION.** Plant a succulent leafy sub-shrub, densely branching and suckering from the base. Erect stems to 25 cm. high, longer stems procumbent to 45 cm. long, 12 mm. diameter, densely leafy. Internodes short with up to 35 leaves per 10 cm. length of stem. Leaves spreading, bright green becoming brownish in dry conditions, deltoid, to 4 cm. long, 2 cm. wide at the base; margins armed with prominent cartilaginous teeth 2-4 mm. long, 4-6 mm. apart; upper surface flat at the base, concave towards the tip, with numerous longitudinally elongated pale green spots; lower surface convex, more densely spotted; many of the spots on both surfaces with raised denticles. Inflorescence simple or with one branch, erect, to 25 cm. Peduncle to 17 cm. long with several sterile bracts. Raceme to 8 cm. long, conical, 6 cm. wide. Flowers spreading in bud, pendent when open. Bracts deltoid, 3-nerved, scarious, 5 mm. long. Buds bright coral-pink with green tips. Open flowers similar, but yellow at the mouth with 1-3 green nerves. Perianth 2.7 cm. long, cylindrical, slightly swollen at the base, base 8 mm. wide; segments with rounded apices, slightly spreading, outer segments free for 8 mm. Anthers and stigma not exserted. Capsules and seeds not seen.

**HOLOTYPE:** Kenya, cultivated plant from Mrs. E. Polhill's garden, South Lake, Naivasha, 24 Oct. 1977, Carter & Stannard 5 (K); otherwise known in cultivation only, worldwide.

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## In defence of the name *Aloe vera*

by L. E. Newton

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Kumasi, Ghana

One species which is featured among the earliest known records of succulent plants is an *Aloe* which has been used as a medicinal herb since ancient times. The earliest known reference to this species is in a 1st Century manuscript herbal by Dioscorides. The natural origin of the species is uncertain, but today it is naturalized in several tropical and sub-tropical countries in both the Old World and the New World. In most of the literature in which it appears the species is referred to as *Aloe vera*. In his book on tropical aloes Reynolds (1966) argues that the name of this species should be *Aloe barbadensis*.

For determining the application of names to the Flowering Plants the starting point is the year 1753, when Linnaeus first published his *Species Plantarum*. In this work the species discussed here appears as a variety, with the epithet *vera*, of *Aloe perfoliata*. According to Reynolds the first reference to these plants as a species distinct from *A. perfoliata* was in the eighth edition of Miller's *Gardeners Dictionary*, published in 1768, where the name *Aloe barbadensis* is used. Reynolds points out that in the *International Code of Botanical Nomenclature* an epithet has priority only in its own rank. He argues that as the

epithet *vera* had been applied only in the rank of variety, the use of *barbadensis* in the first reference to the plants in the rank of species gives this latter epithet priority.

Reynolds's reasoning is correct, but unfortunately he had overlooked one publication. He had examined the appendix on the flora of the South African Cape region at the end of N.L. Burman's *Flora Indica*, published in 1768, but appears not to have read the main body of this work. On page 83 we find *Aloe vera* listed as a species, with references to earlier literature, including the third edition of Linnaeus's *Species Plantarum* (published in 1764):

ALOE (*vera*) foliis spinosis confertis dentatis vaginantibus planis maculatis, floribus pedunculatis cernuis corymbosis. *Linn. sp.* 458. *Roy. lugdb.* 22. n. 3.

*Aloe vera vulgaris*. *Munting. ic.* 96. *Bauh. pin.* 386.

Kadanaku s. Catevala. *Rheed mal.* II. p. 7. t. 3.

Crescit in campis aridis & saxosis utriusque Indiæ.

There is no doubt that this represents a valid change in status for the Linnean variety.

It will be noted that Burman's *Flora* appeared in the same year as the relevant edition of Miller's *Dictionary*. This is a case where it is important to determine the

exact dates of publication of the two books in order to establish priority. Reference to Stafleu (1967) and to Stafleu & Cowan (1976) gives the answer. The exact date of publication of Burman's *Flora* is uncertain, but it is known to be within the period 1st March to 6th April 1768. The eighth edition of Miller's *Dictionary* was published on 16th April 1768. Thus the name *Aloe vera* (L.) Burm. f. clearly had priority over *Aloe barbadensis* Miller by at least ten days.

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Volume 41(2): 30-31 (1979)

## New Combinations in *Ferocactus*

by N. P. Taylor

Royal Botanic Gardens, Kew,  
Richmond, Surrey

***Ferocactus bicolor*** (Galeotti ex Pfeiffer) N.P. Taylor, **comb. nov.** Basionym: *Echinocactus bicolor* Galeotti ex Pfeiffer, *Abbild. Besch. Cact.* 2: t. 25 (1848); *Thelocactus bicolor* (Galeotti ex Pfeiffer) B. & R. in *Bull. Torr. Club* 49: 251 (1922); **non** *Cactus bicolor* Teran & Berland., *Mem. comis. limites* 1 (1832); **non** *Hamatocactus bicolor* (Teran & Berland.) I.M. Johnston in *Contrib. Gray Herb. n.s.* 70: 88 (1924) (syn. *H. setispinus* (Engelm.) B. & R.; *E. setispinus* Engelm.; *F. setispinus* (Engelm.) L. Benson).

***Ferocactus bicolor*** var. ***bolaensis*** (Runge) N.P. Taylor, **comb. nov.** Basionym: *Echinocactus bolaensis* Runge [*'bolansis'*, sphalm.] in *Gartenflora* 38: 106 (1889); *E. bicolor* var. *bolansis* K. Schum., *Gesamtb. Kakt.* 303 (1898).

***Ferocactus bicolor*** var. ***flavidispinus*** (Backeb.) N.P. Taylor, **comb. nov.** Basionym: *Thelocactus bicolor* var. *flavidispinus* Backeb. in *Jahrb. Deutsch. Kakt.-Gesellsch.* 1: 6 (1941).

***Ferocactus bicolor*** var. ***schwarzii*** (Backeb.) N.P. Taylor **comb. et stat. nov.** Basionym: *Thelocactus schwarzii* Backeb. in *Cact. Succ. J. Gr. Brit.* 12: 81 (1950).

While checking names listed in *Index Kewensis* for an account of the genus *Ferocactus* I encountered the name *Hamatocactus bicolor* I.M. Johnston. Avoiding the assumption that others have obviously made (see below), that this was another combination for *Thelocactus bicolor* (Galeotti ex Pfeiffer) B. & R., I checked the reference and discovered the significance of Johnston's account (Johnston, 1924).

Johnston points out that the earliest, valid name for the plant well known as *Hamatocactus setispinus* (Engelm.) B. & R. is *Cactus bicolor* Teran & Berland. in *Berlandier* (1832), which was published in a very rare and little known report (see Stafleu & Cowan, 1976). This antedates the basionym cited by Britton & Rose (1922), which was *Echinocactus setispinus* Engelm. in *Boston J. Nat. Hist.* 5: 246 (1845). This fact has been ignored it seems by all subsequent authors, and what is more both Benson (1969b) and Glass & Foster (1977) have incorrectly listed *Hamatocactus bicolor* I.M. Johnston as a synonym of the plant they call *Thelocactus bicolor*.

Now, I wholeheartedly agree with Benson (1969a) that *Hamatocactus setispinus* is referable to *Ferocactus*, but so also, in my opinion is *Thelocactus bicolor*. The justi-

fication for this will be presented in another paper. The confusion that must inevitably arise should the name *Hamatocactus bicolor* become generally adopted in its proper sense (as it should be, by rights) replacing *H. setispinus*, would extend still further should Teran & Berlandier's epithet be transferred to *Ferocactus*. The new combination *Ferocactus bicolor* (Galeotti ex Pfeiffer) N.P. Taylor, based on *Echinocactus bicolor* Galeotti ex Pfeiffer, pre-empted the situation, however, preventing the legitimate transfer of *Cactus bicolor* Teran & Berland. to *Ferocactus*, and leaving *Ferocactus setispinus* (Engelm.) L. Benson as the correct name for Berlandier's and Engelmann's plant.

The widely distributed *F. bicolor* shows considerable variation throughout its range, and certain components of this variability are distinctive. Here I have followed Glass & Foster (1977) who recognize vars. *bolaensis* and *flavidispinus*, but in addition I have further reduced *Thelocactus schwarzii* Backeb. to this rank. The vars. *pottsii* Salm-Dyck (1850), *schottii* L. Benson (1969) and *tricolor* K. Sch. (1898) are treated by Glass & Foster, loc. cit., as synonyms of the type variety, var. *bicolor*. It should be noted that Salm-Dyck's *Echinocactus pottsii*, also described in 1850, does not belong here, but represents another *Ferocactus* species, *F. pottsii* (syn. *F. alamosanus* var. *platygonus*; see Unger, 1971).

Another widely distributed member of the genus, *F. uncinatus*, displays less extreme variability in comparison to *F. bicolor*. However, the northernmost form of this

species known as var. *wrightii* is worthy of recognition and has been upheld by Benson (1969b). It would appear that the combination for this variety under *Ferocactus* has never been made, hence: ***Ferocactus uncinatus* var. *wrightii*** (Engelm.) N.P. Taylor **comb. nov.** Basionym: *Echinocactus uncinatus* var. *wrightii* Engelm. in Proc. Amer. Acad. 3: 272 (1856).

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## Identifying a rare *Ceropegia*

by Nigel Taylor

photographs by Helmut Broogh

The genus *Ceropegia*, with about 160 spp., is widely distributed in the Old World, occurring from N. Queensland, Australia through tropical and subtropical Asia to Arabia, Madagascar and Africa. The westernmost station of the genus is the Canary Islands, which lie off the west coast of Africa between 27°N and 29°N. The islands are largely volcanic in origin and support a unique flora rich in endemic species. Such richness is of great interest to botanists, and islands like these deserve to head the list of places where conservation of nature should be a priority.

*Ceropegias* are found on four out of seven islands in the archipelago: Tenerife, Gran Canaria, La Palma and Gomera. The plants inhabit the low elevation xerophytic scrub zone of the coast, reaching 1000 m on Gomera. In their attractive book 'Wild flowers of the Canary Islands' (pp. 176–7. 1974) David & Zoe Bramwell enumerate six species of *Ceropegia*, all endemic to the islands.

The first of these to be described was *C. dichotoma* Haworth (1812), followed by *C. fusca* Bolle (1861); both are now common in cultivation. They have erect or sometimes sprawling stick-like cylindrical stems which while in active growth bear pairs of opposite, linear-lanceolate dark green leaves. The flowers are curious tubular structures with five corolla-lobes which usually remain joined at the apex, though are occasionally free. As in other members of the family Asclepiadaceae the fruits are a pair of horn-like follicles splitting to release flat, plumed seeds, well adapted for wind dispersal.

*C. dichotoma* from Tenerife has olive-green stems and yellow flowers, contrasting with *C. fusca* (Tenerife & Gran Canaria) with whitish or brownish stems and reddish-brown flowers. These easily differentiated species were the only representatives of the genus known from the islands for nearly a century, but in the last 25 years the late Dr. Eric Sventenius has added *C. cera-*

*tophora* and *C. krainzii* from Gomera, *C. hians* from La Palma and lastly *C. chrysantha*, restricted to one locality on Tenerife. All four new species have yellow flowers and appear to differ from one another principally in their vegetative characteristics. They seem closely allied to Haworth's *C. dichotoma*, and the possibility that they are merely island races of this species is hard to rule out.

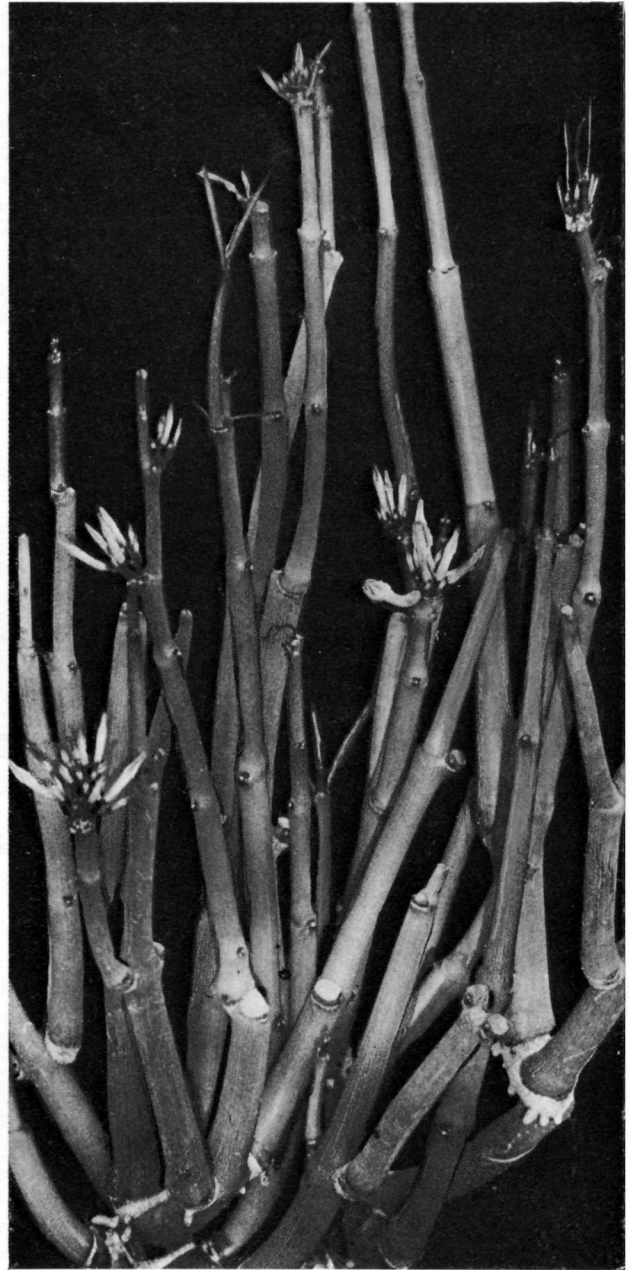
My interest in the yellow-flowered Canarian *Ceropegias* was aroused when Jackie Panter presented the Kew research collection with a well-grown example of one of the group in flower. This specimen is the one illustrated, and is clearly quite different from the form of *C. dichotoma* commonly encountered in cultivation. Unfortunately Jackie's plant was without any data as to its geographical origin which would have facilitated rapid identification by excluding most of the possible alternative names on geographic grounds.

Initially recourse was made to the Bramwells' book which provides a dichotomous key to the Canarian *Ceropegias*. In this key the yellow-flowered species are divided into those with clusters of 2-7 flowers (*C. dichotoma* and *C. hians*) and those with clusters of 10-50 flowers. The plant in question fell into the second category, and then following on through the key it was identified as *C. chrysantha*.

To satisfy curiosity and conscience Sventenius's original description of *C. chrysantha* was consulted (*Additamentum ad Floram Canariensem*, 40. 1960), and here various discrepancies were noted. First, the leaves of our plant were much larger than the  $20-30 \times 2$  mm. called for, and furthermore the description requires flowers in fascicles of 5-10, not 10-50 as suggested by the Bramwells' key. This discovery prompted a study of first descriptions for the other yellow-flowered species, highlighting more discrepancies. For example, *C. hians* is said to have clusters of 8-15 flowers, and not 2-7 as in the key.

Detailed comparison of our plant with the description of *C. hians* showed that it had the densely branched, upright habit and reddened young flower-bearing stems described for this species. There was also agreement in the leaves which are  $50-60 \times 3-4$  mm. in size, olive green, with the midvein pinkish and margins revolute. The only point of difference was the corolla-lobes which are described as free, and not joined at the apex as in our specimen. However, this character is perhaps unreliable, since I have observed flowers on plants in habitat of both *C. dichotoma* and *C. fusca* in either condition.

Despite the element of doubt, we have labelled the plant as *C. hians*—at least for the time being. However, its identity could have been determined for certain if only we knew which of the Canary islands our specimen came from. This is a reminder that it is important to keep a record of any data received with a plant, and also to pass this data on should the plant be propagated or given away (see Gordon Rowley in Feb. issue, pp. 7-9).



A yellow-flowered *Ceropegia* from the Canary Islands, growing in the Kew collection and identified as **C. hians**. Note the densely branched, upright habit characteristic of this species.



**C. hians** has flowers in clusters of 8-15 according to the original description, fewer according to a recent book. It only occurs on the island of La Palma, but unfortunately it is not known whether the specimen illustrated is from there. If this information had been recorded the botanical interest of the specimen would be enhanced: 'C' or perhaps 'B' on Gordon Rowley's scale (see February issue, page 8). We could say for certain whether or not the plant really is **C. hians**, and the plant itself would give us valuable data for comparison with published descriptions and herbarium material of wild plants, and of the behaviour of the species in cultivation.

## Othonna cakilefolia DC.

by Gordon Rowley

drawn by Christabel King

*Othonna cakilefolia* was first described by De Candolle in 1838 (Prodromus 6: 482) from material collected by Drège near the Hol River in Little Namaqualand. It is a geophyte with a carrot-like stock or caudex 3–4 cm. below the soil, from which emerge a rosette of variously divided fleshy leaves and, later, inflorescences overtopping the foliage. The leaf form and showy flower heads with magenta-purple rays distinguish it from all other species, and the name refers to the resemblance of the leaves to those of the sea rocket (*Cakile*).

De Candolle also described a variety *latifolia* with broader, pinnatifid leaves and larger, paler flower heads. This is now treated as a separate species, *O. incisa* Harv. A fuller description of *O. cakilefolia* was given by Harvey in *Flora Capensis* 3: 340–341 (1865), and this seems to be the source of all later accounts. No illustrations are on record; no live material was introduced to cultivation. Then in 1954 the eagle eyes of Harry Hall rediscovered it, and a further colony in 1974 near Nuwerus (17 plants). He states that it grows 'in rocky (and hence unploughable) ground—small islands in a vast series of wheat fields.' The plant is so brittle that it falls to pieces if one tries to dig it up, and seed shares the same bad reputation as other othonnas for non-germination.

However, in 1977 seedlings were eventually raised successfully by Ronald Rutherford in the Botanic Garden at Reading University from seed supplied by Harry Hall, who also parted up with a small plant. Germination is peculiar. Two fleshy, entire cotyledons appear above soil, but nothing further, the apex appearing 'blind'. After a long period, during which the cotyledons may or may not have withered away, new growth arises from a lateral bud on the tuber, and the characteristic lobing of the adult leaf begins to show.

By 1978, about twenty of the above seedlings were large enough to share out at a meeting of the British Section of the IOS, and some of these plants have since flowered, notably at Kew and Reading. It is from the former plants that the accompanying drawing was made. Under glass, the flowers are seen at their best in early morning, when the rays are fully expanded. Later they tend to roll back. To judge from habitat photographs taken by Harry Hall, plants of this species would rival asters and marigolds in our gardens if they had the same hardiness and ease of cultivation. As it is, the species remains something of a challenge for the connoisseur, although the brilliant purplish flower heads offer ample compensation as a change from the yellow of so many other succulent Compositae. Its rarity in the wild, and ever-shrinking habitat, should be a further spur to efforts to master its cultivation and propagation.



*Othonna cakilefolia*



## A Commentary on the genus *Echinofossulocactus* Lawr.

by N. P. Taylor

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*Echinofossulocactus* names of recent usage are reviewed and a ruthless attitude is adopted with regard to their usefulness. Of the 36 validly published epithets, 11 are considered to be of no value, while a further 5 are of uncertain status. The names *E. coptonogonus*, *E. crispatus*, *E. multicosatus*, *E. phyllacanthus*, *E. sulphureus* and *E. vaupelianus* are held as representing the majority of the distinctive taxa belonging in the genus. The remainder are referred, as probable synonyms, to the above.

### Introduction

The alphabetical species list provided below attempts to catalogue all *Echinofossulocactus* binomials in use from the time of Britton & Rose (1922). All the first descriptions have been examined, and these are summarised where they relate to plants known today. The status of each name has been determined; those not accompanied by adequate descriptions of the flower or lacking clear typification have been recorded as of no value, or as of uncertain status.

Some changes are made to my earlier brief notes on the genus (Taylor, 1978). These include the treatment of *E. albatius* (A. Dietrich) B. & R. as of uncertain status, along with *E. ochoterenaus* and *E. boedekeranus*. *E. vaupelianus* is the only name upheld from amongst my earlier Group 5, and contrary to Meyran's comments cited there, this plant seems to have been rediscovered in Hidalgo (Meyran, 1976). In addition eight of the names previously referred to Group 4 (the *E. obvallatus/crispatus* Group) are now regarded as of no value, while the remainder including *E. obvallatus* and three of the ungrouped names, are to be treated as probable synonyms of *E. crispatus*.

The primary aim of the present paper is to distinguish the names whose current application is certain from the many useless or poorly understood epithets. The intention is to provide a reference list for the collector, and also an indication of where the gaps in our knowledge lie.

### Notes on *Echinofossulocactus* literature and the fate of the names for the forms in cultivation

Many names in this genus are poorly typified and consequently sources of information other than the first

descriptions, e.g. Ehrenberg (1846), Schumann (1898), Bravo (1969) and Meyran (1972-5), should be studied with the knowledge that their authenticity may be questionable. The attempts by H. Bravo (1969) and Meyran (1972-5) at linking certain wild populations with inadequately described or poorly typified names, cannot be accepted if a sound classification of this genus is ever to be achieved.

The accounts in popular works such as those of Borg (1970), Backeberg (1961, 1966), etc., should be treated with great caution. Many of the descriptions therein are either modified or amplified, particularly with floral data obtained from cultivated plants that have been assumed to be the same as those often sterile specimens, unknown to us, that were first described in the last century. In view of the remarkable variation apparent in the vegetative characteristics of this genus, names originally unaccompanied by adequate descriptions or illustrations of the flowers are of little value in classifying these plants. Should horticultural opinion demand the continued recognition of the many forms to which these redundant names are at present haphazardly applied, then there is no reason why they should not be given fancy cultivar names. The redundant names themselves should not be used at cultivar rank if further confusion is to be avoided. Only the better understood names (in bold type) that I have included here under *E. crispatus*, *E. multicosatus* and *E. phyllacanthus* could perhaps be used as cultivar names in their current form if desired. Some may warrant recognition as botanical varieties.

### Future work

First and foremost there is the need for more well documented field study, in order that the extent of phenotypic variation and geographical range can be ascertained for each species. The status of plants such as *E. ochoterenaus* and *E. caespitosus* requires clarification, while in the study of morphology there is the opportunity for much investigation into flower, fruit and seed characters.

### Acknowledgements

I wish to thank my colleagues Mr. H. K. Airy Shaw and Mr. B. Stannard for help they have freely given with the translation of certain Latin and German texts, examined for the List of Species.

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## Provisional Key to Echinofossulocactus

1. Inner perianth segments white, pinkish-purple or violet:
  2. Ribs 10-15, 5 mm. or more in width **E. coptonogonus**
  2. Ribs (20-)30-100 or more, usually 1-3 mm. in width:
    3. Ribs 50-100 or more, very thin, c. 1 mm. wide; epidermis pale green; flowers often without pinkish-purple pigments; Zacatecas north to Coahuila and Chihuahua ..... **E. multicosatus**
    3. Ribs (20-)30-60, > 1 mm. wide; epidermis dark green to glaucous, rarely pale green; flowers with pinkish-purple pigments; Zacatecas south to Puebla and Oaxaca ..... **E. crispatus**
1. Inner perianth segments yellowish (sometimes very pale yellow to cream), without pinkish-purple midstripes:
  4. Flower < 20 mm. long with a very short tube, or if longer then radial spines 13 or more:
    5. Radial spines 2-7 ..... **E. phyllacanthus**
    5. Radial spines 10-25 ..... **E. vaupelianus**
  4. Flower > 20 mm. long with a more pronounced tube; radial spines < 13 ..... **E. sulphureus**

## List of Species

*E. acroacanthus* (Stieber) Rowley in Repert. Pl. Succ. 23: 7 (1974); *Echinocactus acroacanthus* Stieber in Bot. Zeit. 5: 491 (1847); *Stenocactus acroacanthus* (Stieber) Marsh. & Bock, Cactaceae, 146, fig. 99 (1941). Based on a living plant in the collection of Kunst, which had originated from seed sent by an undisclosed source from somewhere in Mexico. Flowers and fruit undescribed; name of no value. The plant figured by Marshall & Bock, l.c., is referred to *E. crispatus*.

*E. albatu*s (A. Dietrich) B.&R., The Cact. 3: 112 (1922); *Echinocactus albatu*s A. Dietrich in Allg. Gartenz. 14: 170 (1846). Based upon plants collected by Ehrenberg in Mexico. Type locality unknown. Dietrich's *Echinocactus albatu*s was unknown to Britton & Rose, and is probably not in cultivation. A species of uncertain status. The plant well-known in horticulture as *Echinofossulocactus albatu*s with a pale green epidermis and yellowish flowers is not Dietrich's plant, which was described as having a blue-green (glaucous) epidermis and 'rein weiss' (pure white) flowers. *E. albatu*s Hort. is probably a yellow spined form

of *E. vaupelianus*, of unknown origin, which coincidentally has similar spination to that of Dietrich's species.

*E. anfractu*osus (Mart. ex Pfeiff.) Lawr. in Loudon, Gard. Mag. 17: 317 (1841); *Echinocactus anfractu*osus Martius ex Pfeiffer, Enum. Cact. 63 (1837). Based on a plant in the Munich Bot. Gard., (?) possibly sent from Mexico by Karwinsky. Flowers and fruit undescribed. Type locality unknown. Apparently not illustrated by the basionym authors or their contemporaries, unless the drawing is unpublished. A name of no value. Plants in cultivation under this name and those illustrated by H. Bravo (1969), fig. 20, and Meyran (1973), figs. 56-61, are referred to the *E. crispatus* complex.

*E. arrigens* (Link ex Dietrich) B.&R., The Cact. 3: 114 (1922); *Echinocactus arrigens* Link ex Dietrich in Allg. Gartenz. 8: 161-162 (1840). Based on plants cultivated at Berlin; origin not stated, but perhaps collected by Ehrenberg at Zimapan, Hidalgo; see Ehrenberg (1846), p. 355. Illustration: Pfeiffer, Abbild. Beschr. Cact. 2 (6): t. 27 (1850). Probably conspecific with *E. crispatus* (see Table). Notable for its very short flower.

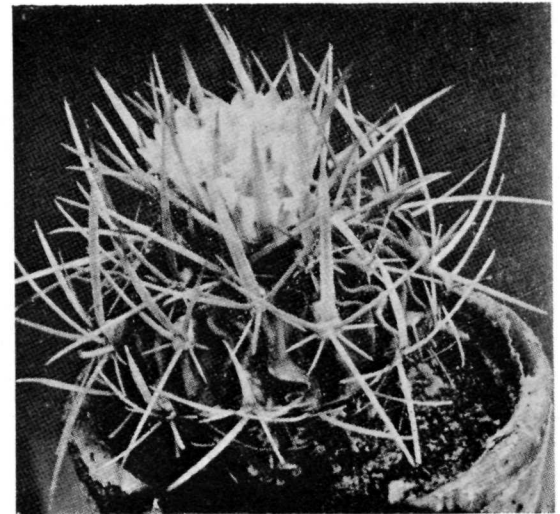
*E. boedekeranus* (A. Berger) Croizat in CSJA 14: 111 (1942); *Echinocactus boedekerianus* A. Berger, Kakteen 246 (1929); *Stenocactus boedekerianus* A. Berger, l.c., 346. Type: Zacatecas, near Concepcion, Ritter (? not preserved). Flower and fruit undescribed. The distinctive spination attributed to this plant (radials c. 20; centrals 6-9) suggests relationship with either *E. ochoteranus* or *E. vaupelianus*, but positive identification is impossible in the absence of floral data. Apparently never illustrated, and perhaps not now in cultivation. A plant of uncertain status.

*E. bravoae* Whitmore (1934), nom. nud.

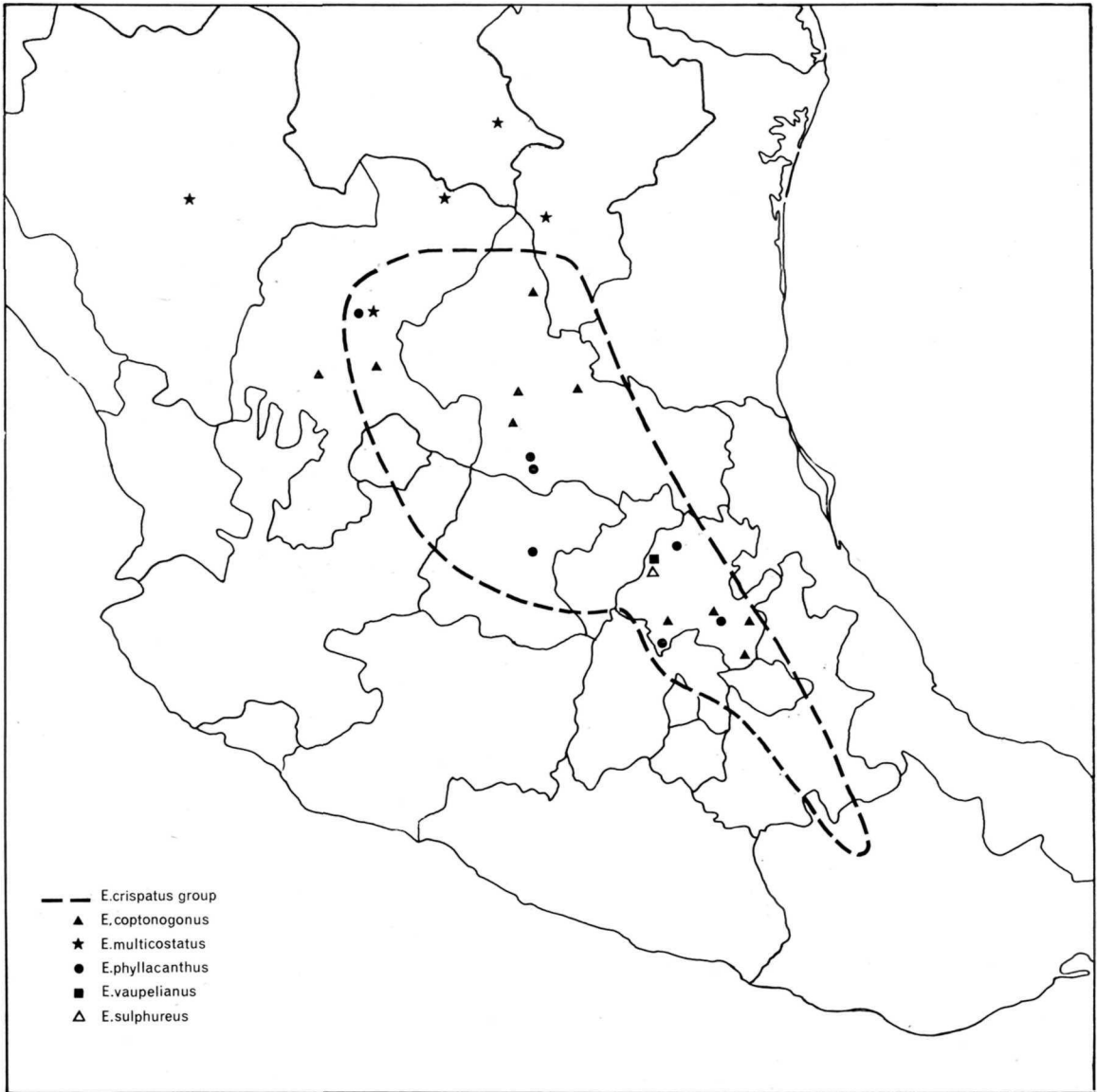
*E. bustamantei* (H. Bravo) Croizat in CSJA 14: 111 (1942); *Stenocactus bustamantei* H. Bravo, Cact. Mex., 404, fig. 210 (1937). Based on plants collected in Hidalgo; fig. 210, loc. cit., is assumed to depict the type. Probably conspecific with *E. crispatus* (see Table). Nearly identical with *E. lezarzai*.

*E. cadaroyi* Hort. See Backeberg (1961), p. 2775, fig. 2618. Perhaps a plant of the *E. crispatus* complex.

*E. caespitosus* Backeb. in CSJGB 12: 81, with fig. (1950). Based on plants sent from Schmolle in Mexico; the illustration, l.c., is presumed to be of the type. Type locality unknown.



*E. caespitosus*. Backeberg's original illustration that is assumed to depict the type.



**Geographical distribution of Echinofossulocactus.** Owing to the uncertain identity of many of the plants for which locality data are available, the full distribution of the genus has not been plotted on the map. Thus the range of *E. crispatus* and *E. multicostatus* in the north of Mexico is almost certainly more extensive than is shown. (Map drawn by Christabel King.)

(*E. caespitosus* contd.)

Plant solitary or (?) later caespitose (flowering when less than 5 cm. in diam.); ribs c. 27, undulate and bearing ar. with white felt; upper (central) spines 3[-4], c. 21 mm. long, yellowish, the uppermost one more flattened, to 2 mm. broad, the laterals to 1 mm. broad; lower (radial) spines 4, 5-6 mm. long, whitish, thin. Fl. c. 11 mm. long [but see Backeberg's fig.]; inner per. segs. white with a greenish midstripe, throat greenish; anthers and 10 stigmas greenish. [Fr.; seed ?].

This diminutive plant seems distinctive, being distinguished from *E. multicostatus* by its few ribs, and from the rest of the genus by its small white flowers. It is known for certain only

from the above description and illustration, and awaits re-discovery in the wild. However, Bravo (1969), p. 21, describes a plant under this name with similar vegetative characteristics, but with a flower 25 mm. long and per. segs. with purple mid-stripes (cf. *E. crispatus*). She says that this plant originated from C. Schmolle who claimed that it was Backeberg's species, and who presumably was the supplier of his original material. In addition Bravo, loc. cit. p. 34 describes a new variety *gracilispinus* (as *gracilispinus*) for this species, with a flower fitting Backeberg's description, only larger. (This varietal name is invalid according to Arts. 36 & 37.) If Bravo's plants are related to those that Backeberg had before him, we can perhaps only suggest

that his material was either aberrant or inaccurately described. Should this be the case, then *E. caespitosus* is referred to the *E. crispatus* complex as a form with the tendency of producing large or small, white flowers, with purple or green midstripes. At present this name is of uncertain status.

*E. carneus* Whitmore (1934), nom. nud.

*E. confusus* B.&R., The Cact. 3: 120 (1922). Based on the plate of *Echinocactus gladiatus* in Guerke & Vaupel, Bluhende Kakt. 3: t. 159 (1914), which illustrates a plant probably cultivated at Berlin, of unknown origin. Probably conspecific with *E. crispatus* (see Table).

***E. coptonogonus*** (Lem.) Lawr. in Loudon, Gard. Mag. 17: 317 (1841); *Echinocactus coptonogonus* Lemaire, Cact. Aliq. Nov., 23 (1838). Based on plants collected in Mexico by Deschamps (? none preserved). Type locality unknown. Range: San Luis Potosi, Zacatecas and Hidalgo. Illustrations: Schumann & Guerke, Bluhende Kakteen 1: t. 28 (1904); Borg, Cacti, ed. 4, t. 44b (1970); Oudshoorn, 126 Cacti & Succ. in Colour, 66 (1977).

Plant depressed to globose, glaucous-green; ribs 10–14[–15], acute, stout, crenated and with transverse grooves [at the ar.]; ar. 2 cm. apart with immediately deciduous white wool, elongated above the spines [into the flower bearing area which, often has some nectar secreting glands]; spines [3–]5[–7], grey-whitish, [yellow or reddish], the uppermost one broadest and longest, to 25[–35] mm. long, with planed (flattened) surfaces, lateral pair almost tetragonal and like the first pointing vertically upwards [or incurved], lowermost pair [when present] short, more slender and hardly flattened. Fl. Fr.; seed undescribed. [Fl. 30 mm. long, 40 mm. in diam.; tube short; inner per. segs. numerous, oblancoolate, acute, white with violet to purplish-red midstripes; filaments red; style violet with 7–9, not spreading, white stigmas; ovary brownish-violet, bearing thin scales. Fr. ?; seeds ± globose, brownish, reticulate].

The only clearly distinguishable species when not in flower, and the lectotype of the genus designated by Britton & Rose (1922). The occurrence of areolar glands in this species points to a close relationship with *Ferocactus* B.&R.

***E. crispatus*** (DC.) Lawr. in Loudon, Gard. Mag. 17: 317 (1841); *Echinocactus crispatus* DC., Prodr. 3: 461 (1828), and in Mém. Mus. Hist. Nat. Paris 17: 37, 115, t. 8 (1828). Based on Mociño & Sessé's illustration of *Cactus crispatus* in their unpublished Flora of Mexico which was reproduced by De Candolle. Type locality unknown. The total range of the typical form is uncertain, but it has been recorded from the states of Mexico, Hidalgo, Puebla and Oaxaca, according to Meyran (1972), pp. 61–62.

Plant obovoid, somewhat depressed at the apex; ribs 25–60, more or less folded and undulate, somewhat tuberculate; spines straight, rigid and unequal. Fl. 8–10 at once, from the stem apex; tube pronounced, covered with imbricating scales; per. segs. in two series, oblong-linear, acute, purple-violet. [Fr.; seed ?].

The following are probably conspecific (see Table): ***E. arrigens*** (Link ex Dietrich) B.&R., ***E. bustamantei*** (H. Bravo) Croizat, ***E. confusus*** B.&R., ***E. guerraiianus*** Backeb., ***E. kelleranus*** Krainz, ***E. lamellosus*** (A. Dietrich) B.&R., ***E. lancifer*** (A. Dietrich) B.&R., ***E. lexarzai*** (H. Bravo) Croizat, ***E. multiareolatus*** H. Bravo, ***E. obvallatus*** (DC.) Lawr., and ***E. violaciflorus*** (Quehl) B.&R.

In addition to the above a number of other names may belong here. The poorly known *E. ochoterenus* and its allies are perhaps forms with more extreme spination, while the confused *E. caespitosus* may be a small flowered member of this complex. Further study may reveal that the many-ribbed *E. multicosatus* and those included with it are little more than an extreme northern geographical segment of this species. As circumscribed

here *E. crispatus* does not include plants with yellow flower pigments, but consideration for the inclusion of examples such as those mentioned under *E. sulphureus* and *E. vaupelianus* may be necessary in the future. Much further research is required into all aspects of the *E. crispatus* complex.

*E. densispinus* C. Schmoll (1934), nom. nud.; C. Schmoll ex Pechanek (1971), nom. inval. See *E. ochoterenus*.

*E. dichroacanthus* (Mart. ex Pfeiff.) B.&R., The Cact. 3: 117 (1922); *Echinocactus dichroacanthus* Martius ex Pfeiffer, Enum. Cact., 62 (1837). Based on a plant in the Munich Bot. Gard., possibly sent from Mexico by Karwinsky. Flower, fruit and type locality unknown. Apparently not illustrated by the basionym authors or their contemporaries, unless drawings are unpublished. A name of no value. Plants in cultivation under this name and those illustrated by H. Bravo (1969), fig. 1 and Meyran (1972), figs. 35 and 41, are referred to the *E. crispatus* complex.

*E. erectocentrus* Backeb. (1961), nom. inval. See *E. multicosatus*.

*E. esperanzaensis* Whitmore (1934), nom. nud.

*E. flexispinus* H. Bravo in Cact. Suc. Mex. 14: 44 (1969); Based on *Echinocactus flexispinus* Salm-Dyck, Cact. Hort. Dyck. 1849, 159 (1850), not of Engelmann (1848). Based on a sterile, living specimen of unknown origin in the collection of Salm-Dyck. A name of no value.

The plants described by Bravo under this name cannot be realistically linked with the little known plant of Salm-Dyck. Her plants are referred to the *E. crispatus* complex.

*E. gasseri* Whitmore (1934), nom. nud.

*E. gladiatus* (Link & Otto) Lawr. in Loudon, Gard. Mag. 17: 317 (1841); *Echinocactus gladiatus* Link & Otto, Verh. Ver. Beford. Gartenb. 3: 426, t. 17 (1827). Based on a plant belonging to Deppe and illustrated by Link & Otto. Type locality unknown. The illustration and description do not resemble any known plant of this genus, and there is no mention of the flower or fruit. A name of little value.

*E. grandicornis* (Lem.) B.&R., The Cact. 3: 114 (1922); *Echinocactus grandicornis* Lemaire, Cact. Gen. Nov. Sp., 30 (1839). Based on a plant cultivated by Odier. Flowers and fruit undescribed. Type locality unknown. A name of no value.

*E. grisacanthus* Whitmore (1934), nom. nud.

*E. guerraiianus* Backeb., Stachlige Wildnis, 339 (1942), and in Feddes Repert. 51: 63 (1942). Based on plants from the Barranca de Venados, Hidalgo. Probably conspecific with *E. crispatus* (see Table).

*E. hastatus* (Hopffer ex K. Schum.) B.&R., The Cact. 3: 111 (1922); *Echinocactus hastatus* Hopffer ex K. Schumann, Gesamtb. Kakt., 376 (1898); *Echinocactus hastatus* Hopffer ex Foerster, Handb. Cact., 315 (1846), nom. nud. Type: Hidalgo, N. of Pachuca, nr. Metztilan, Mathsson (? not preserved/destroyed). Fls. described as yellowish white and as the largest in Schumann's subgenus *Stenoacanthus*. Plants with flowers of this nature do not appear to have been illustrated by Schumann or his contemporaries. As yet this plant seems to have escaped re-discovery in the wild, and is treated here as of uncertain status.

Authors after Schumann, e.g. M. Guerke in MDKG 17: 85 (1907), have described plants under this name with reddish violet flowers. These are referred to the *E. crispatus* complex.

*E. heteracanthus* (Muehlenpfordt) B.&R., The Cact. 3: 112 (1922); *Echinocactus heteracanthus* Muehlenpfordt in Allg. Gartenz. 13: 345 (1845). Based on plants from Real del Monte (Hidalgo). This plant was inadequately typified and poorly described, lacking flower and fruit data. In spite of this Meyran (1975), pp. 35–38, attempts to link this name with *E. bustamantei*

Name	Plant colour	No. of ribs	Rad. sp.: no., length, colour	Cent. sp.: no., length, colour	Fl.: length, diam.	Flower-tube	Per. seg. colour	Stigmas: no., colour
<i>arrigens</i>	blue-green	many	8, 6-13 mm. whitish	4, 25-37 mm. whitish, 1 tipped brown	13 mm. long	with purplish-red scales	white with reddish midstripes	6-7 bright yellow
<i>bustamantei</i>	—	c. 35	8-9, 10-15 mm. whitish	3, 30-50 mm. whitish with dark tips	20-25 mm. long	—	white with violet-purple midstripes	—
<i>confusus</i>	pale green	26-30	4-5, 7-10 mm. yellow	1, to 40 mm. yellow	40 mm. in diam.	—	purplish	—
<i>crispatus</i>	—	25-60	—	—	—	long, with imbricating scales	purple-violet	—
<i>guerraianus</i>	dark green	30-35	2-4, 10-28 mm. yellowish tipped brown	4, 18-40 mm. yellowish tipped brown	30 mm. in diam.	—	white with violet midstripes	—
<i>kelleranus</i>	—	c. 60	2-4, c. 5 mm. brown	1, 10 mm. black above, whitish-grey beneath	25 mm. in diam.	—	outer: white with purple midstripes inner: white	9 white
<i>lamellosus</i>	blue-green	many	2, < 13 mm. white tipped brown	4, 13-38 mm. white tipped brown	37 mm. long to 20 mm. in diam.	13 mm. long with dark purplish scales	carmine red	5 yellow
<i>lancifer</i>	dark green	many	4, < 13 mm. white	4, 13-38 mm. white tipped brown	c. 40 mm. long	13 mm. long with reddish scales	pale pinkish with purplish-red midstripes	8 bright yellow
<i>lexarzai</i>	—	40-50	8-10, 8-13 mm. white	4, 10-65 mm. whitish with dark tips	30 mm. long	—	white with purplish-red midstripes	—
<i>multiareolatus</i>	green to greyish	c. 55	(2-)4(-5), 6-8 mm. glassy white	3, 10-28 mm. yellowish tipped black to reddish	20 mm. long	—	white to pink with pinkish-purple midstripes	8 cream
<i>obvallatus</i>	—	c. 20	—	—	—	short	white with purple midstripes	—
<i>violaciflorus</i>	blue-green	c. 35	4-5, 7-12 mm. glassy white	3, to 30 mm. yellowish	25 mm. long 30 mm. in diam.	with green to brownish scales	white with violet midstripes	9 muddy yellow

*The E. crispatus complex (data from the first descriptions)*

and *E. lexarzai*, and should this be correct then all three belong to the *E. crispatus* complex. Earlier, Schumann (1898) and Britton & Rose (1922) included *E. tetraephiphus* here, but both names are poorly understood and should be rejected.

*E. kelleranus* Krainz in Schweiz. Gart. 1946: 10 (1946), cf. Neue u. seltene Sukk. 9, with figs. (1946). Based on plants cultivated at Zürich, originating from Schmoll in Mexico. Type locality unknown. Probably conspecific with *E. crispatus* (see Table). Notable for its inner per. segs. which lack the purplish midstripes that are characteristic of the *E. crispatus* complex.

*E. lamellosus* (A. Dietrich) B.&R., The Cact. 3: 113 (1922); *Echinocactus lamellosus* A. Dietrich in Allg. Gartenz. 15: 177 (1847). Based on plants cultivated at Berlin; origin not stated. Range: San Luis Potosi, Queretaro, Vera Cruz & Hidalgo (fide Meyran, 1973). Probably conspecific with *E. crispatus* (see Table), and barely distinguishable from *E. lancifer*.

*E. lancifer* (A. Dietrich) B.&R., The Cact. 3: 118 (1922); *Echinocactus lancifer* A. Dietrich in Allg. Gartenz. 7: 154-155 (1839). Based on plants cultivated in the Schelhase collection and mentioned by Pfeiffer, Enum. Cact. 63 (1837), under *E. obvallatus*. Pfeiffer later illustrated one of these in Abbild. Beschr. Cact. 2 (5): t. 22 (1848). Type locality unknown. Probably conspecific with *E. crispatus* (see Table), and cf. *E. lamellosus*.

*E. latipetalus* H. Bravo (1969), nom. prov.

*E. lexarzai* (H. Bravo) Croizat in CSJA 14: 111 (1942); *Stenocactus lexarzai* H. Bravo, Cact. Mex., 400, fig. 208 (1937). Based on plants collected at Real del Monte, Hidalgo; the illustration cited presumably depicts the type. Probably conspecific with *E. crispatus* (see Table), and cf. *E. bustamantei*.

*E. lloydii* B.&R. (1922). See *E. multicostatus*.

*E. mocinianus* H. Bravo (1969), nom. prov.

*E. multiareolatus* H. Bravo in An. Inst. Biol. Mex. 30: 59, with fig. (1960). Type: Mexico State [Hidalgo?], Apam [collector?], (MEXU). Probably conspecific with *E. crispatus* (see Table). Notable for having up to six areoles per rib.

**E. multicostatus** (Hildmann ex K. Schum.) B.&R., The Cact. 3: 111 (1922); *Echinocactus multicostatus* Hildmann ex K. Schumann, Gesamtb. Kakt., 376, fig. 64 (1898); *Echinocactus multicostatus* W. Moerder in Rev. Hort. 1895: 186 (1895), nom. subnud.; *Echinocactus multicostatus* Mathsson in Gartenflora 39: 465 (1890), nom. nud. Type: Coahuila, Saltillo, at c. 2000 m., 1889, Mathsson (? not preserved/destroyed). Flowers described by Britton & Rose, loc. cit., from plants collected at the type locality by Palmer (1905) and Safford (1907). Range: Coahuila, Chihuahua & Durango (fide H. Bravo, 1969). Other illustration: CSJGB 40: 93 (1978).

Plant solitary or sprouting when old, depressed-globose to obliquely-ellipsoid, rounded above and there clothed with fine whitish wool and a few spines, stem to 8[–10] cm. in diam., and 6 cm. high, bright green; ribs up to 120, very thin, of the thickness of a piece of card, sharp-edged, compressed and wavy, with very narrow furrows in between; ar. seldom more than one to a rib and 10–12 mm. from the next nearest, positioned at a thickening in the rib, circular, 2–2.5 mm. in diam., with delicate snow-white wool, later becoming bare; rad. sp. 4, glassy white, straight or slightly curved; cent. sp. 3, to 30 mm. long, papery, 4-angled, white, curved; spination noted as being very variable, some specimens being nearly spineless. Fl. 25 mm. long; outer per. segs. oblong, acuminate; inner per. segs. oblong, acute or obtuse [? colour]; scales on the flower tube oblong, acuminate; scales on the ovary broadly ovate, acute to acuminate, very thin, more or less papery, early deciduous. [Fr.; seed ?].

To be considered here along with the points in which they differ from the above are: **E. lloydii** B.&R., The Cact. 3: 113, fig. 118 (1922). Type: Zacatecas, August 1908, Lloyd 7 (?US). The type was flowered at Washington later that year and is illustrated, loc. cit. Rad. sp. 10–15, (2–8 mm. long); cent. sp. light brown, one to 90 mm. long. Fl. small, (nearly white); outer per. segs. with a green midstripe; inner per. segs. thin,



A plant grown in Mr. W. C. Keen's collection as *E. lloydii*. This name is treated here as probably conspecific with *E. multicostatus*; plants referred to this species can only be determined for certain when accompanied by flower and provenance data (photo: Helmut Broogh).

narrowly oblong. **E. zacatecasensis** B.&R., The Cact. 3: 113 fig. 119 (1922). Type: N. Zacatecas, 1908, Lloyd 58 (?US). The type was later flowered at Washington and is illustrated, loc. cit. Ribs c. 55; rad. sp. 10–12, (8–10 mm. long); cent. sp. brownish, the uppermost to 40 mm. long, (laterals terete). Fl. 30–40 mm. in diam., (nearly white); inner per. segs. linear-oblong, with an ovate apiculate tip, (slightly tinged lavender, 15 mm. long; style slender with bifid stigma-lobes). *E. erectocentrus* Backeb., Die Cact. 5: 2772, fig. 2617 (1961), nom. inval. (Art. 37). Based on a plant sent from somewhere in Mexico by F. Schwarz and presumably the subject of the fig., loc. cit. Ribs 50 or more; rad. sp. 5–6(–9), (to 10 mm. long); cent. sp. brownish or horn-coloured, one to over 50 mm. long, striped, (laterals terete). Fl. less than 20 mm. long (whitish).

The above four names account for this distinctive northerly part of the genus, characterised by a light green epidermis, very numerous, extremely thin ribs, and probably whitish flowers. Though treated as distinct here, further investigation may show links with the geographically adjacent *E. crispatus* complex.

*E. obvallatus* (DC.) Lawr. in Loudon, Gard. Mag. 17: 317 (1841); *Echinocactus obvallatus* DC., Prodr. 3: 462 (1828), and in Mém. Mus. Hist. Nat. Paris 17: 37, t. 9 (1828). Like *E. crispatus* this name is based on a Mocifio & Sessé illustration reproduced by De Candolle. Type locality unknown. Probably conspecific with *E. crispatus* (see Table). The oldest name for the components of the *E. crispatus* complex with short-tubed flowers.

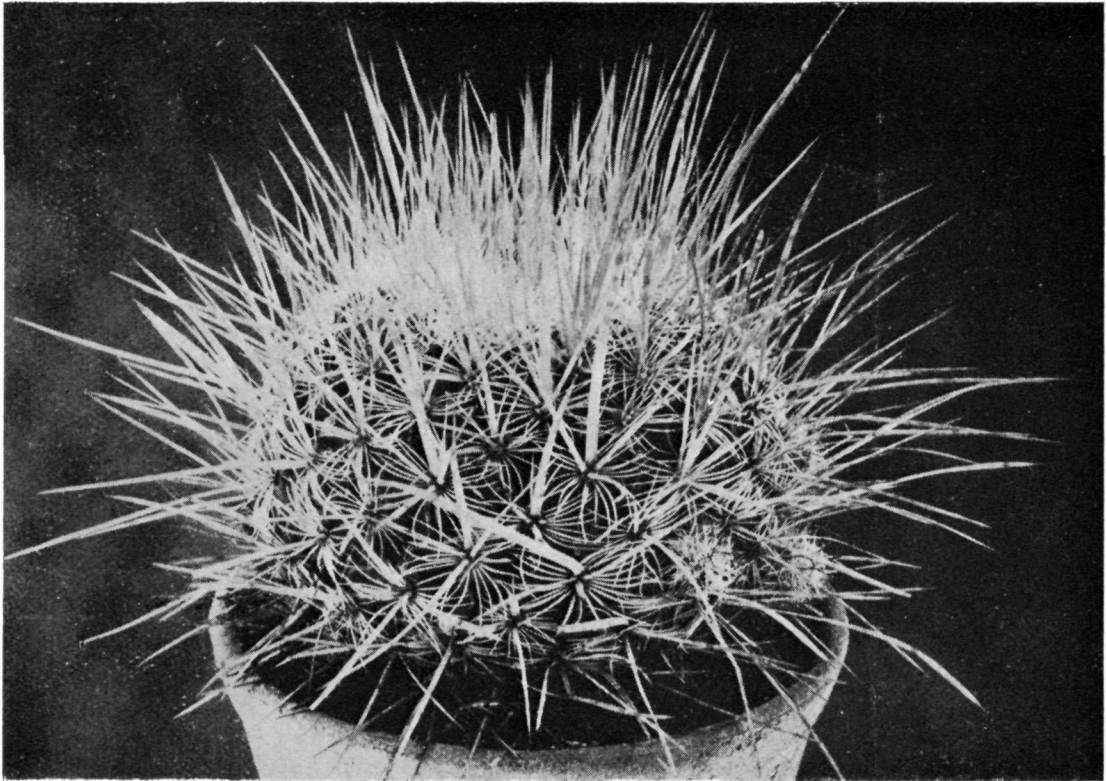
*E. ochoterenaus* (Tieg.) Whitmore in CSJA 5: 589 (1934); *Stenocactus ochoterenaus* Tiegel in Moellers Deutsche Gartner-Zeit. 48: 397, with fig. (1933). Based on plants sent from Mexico by F. Schmoll. Tiegel's fig. of a sterile plant is assumed to depict the type. Type locality: somewhere on the Guanajuato–Querétaro state border.

Plant solitary [or caespitose, at least in cultivation], globular, 7 cm. high and 10 cm. in diam., bluish green with yellowish wool; ribs c. 30, fairly thin and wavy with acute furrows, edge rounded and expanded at the ar.; ar. 2–2.5 cm. apart, circular, with yellowish wool when young; rad. sp. 22 or more, to 12 mm. long, acicular, glassy white, curved about the plant body, cent. sp. 4, flattened, the uppermost one up to 60 mm. long and 2 mm. broad, acuminate, the laterals shorter and thinner, the lowermost one only 10 mm. long, smaller additional cent. sp. often present beneath the uppermost spine, all cent. sp. straw coloured, or golden yellow when young, surface weakly ribbed [? transversely] and slightly impressed [? roughened]. Fl. whitish pink [size, form ?]. Fr. green, round, with crescent-shaped, white scales; seed 1.5 mm. long, dark greyish brown, pitted.

Five other plants bearing *nomina nuda* or invalid names are said (fide Backeberg, 1961) to belong here. They are *E. densispinus* C. Schmoll in CSJA 6: 36, with fig. (1934), n. nud.; C. Schmoll ex Pechanek in Cactus (Brussels) 3 (9): 132 (1971), n. inval.; *E. parksianus* Whitmore in CSJA 5: 589 (1934), n. nud.; C. Schmoll, loc. cit., with fig. n. nud.; C. Schmoll ex Pechanek, loc. cit., 130, n. inval.; *E. rectospinus* Whitmore, loc. cit., n. nud.; C. Schmoll, loc. cit., n. subnud.; *E. rosasianus* Whitmore, loc. cit., n. nud.; C. Schmoll, loc. cit., with fig. n. nud.; Whitmore ex Pechanek, loc. cit., n. inval.; *E. sphaclatus* Whitmore, loc. cit., n. nud.; C. Schmoll, loc. cit., with fig. n. nud. Of these only *E. densispinus* and *E. rectospinus* have any floral data allowing comparison with the above. Pechanek's attempt to validate three of these names is unsuccessful since the types he designates are living specimens and not preserved in a herbarium (see ICBN Art. 9 & Recs. 7A, 37B).

All six of the above plants are poorly understood, and of uncertain status, since adequate floral data is lacking. They may possibly represent an extreme segment of the variable *E. crispatus* complex, but are best excluded from there until they are better known.

*E. parksianus* Whitmore (1934), nom. nud.; C. Schmoll (1934), nom. nud.; C. Schmoll ex Pechanek (1971), nom. inval. See *E. ochoterenaus*.



*E. ochotereneus*. Tiegel's original illustration that is assumed to depict the type.

*E. pentacanthus* (Lem.) B.&R., *The Cact.* 3: 115 (1922); *Echinocactus pentacanthus* Lemaire, *Cact. Aliq. Nov.*, 27 (1838). Based on living plants collected by Deschamps somewhere in Mexico. Flower and fruit unknown. A name of no value. Plants in cultivation under this name and those described by Bravo (1969) and Meyran (1972) are members of the *E. crispatus* complex. Others may have used this name for plants of *E. phyllacanthus*.

***E. phyllacanthus*** (Dietrich & Otto) Lawr. in Loudon, *Gard. Mag.* 17: 317 (1841); *Echinocactus phyllacanthus* Dietrich & Otto in *Allg. Gartenz.* 4: 201-202 (1836); *Echinocactus phyllacanthus* Martius ex Pfeiffer, *Enum. Cact.*, 63-64 (1837); *Echinocactus phyllacanthus* Martius ex Pfeiffer & Otto, *Abbild. Beschr. Cact.* 1(2): t. 9 (1839). Based on a specimen from Karwinsky, and seedlings resulting from it. Some of these were sent to Berlin, where Dietrich & Otto (1836) flowered and described them. Others were kept at Munich and were also flowered and described by Pfeiffer (1837). This is worth mention since the above authors' descriptions differ as to the colour of the flowers, though both were aware of Karwinsky's original habitat material, which is illustrated by Pfeiffer & Otto, loc. cit. Type: Hidalgo, Pachuca, c. 1832, *Karwinsky* (? not preserved). Range: San Luis Potosi to Hidalgo; Zacatecas, fide Glass & Foster, ined.; Guanajuato, fide Bravo (1969). Other illustrations: Meyran (1972), pp. 35-36, figs. 30, 31; *CSJGB* 40: 94 (1978). Description from Dietrich & Otto (1836) and Pfeiffer (1837), with additional data mostly from Meyran (1972), p. 59.

Plant [simple or rarely caespitose, 4-10 cm. in diam., depressed-globular to] obovate-cylindric, flat or slightly depressed at the apex, dark green; ribs many [26-60], very thin (c. 1 mm. thick) and strongly undulate; ar. few [1-2 per rib] with short white wool; rad. sp. [2-]4-7, 4[-6-9] mm. long, straight, setaceous or awl-shaped, white, the uppermost pair larger

[= lateral cent. sp.]; cent. sp. 1-2[-3], the uppermost one 6[-30] mm. long, [1.5-3 mm. wide] flattened and leaf-like, applanate, [erect or connivent over the plant apex], white with brown a tip, later yellowish, brownish, then grey, [laterals rounder, subulate, 4-13 mm. long, 1 mm. wide]. Fl. arising amongst the wool at the plant apex, to 20 mm. long [often much smaller], almost funnel-shaped; tube [? incl. ovary, short], 6 mm. long, [4 mm. wide], green, with a few very small (1-2 mm.) greenish white scales with dark green to reddish [to purplish] tips; outer per. segs. lanceolate, to 12 mm. long, white or yellow with purplish [reddish or brown] midstripes, [with a light brown mucronate apex]; inner per. segs. linear-lanceolate, white (acc. to Dietrich) or pale yellow [sometimes with a thin brown midstripe], mucronulate; stamens short, [with greenish white filaments], anthers yellow; style exceeding the stamens, [yellowish to slightly pink], stigmas 5[-7], 2 mm. long, obtuse, straight [yellowish]. [Fr. a small green berry, with a few white scales, dehiscing by a lateral slit; seeds 1-1.3 mm. long, subglobose, dark brownish, with a reticulate testa surface.]

To be included here is ***E. tricuspoidatus*** (Scheidw.) B.&R., *The Cact.* 3: 117 (1922); *Echinocactus tricuspoidatus* Scheidweiler in *Allg. Gartenz.* 9: 51 (1841). Based on two forms of *E. phyllacanthus* found in cultivation. Differs from the above only in the aberrant 3-toothed, upper central spine. Plants presumably with this character were collected by Palmer (1902, 1905) and Orcutt (1915) in San Luis Potosi, and these must have borne the small yellow flowers that Britton & Rose, loc. cit. describe for this taxon. Meyran (1972), p. 59, reports that plants with the aberrant central spine occur frequently amongst two populations of *E. phyllacanthus* near Santa Maria del Rio, S.L.P.

This is perhaps the most distinctive member of the genus after *E. coptonogonus*. Plants in cultivation appear to be self-incompatible.

*E. rectospinus* Whitmore (1934), nom. nud.; C. Schmolli (1934), nom. subnud. See *E. ochoterenaus*.

*E. recurvispinus* H. Bravo (1969), nom. prov.

*E. reichianus* H. Bravo (1969), nom. prov.

*E. robustus* Whitmore (1934), nom. nud.; H. Bosman in Succulenta 54(4): 71, with fig. (1975), nom. inval. (Arts. 36 & 37). Illustration is of a plant in the *E. crispatus* complex.

*E. rosasianus* Whitmore (1934), nom. nud.; C. Schmolli (1934), nom. nud.; Whitmore ex Pechanek (1971), nom. inval. See *E. ochoterenaus*.

*E. sphacelatus* Whitmore (1934), nom. nud.; C. Schmolli (1934), nom. nud. See *E. ochoterenaus*.

***E. sulphureus*** (A. Dietrich) Y. Ito in Cacti 1952: 101 (1952); *Echinocactus sulphureus* A. Dietrich in Allg. Gartenz. 13: 170 (1845). Based upon plants in cultivation, originally sent to Germany from Toliman, Hidalgo; see Ehrenberg (1846).

Plant subglobose, 7–10 cm in diam., light green with many thin, undulating ribs; ar. with white wool; rad. sp. 7–8, up to 25 mm. long, brownish at first, later greyish white, subulate and compressed at base; cent. sp. 1, 50 mm. long, porrect. Fl. arising from between the spines at plant apex, funnel-shaped, 25 mm. long and up to 38 mm. in diam.; inner per. segs. oblanceolate, sulphur yellow or slightly paler; stamens nearly half the length of the petals, anthers deep yellow; style exceeding stamens, with 6–7 sulphur yellow, linear stigmas. [Fr.; seed ?].

Meyran (1977) claims to have rediscovered this plant in the Barranca de Toliman, Hidalgo. The plants described by him differ from the above: Plant green or yellowish green (ribs 26–40); rad. sp. 7–12; cent. sp. 3–4, 12–45 mm. long. Fl. (see figs. 18, 19, l.c.) 25–35 mm. long, 25–32 mm. in diam.; (tube green with yellowish green scales; inner per. segs. dentate near the obtuse or sometimes mucronate apex); stigmas 6–8. This discovery seems distinctive; the large flower with a pronounced tube separates it from *E. phyllacanthus*, while the flower size and dark colour along with the spination distinguish it from *E. vaupelianus*.

Plants resembling those described and illustrated by Meyran with large yellow flowers, are at present in cultivation, and these may well belong here. They can be distinguished from the *E. crispatus* complex only in the colour of their flowers.

*E. tegelbergii* Schutz in Kaktusy 8: 93–94 (1972), nom. inval. (Art. 37).

'*E. tellii* Hort.' Bravo (1969), p. 68, lists this name as of uncertain status, citing the place of publication as MDKG 11: 161 (1901). The name appearing in MDKG was, however, *Echinocactus tellii*, and no combination under *Echinofossulocactus* has been validly published.

*E. tetraaxiphus* (Salm-Dyck ex K. Schum.) Oehme in Beitr. Sukkulenteuk. u.-Pflge 1938: 82 (1938); *Echinocactus tetraaxiphus* Salm-Dyck ex K. Schumann, Gesamtb. Kakt., 363, fig. 63 (1898); *Echinocactus tetraaxiphus* [attributed to Otto by] Salm-Dyck, Cact. Hort. Dyck. 1844, 20 (1845), nom. nud. Apparently based on a sterile plant figured as *Echinocactus tetraaxiphus* Otto by T. Guerke, fig. 63, l.c. Type locality not definitely indicated, but Schumann records Mathsson as having collected this plant in Zacatecas and Hidalgo (Pachuca). Schumann also records Ehrenberg as having collected this plant at Real del Monte, Hidalgo, but this location is for *E. heteracanthus* which is treated by him as a synonym. A name of little value.

Plant solitary, short cylindrical, 15 cm. high and 10 cm. in diam., bright green with white wool at the apex; ribs thin, up to 30 or more; ar. up to 8 mm. in diam., with white wool; rad. sp. 16–18, translucent then white, needle-like, the lowermost up to 15 mm. long; cent. sp. 4, divergent, almost blade-like or sword-shaped, the uppermost one to 40 mm. long, somewhat curved, annulate and dark yellow to brown. [Fl. Fr.; seed ?].

Bravo (1969), pp. 83–85, fig. 38, describes and illustrates a plant under this name, but does not indicate where the plant was collected. Her description differs from the above: Plant smaller, depressed to globose or rarely cylindrical; ar. when young with greyish or somewhat yellowish wool; rad. sp. 12–18, 6–10 mm. long; cent. sp. greyish tipped yellow or black, the longest to 45 mm. (Fl. 35 mm. long; tube narrow, to 15 mm. long, covered with purple scales with yellowish green margins; per. segs. with white margins and purple midstripes; filaments white; style purple with yellow stigmas). This plant is clearly another form of *E. crispatus*, with somewhat extreme spination. *E. tricuspidatus* (Scheidw.) B.&R. (1922). See *E. phyllacanthus*.

***E. vaupelianus*** (Werderm.) Whitmore in CSJA 5: 590 (1934); *Echinocactus vaupelianus* Werdermann in Notizbl. Bot. Gard. Berlin 11: 273 (1931). Based on plants grown at the Berlin Botanic Garden of unknown origin. The type if preserved was destroyed during World War II.

Plant solitary, matt green with white wool and dense spines at the apex; ribs 30–40, thin and undulate, 5–8 mm. high; ar. 15–20 mm. apart, elliptical, at first densely woolly, later bare; rad. sp. 15–25, 10–15 mm. long,  $\pm$  horizontally directed, acicular, white, pale yellow at base; cent. sp. 1–2, to 70 mm. long, porrect or one curving upwards, sharp subuliform, brownish black, later reddish brown. Fl. up to 20 mm. long; ovary green and covered with green toothed scales; per. segs. 15 mm. long, very pale yellow (cream); stamens numerous, filaments pale yellow, exceeding the stamens. [Fr.; seed ?].

Meyran (1976), pp. 51–55, figs. 20 & 21, claims to have rediscovered this plant growing 10 km. north of Zimapan, Hidalgo. Meyran's plants differ from the above: Plant solitary or caespitose (up to 11 cm. in diam.); ribs 27–42; ar. up to 25 mm. apart; rad. sp. 13–19; cent. sp. 1–4, 10–32 mm. long. Fl. to 25 mm. long, yellowish. The purple-flowered plants mentioned under this name by H. Bravo (1969), p. 65, if they belong here, suggest relationship with those listed here beneath *E. ochoterenaus*. All these could be extreme members of the *E. crispatus* complex.

The plant known in cultivation as *E. albus* may be a form of this species with yellow central spines, and of unknown wild provenance.

*E. vaupelii* Werdermann ex H. van der Velde in Succulenta 1956: 84 (1956). Presumably an incorrect spelling of *E. vaupelianus*.

*E. violaciflorus* (Quehl) B.&R., The Cact. 3: 114, fig. 121 (1922); *Echinocactus violaciflorus* Quehl in MDKG 22: 102–105, with fig. (1912). Based on a number of plants received by the nurseryman De Laet from Zacatecas, Mexico. Range: Zacatecas and Aguascalientes (fide B.&R., l.c.). Probably conspecific with *E. crispatus* (see Table).

*E. wippermannii* (Muehlenpfordt) B.&R., The Cact. 3: 111 (1922); *Echinocactus wippermannii* Muehlenpfordt in Allg. Gartenz. 14: 370 (1846). Based on a plant cultivated by Fennel. Without mention of flower, fruit or geographical origin. This plant with 18–22 radial spines is judged to be near *E. vaupelianus* or *E. ochoterenaus*, but Muehlenpfordt's inadequate data prevent its certain identification. A name of no value.

Bravo (1969), p. 70, describes plants under this name with small violet flowers. Like those mentioned here under *E. vaupelianus* these may be extreme members of the *E. crispatus* complex.

*E. xiphacanthus* (Miq.) Backeb., Die Cact. 5: 2776 (1961); *Echinocactus xiphacanthus* Miquel in Linnaea 12: 1, t. 1 (1838). Based on plants in "our collection in London", that were obtained from an unknown source somewhere in Mexico. Without data for flower or fruit. A name of no value. Plants in cultivation under this epithet are referred to the *E. crispatus* complex.

*E. zacatecasensis* B.&R. (1922). See *E. multicostatus*.



## Connoisseurs' Cacti

chosen by Jackie Panter,  
Margaret Martin, Peter Chapman  
and Nigel Taylor

### 3. *Rebutia krainziana*

Every cactophile should have a few Rebutias and if I had to list a selection I would certainly include *R. krainziana*. In my collection I have two plants which differ slightly from one another, although both were purchased as *R. krainziana*. The first, shown in the photograph, is a lightish green plant with small heads about 2.5 cm. across, small white spines and flowers 5 cm. long by 4 cm. broad with red outer petals and orange inner ones, a lovely combination. The second has very dark green, slightly larger heads about 4 cm. across with flowers of a deeper red. (In *Ashingtonia* 2: 66. 1976, John Donald says there is a short-spined plant in cultivation as *R. krainziana* which may be a stabilized hybrid between *R. wessnerana* and the true *R. krainziana*

but should, in his opinion, be considered to be a very short-spined form of *R. wessnerana*. Possibly my second plant is this form.)

A little care should be taken with the cultivation of this and other Rebutias. Give them an open compost in a shallow pan and a good layer of gravel underneath the plant to keep it away from any damp soil. Caution with watering is also advisable as their clumping habit tends to prevent rapid evaporation of surface moisture in dull overcast weather. They seem to prefer some shade, too. Last year I moved my Rebutias to another part of the greenhouse which is shaded by a tree in the afternoon, and they seem to be doing much better in their new position. Most important of all, look out for red-spider attack, as the genus is rather susceptible to this pest, perhaps because the plants have a thinnish epidermis. The best remedy is to water the plants with systemic insecticide and spray with water in hot dry weather. Luckily, any damage caused by red-spider grows out quite quickly and is soon lost to view.

J.P.



*Rebutia krainziana*

(photo: Jackie Panter)

#### 4. *Weingartia neumanniana*

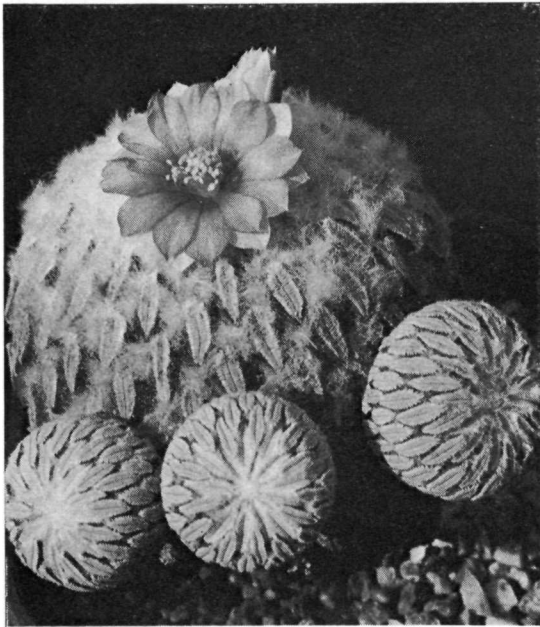
The genus *Weingartia* was created in 1933 to accommodate *W. fidaiana*. The plants allied to this, the type species, are closely related to *Gymnocalycium* but the remainder of the genus, including the species associated with *W. cumingii*, are probably closer to *Sulcorebutia*.

The plants are native mainly to the Bolivian Andes and if kept dry during winter they will require very little artificial heat. We find that they grow well in John Innes No. 2 compost, or a no-soil one, and if kept in a sunny part of the greenhouse, flower freely. The species we have grown all have lemon-yellow to orange-yellow flowers. The flowers are carried just below the crown of the plant.

One of the most attractive species belonging to the *W. fidaiana* Group is *W. neumanniana*, a slow-growing, clustering plant with a main head about 7 cm. high and 5 cm. across. It has a prominent tap root. The epidermis is a greyish-green colour and the spines dark brown to black. The plant body is divided into about 14 ribs carrying the large areoles spaced about 1 cm. apart. There are usually 6 radial spines and 1 central about 2 cm. long. The orange or yellowish flowers are around 2.5 cm. across. M.J.M. & P.R.C.



*Weingartia neumanniana* (photo: Margaret Martin)



*Pelecyphora aselliformis* (photo: Jackie Panter)

#### 5. *Pelecyphora aselliformis*

A hatchet-bearing cactus with spines resembling a woodlouse or sow-bug—that's what the name means, and such a name must surely belong to something of an oddity in the cactus world.

What makes it so different? For a start, the club-shaped body is very hard and measures some 5 cm. across at maturity, tapering away at the base to a thick tap root. The tubercles are flattened and bear at the areole two comb-like or pectinate rows of tiny silver-grey spines lying either side of it which at a distance do resemble wood-lice. The apex is crowned with a mass of soft white hairs which gradually become less towards the base which is bald and corky with age. It is very slow-growing eventually producing offsets which in my plant as shown have emerged from halfway up the body. Small violet flowers arise from the crown in the summer. According to Britton and Rose (*The Cactaceae* 4: 59. 1923) it shares with *Lophophora williamsii* the Indian name of peote, peyote, peyotillo or peotillo, and is said by the Mexicans to possess medicinal properties.

*P. aselliformis* needs an open compost, a sunny shelf and caution when watering. Make sure that the soil is completely dried out first and give no water at all from October till April to be on the safe side.

J.P.

#### 6. *Turbinicarpus valdezianus*

Let us hope that this delightful, dwarf member of the Cactaceae has at last found its correct systematic position for, since its first description in 1930, it has been referred to *Echinocactus*, *Mammillaria*, *Thelocactus* and *Gymnocactus* in addition to more familiar synonyms under *Pelecypora* and *Normanbokea*. Now, *T. valdezianus* and its ally *T. pseudopectinatus*, have been placed alongside the diminutive members of *Turbinicarpus* (see Glass & Foster in CSJA 49:161-176 (1977)). They differ from the previously recognized species of this genus only in their retention of juvenile spination at maturity. This feature is an example of *neoteny*, a process by which the evolution of new taxa (of any rank) proceeds through the attainment of the capacity to flower in the juvenile phase, followed by the non-development of the mature phase. The retained juvenile spination as seen in the illustration is plumose, while in *T. pseudopectinatus* development goes further until pectinate, non-plumose spines are reached. The mature spination for this genus

includes prominent upward curving central spines, which are absent in these neotenuous taxa. Both species have the characteristic turbinate, laterally dehiscent fruits and black, tuberculate seeds of the genus. Flower colour as in other Chihuahuan desert cacti is variable. The rare type locality form of *T. valdezianus* most commonly seen in cultivation has reddish violet flowers, while in the more frequently encountered wild form they are white. This species along with the rest of the genus is easily grown in full sun, in a well drained compost with liberal watering during the summer months. Frost protection is all the heating required during the winter months when the plants should be quite dry. Propagation is rapid from seeds, and the plants can be flowered in their third year. Members of the genus appear to be self-incompatible in cultivation, and so at least two seedlings must be retained by the grower if further propagation is contemplated.

N.P.T.



*Turbinicarpus valdezianus*, one of the most precocious of cacti, flowers and fruits when really only a seedling. This close-up photograph by Mark Eban of a plant only half-an-inch across, shows the plumose spination of the seedling phase and the laterally splitting dry fruit characteristic of the genus.

## Watering and Feeding

by John Pilbeam

Years ago plastic pots were available only expensively and in pastel shades from a firm called 'Jury', and they were regarded with scorn by growers who had followed centuries of tradition in tapping their pots with mallets on long sticks to tell by the sound whether they were dry. Almost as fast as you poured water on to your plants in clay it was drawn out through the sides, with the roots vainly trying to follow and being cooked on the inside surface as the clay took the sun's heat like a second firing.

At this time a chap who constantly swept the board with magnificent specimen cacti used to say bluntly to the ladies of the branch: 'You don't water the \*\*\* things enough.' And their coloured straw hats quivered, as they went home and picked up their watering-cans—metal of course.

But the plants he produced were silent witness to his advice—though you could almost hear them growing. It was good advice, whether you followed it then with regard to clay pots, or now, when most use plastic.

Beginners are often reluctant to water too freely, in the firm belief that these 'desert' plants are built to survive drought, and should be treated accordingly. It is true that they will tolerate dryness, but the conditions we impose on them are liable to be far drier at the root in a small potful of soil than in their native surrounds, when, with no restriction on their spread of roots they can garner whatever is going in the way of moisture, and indeed often revel in the flash flood conditions which enable them for a short period of the year to make rapid growth.

But do not rush out and water in this carefree way without due regard to the time of year and the prevailing weather conditions. For cacti, the rule of thumb is dryness in the winter months, from say December to early March, depending on your latitude and the temperature maintained—the more southerly and/or warmer you keep the greenhouse, the more you can shorten the dry period—with a gradual increasing of the water given in the early spring and a corresponding decrease in the autumn. In the hot summer months make the most of it and let the water run freely, once or twice a week in really hot periods.

Many succulents are best kept on the dry side in the cold months too, with a light watering only when the leaves start to flag or wrinkle. But Stapeliads and most other stem succulents are best kept completely dry until the sun starts to have some warmth again.

The real danger periods for any plants are in the autumn when you are aiming at drying off your plants, and in the spring, when they seem to be crying out for water. Too much at these times can either leave them soggy in the winter period, especially in the bigger pots,

which combined with low light and low temperatures spells disaster, or cause rotting in the spring in plants which have not really started to grow.

On sunny days in the winter and spring, cacti revel in a good drenching spray, which helps prevent them shrivelling too much, and keeps the compost from drying out completely leading to drying of the roots.

The heavy watering talked about at the start of this article comes in when you start casting your clouts—when May is out. And from June to the beginning of September the plants should be encouraged to take advantage of the time of year when they will really put on some weight.

And this is the time of year when feeding should be started. I shall never forget the same character demonstrating to the straw hats how to collect cow manure (with two flat pieces of wood at arms' length and a biscuit tin, I should add for the curious) with the exhortation that nothing was good as nature. Certainly if you are one who likes the rich smell of farming country there is nothing to beat a small bag of this substance steeped in a five-gallon drum for a few months before use—the dose is I believe one teacup full to the gallon of water, or it may be a coffeecup full. But modern developments of liquid feeds are easier to live with, and Tomorite, Phostrogen or any other high potash fertiliser will do well and bring you plants along faster than you might have thought could be possible. For best results apply the feed only when the compost is damp.

Some of the more compact succulents are perhaps better not fed too often: once or twice a year is probably right for such as *Lithops*, *Conophytum*, *Gibbaeum*, some *Crassulas* and the like, to maintain the compact growth and colouring sought in these plants.

Let me end on a note of caution on both these topics. It is never a good thing to go overboard on fresh advice. If these methods contrast with your present ways, but you wish to give them a try, do it experimentally on a few plants and compare results. Until you have the hang of telling when water is needed—by weight of pot or inserting a label to test the moisture—take it gently, and make haste slowly.

The Cactus and Succulent Journal of  
Great Britain

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67 Gloucester Court, Kew Road, Richmond,  
Surrey TW9 3EA

## Show Scene (1)

### Society's Summer Show, 16 June

As mentioned in the February journal, the Society's Summer Show is at Pimlico on Saturday 16 June and the Show Committee hope you have already made a decision to enter. If you have not yet sent for your schedule and entry form make sure you contact your Branch Secretary straight away or send a self-addressed stamped foolscap envelope to the Show Secretary, Mrs. H. Hodgson, 16 The Braid, Chesham, Bucks HP5 3LU. Please also help her by sending in your entry forms and money in good time.

The venue is again St. Saviours Church Hall, St. Georges Square, Pimlico which lies between the embankment and Vauxhall Bridge Road not far from Vauxhall Bridge. There is an underground car park a few minutes walk away and for those without cars Pimlico Underground Station and several bus routes from main line stations are within a few minutes walk. Staging is from 9.30-10.45 a.m. and the Show is open from 2-6 p.m. with the Grand Draw and presentation of prizes at 5.30 p.m. Admission is 10p but free if you enter five or more classes.

There are a few changes from the 1978 Schedule. The class for three Echinocactinae has been changed to One

*Astrophytum* which should ensure a good entry and class 9 is now for just ONE *Echinocereus*. Class 12 has been reduced to FOUR cacti in pots not exceeding six inches and the one change in the 'Other Succulents' classes is Class 20, now only ONE *Asclepiadaceae*. The Junior classes have been omitted as there were no entries last year but, of course, if a number of Junior members enter the Novice Classes for three cacti in pots not exceeding 3½" diameter, for three cacti in pots not exceeding 5" diameter and for one *Aloe*, *Gasteria* or *Haworthia*, will be subdivided. It is hoped, too, that commercial growers will enter Class 28 for twelve cacti and/or other succulents. This class will be withdrawn if it is not supported this year.

Dr. & Mrs. A. Mace will be the judges this year so please make every effort to bring along some good plants to make their journey worthwhile.

Please contact me if you can help in any way during the afternoon or can bring along refreshments to help with the catering.

The way cacti are classified for the GB Show classes has been brought up-to-date and into line with NCSS practice. Notes on the new 'Guide to Genera', which is available from me, follow on the next page.

BETTY MADDAMS



At the 1978 Autumn Show

(photo: Peter Chapman)

## Show Scene (2)

### REVISED CLASSIFICATION FOR SHOW SCHEDULES

The Society's 'Guide to Genera of Cacti and Other Succulents', published in 1970, has provided the criteria by which plants were assigned to the various classes in our Society's Shows in the subsequent period of almost a decade. It has now become decidedly obsolete, for two reasons. Since 1970 a number of new genera have been established and plants from them are frequently represented on the show bench. Secondly, so far as the cacti are concerned, the guide was based on Borg's classification and it is now generally accepted that this is inconvenient for show purposes and incorrect in some points of detail.

There is therefore the need for a new guide to genera, one that will combine practical show requirements with reasonable taxonomic accuracy. It is clear that any major revision would have produced a classification very similar to the one published by the National Cactus and Succulent Society, which is widely used. Hence, rather than propose a system with minor differences from the NCSS system it is logical to adopt this latter with minor updating, and to ignore its one or two contentious points on the grounds of expediency. This move has the approval of the NCSS Shows Committee as it should lead to a unified approach to show schedules in Great Britain and avoid the occasional difficulties that have occurred at GB Society Shows in the case of competitors better versed in the NCSS system.

The new Guide, which will come into use at the Pimlico Show on 16 June, differs considerably from its predecessor. The old tribes and subtribes of the Britton & Rose system disappear and in the consequent general reorganization the term 'group' is introduced. In some cases, such as ECHINOPSIS, this covers a very small number of genera. In others, most notably the EPIPHYTE group, there has been considerable lumping by a combination of the sub-tribes listed by Borg. The problem posed by the four genera *Arequipa*, *Denmoza*, *Matucana* and *Oroya* has been overcome by establishing the MATUCANA group and the familiar but taxonomically illogical 'Coryphanthanae' have been separated into MAMMILLARIA, CORYPHANTHA and THELOCACTUS groups.

Two groups, CEREUS and ECHINOCACTUS, are large enough to warrant division, both into six sub-groups. These will find use at large shows where there are a considerable number of classes but at less ambitious ventures the two groups will probably be used on a collective basis. These particular sub-groups are indicated after the abbreviation for the parent group, e.g. *Horridocactus* ECA, NEOP, indicating that it belongs to the *Neoporteria* subgroup of the ECHINOCACTUS group and *Pilosocereus* CER, CEPH showing that it is in the *Cephalocereus* subgroup of the CEREUS group. Four genera, *Discocactus*, *Melocactus*, *Pereskia* and *Wilcoxia* are placed in the miscellaneous group OTHER because they do not fit elsewhere. In practice, this means that they will be encountered in general classes that call for a specific number of cacti.

Practical consequences of these changes in terms of the schedules used for the two Society Shows in 1978 would have been as follows: In the case of Class 7 of the Summer Show for three plants in Echinocactinae, the genera *Arequipa*, *Denmoza*, *Matucana* and *Oroya* would be excluded, as they constitute the MATUCANA group and *Glandulicactus* would also be excluded as it belongs to the THELOCACTUS group. This would also be the case with Classes 4 and 5 of the Autumn Show. Class 2 would be retitled 'Three plants in the MAMMILLARIA, CORYPHANTHA and THELOCACTUS groups' and in Class 3, for one plant in 'Cereanae' the genus *Wilcoxia* would be excluded. Overall, a sensible and practical system has been introduced at the cost of very few changes and we are confident that no problems should arise at the two 1979 shows.

There have not been any real changes in the system used to classify the other succulents. The new list, considerably more extensive than its predecessor, reflects the appreciable increase in popularity of previously little known genera during the past decade. Although the term 'Stemless Mesembryanthemum' is difficult to define and has therefore come under censure by the NCSS Shows Committee it has been perpetuated in our Shows by the award of the Denton Medal. We therefore follow the practice of the previous Guide in marking genera which include stemless mesembryanthemums, with the caution that the onus is on exhibitors to select species from them which have indisputably the characteristics implied by the term.

W. F. MADDAMS

### THE CACTUS & SUCCULENT SOCIETY OF GREAT BRITAIN

## Report of the Council for the year ended 31st December 1978

1978 has been a year of continued change and consolidation in the organisation of the society and it has proved fairly conclusively that cactophiles are avid readers and that if the Society's journal is good and subscription rates kept within bounds then the membership will flourish.

For the first time for many years our membership has topped the thousand mark and much of the credit must surely go to our Journal Editor and Honorary Treasurer—David Hunt and Jackie Panter the Membership Secretary who, in their two years in office, have achieved what a couple of years ago must to many of us have seemed the impossible.

It is a great tragedy that in this year of uplift for the Society, our President—Dora Shurly—passed away. She and her late husband before her had held the Presidential office for almost thirty years between them. A very warm welcome is extended to our new President—Arthur Boarder—who has been invited by Council to fill this post and who has accepted.

Apart from its shows the Society held two meetings during the year, the first was the A.G.M. in March held at the Royal Botanic Gardens, Kew, when a record attendance for such a meeting of over 55 crammed into one of the lecture rooms after a most enjoyable and instructive conducted tour of the succulent plant houses and other places of interest within the gardens and propagating complexes, to say nothing of a splendid tea.

After tea Nigel Taylor gave an interesting illustrated lecture on *Dolichothele* which was followed by a general discussion on the subject.

The second of the half-day meetings was held on Saturday 28th October at St. Mary's Church Hall, Ewell when excellent talks were given by Keith Grantham, Robert Holt and David Clark the last of whom also produced plants for sale. Whilst the speakers were first class the attendance was very disappointing particularly after the numbers who came to the A.G.M.

The June and October Shows were staged at Pimlico and Napier Hall, Westminster respectively; the former was not as well supported as the latter but the quality of the exhibits was of a very high standard in both and we were pleased to see exhibitors from Warrington and visitors from Australia, Germany and America. The venue of the October Show was felt to be rather too small and it is hoped to have both shows at Pimlico next year.

Council are pleased to announce the formation of the Warrington & District Branch during the year and wish it every success under its inaugural management of Dr. Dangerfield

(Chairman), Mrs. Pritchard (Hon. Secretary) and Mrs. Hugo (Hon. Treasurer).

Due largely to transport problems the Society was unable to stage an exhibit at the Chelsea Flower Show this year. It is hoped to renew this annual activity as soon as circumstances permit.

Susan and Denis Holmes were our guests of honour at this year's Annual Dinner and after a very enjoyable meal showed some fine slides of their trip to East Africa. The number attending was a little disappointing however.

The seed distribution in the capable hands of Dr. Smale (Purchasing Officer) and Mrs. Boote (Distributor) went off as smoothly as ever but supplies were found to be not quite enough to cope with the expanding membership and will be increased in future.

Council wishes to conclude by offering its sincere thanks to all the senior and junior officials of the Society, to its own members and the various speakers and show organisers and all the Society's Branch officials and members who have assisted in any way with the organization of the Society or the stewarding of its shows.

R. H. I. READ  
Hon. Secretary

## TREASURER'S REPORT

Membership and subscription income showed a net increase of 28% during 1978, enabling us to add to our reserves and stabilize the normal subscription rate despite spending appreciably more on the Journal. Numerous joining members purchased back numbers, and our income from this source was also higher than in previous years.

Although the financial position of the Society is now healthier than of late, the upward trend in membership must continue if in 1979 we are to offset the annual increase in Journal printing costs resulting from inflation. It also goes without saying that our whole operation depends on voluntary effort and in this connection I should like to express my especial personal thanks to Miss Jackie Panter, who in addition to her burdensome duties as Hon. Membership Secretary has also acted as Hon. Assistant Treasurer by paying in to the bank all monies received for our principal account and doing the necessary book-keeping.

D. R. HUNT  
Hon. Treasurer

## EXPENDITURE AND RECEIPTS FOR THE YEAR ENDING 31st DECEMBER 1978

EXPENDITURE		RECEIPTS	
1977	1978	1977	1978
£	£	£	£
2594.71	3202.92		Subscriptions for year:
320.00	450.60	875.93	Paid in advance .. .. .
184.13	206.35	1835.68	Paid during year .. .. .
96.76	177.87		
25.25		2711.61	Journal sales:
	40.91		Back numbers .. .. .
112.56	144.71	351.57	Offprints .. .. .
160.30	178.80	145.00	Advertising .. .. .
226.97	195.16	362.90	Journal donations .. .. .
96.39	253.05	246.29	Booklet sales .. .. .
92.31	18.35	82.31	Seed sales .. .. .
7.00	—	144.61	Raffle and plant sales .. .. .
		127.38	Society sales items .. .. .
3916.38	4868.72	110.66	Annual Dinner .. .. .
		236.50	Donations .. .. .
708.74	1336.67	37.10	Bequest (Mrs. D. Shurly) .. .. .
		—	Sundry income .. .. .
		69.19	
4625.12	6205.39	4625.12	

## BALANCE SHEET 31st DECEMBER 1978

107.07	Accumulated fund:	1956.50	Cash at Barclays Bank .. .. .	3777.70
	Balance at 1.1.77 .. .. .	815.81		
708.74	Add excess of receipts over expenditure .. .. .	1336.67	25.76	Deduct unrepresented cheques .. .. .
815.81		2152.48	1930.74	1074.99
1018.93	Current liabilities:			2702.71
96.00	Subscriptions in advance .. .. .	392.23		
	Advertisements pre-paid .. .. .	158.00		
1930.74		2702.71		

Audited and found correct: J. S. KEESING, D. PHILCOX,  
Hon. Auditors.  
D. R. HUNT, Hon. Treasurer.

## For your diary

### GB SUMMER SHOW, 16 June

For details, see page 47.

### NCSS NATIONAL SHOW, 25 August

The National Show, to be held at Vauxhall Motors Canteen, Luton, will open at **1 p.m.**, not 11 a.m. as previously stated. Admission 50p.

The Show has been planned on similar lines to the last National Show at the same venue in 1975 which was a highly successful event. Some of the best plants in the country will be on display at this biggest meeting on the Show calendar. Besides the 105 competitive classes, there will be numerous trade stands and other organizations represented, so wear your most comfortable shoes, bring your cheque book, and, of course, don't forget to wear your 'GB' badge! (If you haven't got one, they will be on sale at the 'GB' stall).

### GB AUTUMN SHOW, Saturday 29 September

The venue will be the same as for the Summer Show, i.e. St. Saviour's Church Hall, St. George's Square, Pimlico. Further details in our August issue.

### GB/IOS JOINT WEEKEND

#### Chichester, 20-21 October

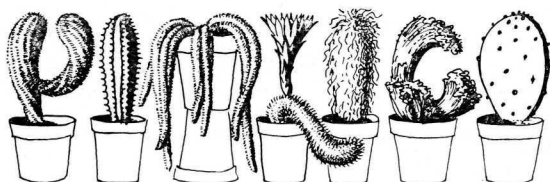
See page 26 and enclosed booking-form. The two-day programme will incorporate the Society's Annual Dinner on the evening of Saturday, 20 October.

### And (when it's too hot in the greenhouse) . . .

#### VISIT AN ENGLISH GARDEN

1979 is 'The Year of the Garden' and the English Tourist Board has launched a big campaign to encourage everyone to visit an English garden. Details of gardens opening in aid of charities will be found in two publications: 'Gardens to Visit', published by The Gardeners' Sunday Organization, price 25p at bookstalls or 35p (incl. postage) from Mrs. K. Collett, White Witches, Claygate Road, Dorking, Surrey; and 'Gardens Open to the Public', price 50p at bookstalls or 65p (incl. postage) from The National Gardens Scheme, 57 Lower Belgrave Street, London SW1W 0LR.

### See you at . . .



## Branch Activities

Items for inclusion in the next issue must reach the Editor not later than 15th June.

### Essex

**Secretary:** F. Braun, 63 Heighams Road, East Ham, E6 2JJ.

**Meeting Place:** Room A3 (film room), Little Ilford Comprehensive School, Church Road, Manor Park, London E.12.

**Time:** 1st Saturday in month, 7 for 7.30 p.m.

Forthcoming meetings:

- |                  |                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------|
| 2 June           | Show discussion and Plant Auction.                                                                                            |
| 10 June (Sunday) | Coach outing to Abbey Brook Nursery, Matlock. Coach leaves Barking Old Town Hall. Anyone interested contact Branch Secretary. |
| 7 July           | Favourite Plants (Derek Bowdery)                                                                                              |
| 4 August         | South American Cacti Study Evening (Please bring plants and slides)                                                           |

### North London

**Secretary:** Mrs. B. Massey, 86 Auckland Road, Potters Bar, Herts.

**Meeting Place:** Capel Manor Primary School, Bullsmoor Lane, Enfield.

**Time:** 3rd Friday in month, 7.30 p.m.

A last minute change was necessary at our February meeting as John Raynor was unable to get there. The 'spot' was filled by our Mrs. H. Guirl with slides of her second American visit, which made a most interesting evening.

Future meetings:

- |                    |                                  |
|--------------------|----------------------------------|
| 18 May             | Mexico (John Hughes)             |
| 2-3 June (Sat/Sun) | Main Branch Show at Capel Manor  |
| 15 June            | Sulcorebutia (J. Gooch)          |
| 20 July            | Gymnocalycium (F. Fuschillo)     |
| 17 August          | Overcoming inflation (G. Hollis) |

### North Surrey

**Secretary:** W. F. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG.

**Meeting Place:** Adult School, Benhill Avenue, Sutton.

**Time:** 1st Tuesday in month, 7.45 p.m.

Future meetings:

- |         |                                            |
|---------|--------------------------------------------|
| 5 June  | Branch Restricted Competition              |
| 3 July  | Stapelid Study Evening led by Alf Woodward |
| 31 July | My favourite plants (Jean Ellis)           |

Advance notice: The Branch Show will be held in conjunction with the Carshalton Show on Saturday 1 September at the Woodstock Recreation Leisure Centre. Details from Mrs. Maddams.

### Warrington & District

**Secretary:** Mrs. D. Pritchard, 81 Birdwell Drive, Great Sankey, Warrington, tel. no. Penketh (092572) 4699.

**Meeting Place:** The Officers' Mess, Appleton Thorn Prison, Appleton, Warrington.

**Time:** 2nd Wednesday of the month, 8 p.m., except May.

The Branch is looking forward to its first full year's programme. Visitors are welcome to all events:

- |                  |                                                                     |
|------------------|---------------------------------------------------------------------|
| 16 May           | Visit of Mr. & Mrs. Maddams                                         |
| 20 May           | Visit to Nursery near Spalding                                      |
| 13 June          | Advice on Showing and Ariocarpus Forum                              |
| 17 June (Sunday) | Branch Show. Trophies will be presented by the Mayor of Warrington. |
| 11 July          | Plant Photography (Eric Jennison)                                   |
| 8 August         | A.G.M. and Plant Auction.                                           |



# Nursery List

*Nurserymen and others who regularly offer plants or seeds for sale are listed below as a service to members, but this does NOT imply the Society's approval or recommendation of plants or other goods offered.*

## North & South Yorkshire

**Cruck Cottage Cacti** (Dorothy & Ronald Wood), Cliff Road, Wreilton, Pickering, North Yorkshire YO18 8PJ. Tel. no. Pickering (0751) 72042. Open daily except Sat. morning. No lists. Nursery in garden setting.

**Whitstone Gardens Ltd.**, The Cactus Houses, Sutton-under-Whitstonecliffe, Thirsk, North Yorkshire YO7 2PZ. Tel. no. Sutton (08456) 467. Open daylight hours every day throughout the year. Send 4 × 7p stamps (UK) or 3 international postal reply coupons for list. Everything for the cactophile; plants, seeds, books, sundries; substantial stocks and extensive collection on view.

**Oak Dene Nurseries**, 10 Back Lane West, Royston, Barnsley, Yorkshire S71 4SB. Tel. no. Royston (022670) 2253. Open every day, April–Sept. 9–6, Oct.–March 10–4 (closed for lunch 12.30–1.30). S.A.E. for list. Seed, plants, books and sundries.

## Merseyside

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Volume 41/Number 3  
August 1979

# The Cactus and Succulent Journal of Great Britain



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The Journal is published quarterly by the Society, price £1. (ISSN 0007-9375).

# The Cactus and Succulent Journal of Great Britain

Volume 41 Number 3 August 1979

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## Multi-National

Though our Society and its Journal are British-based, we are very happy that our support is increasingly international, with more than one-third of our members and subscribers in countries other than Britain—more than 30 countries in all. The Editor is also pleased to receive contributions from abroad for the Journal (especially if they are in English!) and in this issue, more by chance than forward planning, we are fielding quite a cosmopolitan team, with articles from Austria, Canada, Germany, Holland and Mexico, as well as the home patch.

Dr. Heimo Friedrich, who writes on floral evolution in cacti, has been Hon. Secretary of IOS since 1971; Dale Speirs is a relative newcomer with his short varied pieces in a variety of journals; Dr. Horst Pfennig is the acknowledged expert on *Sansevieria*, admittedly a 'fringe' group, succulently speaking, but unjustly neglected; Joop van Keppel is the well-known Dutch specialist on *Echeveria*; and, of course, Alfred Lau is known to everyone as the discoverer of innumerable new plants in Mexico and South America. Our thanks to all these contributors, and (like *Oliver Twist*) may we ask for more?

## Colour Plate: *Echeveria laui*

The history of *Echeveria*, about which Joop van Keppel begins a two-part article on page 73, goes back more

than a century and a half, but one of the finest species was made known to science only three years ago. It was found by Alfred Lau and one of his students, Sergio Reyes, in the Tomellin Valley, near the localities of some of the Mammillarias he describes on pages 61–66. *Echeveria laui* grows at low elevation for a member of this genus, and in winter the air is dry. The thick leaves, reminiscent of the 'sugared almond' leaves of some Pachyphytums, are soft and rather liable to rot at the base in our damp atmosphere. Unlike most *Echeverias*, detached leaves do not make a habit of rooting, and the stem does not branch, so unless one of the *Echeveria* experts finds the knack of propagating this beautiful plant, it seems likely to remain rather rare in cultivation. It was described by Drs. Moran & Meyran in the Mexican Journal, *Cactaceas y Suculentas Mexicanas*, volume 21, p. 59 (1976).

The coloured plate of *E. laui* accompanying this issue is from the current issue of Curtis's Botanical Magazine, by arrangement with the Bentham-Moxon Trust. The drawing is by Margaret Stones. Curtis's Botanical Magazine has been prepared at the Royal Botanic Gardens, Kew, since 1841, when Sir William Hooker became Director. Twelve plates from recent issues, all by Margaret Stones, feature in the Kew Calendar 1980, which makes an attractive gift and is now available from Kew Gardens Galleries, 305 Sandycombe Road, Richmond, Surrey, England, price (UK) £1.80, (overseas) £2.30, post free.

## Society's Summer Show

Entries were down in quantity on last year (thanks, no doubt, to the petrol shortage) but not in quality, but maybe those members who came by public transport and wished they had brought their plants too will do so for the Autumn Show at the same venue on 29 September. There were plenty of flowers to see for the visitors who crowded in all afternoon, notably in Mrs. Dennard's group entry and amongst the Mammillarias and Rebutias. Principal prize-winners were Mr. & Mrs. Maddams, Mr. Bowdery, Mrs. Dennard, Mrs. Ellis and Mr. Hooker. Further details on page 82.

Our thanks to the ladies of North Surrey Branch who provided and served most of the excellent refresh-

## FROM THE PRESIDENT

Dear Members,

I am writing to thank you for the honour bestowed on me by electing me as President. I am very grateful and happy to have reached the zenith of my long association and interest with the Society. The Society has been a great help to me and no one who was not interested in growing Cacti and other Succulents before the advent of the Society can realise what it was like before 1931, when the Society was formed.

I started growing cacti in 1905 when I was ten years old and had a very modest collection. It was not until 1923 that I met another cacti enthusiast with whom I could exchange views. I had only had the very rare visit to Kew Gardens to see other cacti up to that time. When the present Society was suggested by Mr. E. Shurly, I was very keen to be in at the beginning. From then on a whole new world of interest was opened to me. I met many growers and made many friends. I was elected to the committee in 1932 and served thereon until becoming Chairman. For many years I served as exchange secretary and as part of my task I cleaned, packeted and sent out the free seeds for the Society. All this widened my group of friends and when after the war I started to judge at our shows and those of several branches, this brought me in contact with so many more friends.

During all the years I hardly ever missed a meeting, either committee or monthly, and enjoyed every minute of the opportunity to meet so many interesting people. Unfortunately my health necessitated a move to the south coast and failing eye-sight has prevented me from attending meetings and travelling to town. I do hope that all members will do their utmost for the good of the Society, by attending branch meetings and if there is not one in your district, why not try to form one? A Society is only as strong as its members allow and if unable to help in any other way, surely there is something of interest you could write about concerning your activities with your plants.

I wish all members the very best of success with their plants this season.

ARTHUR BOARDER

ments, and to those who helped on the door and with the Prize Draw (results, p. 82) and publicity stand.

### Shurly Award

To encourage the study of succulents, and the writing of articles for the Journal, this new award commemorating Ernest and Dora Shurly, late Presidents of the

Society, will take the form of a cash prize for an article embodying original ideas, observations or research, to be published in the Journal. The winner will also receive a silver cup, presented by the Shurly family, to be retained for one year.

All members of the Society at home and abroad, other than members of the Society's Council, will be eligible for the prize, and full details will be given in the next issue.

### Next 'Forum': Copiapoa

On the theme of contributions for the Journal, I must apologize to Ray Pearce for forgetting to include a note in the May issue about the topic chosen for his next 'Forum' article, which is the genus *Copiapoa*. These fine plants have become increasingly popular of late, and the *Copiapoa* Forum will be the opportunity for a thorough survey and exchange of views on all the species, their characteristics and cultivation. Please write to Ray with your comments and experiences. His address is: Dr. R. B. Pearce, Department of Forestry, University of Oxford, South Parks Road, Oxford OX1 3RB, England.

### Sure-fire Bestseller

Congratulations to Gordon Rowley whose *Illustrated Encyclopedia of Succulents* (Salamander Books, 1978, price £7.95) has been selected as one of the outstanding reference books of 1978 by the American Library Association Reference and Adult Services Division. Gordon's next book, *Name that Succulent* (Keys to all families and genera of succulent plants in cultivation) is already in press (Stanley Thornes Ltd.).

### CSSGB/IOS MEETING 20-21 OCTOBER Dolphin and Anchor Hotel, Chichester

Provisional titles and running order for the talks at this meeting are as follows:

*Saturday morning:*

1. Introductory Review (Gordon Rowley)
2. Cultivation in the '70s (Bill Keen)
3. Mammillarias in the '70s (Bill Maddams)

*Saturday afternoon:*

4. The New South Americans (Tony Mace)
5. NE. Africa and Arabia (Keith Mortimer)
6. A Decade of Research (Werner Rauh)

*Sunday morning:*

7. Showing in the '70s (Keith Grantham)
8. The Zurich City Collection (Dieter Supthut)
9. Talk by Len Newton
10. That Was the Decade That Was (Robert Holt)

*Sunday afternoon*

11. Talk by John Lavranos
12. Cacti of Argentina (Roberto Kiesling)

Admission is by ticket only and booking-forms were enclosed with your May Journal. Further details and booking-forms are available from Mrs. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG. Tel. **Burgh Heath** 54036 (not *Banstead* as stated on the form).





Some of the 6,000 cacti confiscated at Frankfurt in April. Matches give the scale. Some of the suitcase-loads contained numerous plants of choice species like *Strombocactus disciformis*. (photo: W. Barthlott)

### Cacti seized at Frankfurt airport

Germans Customs seized about 6,000 cacti in the baggage of travellers returning from a tour of Mexico last April. The party, organized by Ehlers Reisen of Stuttgart, had apparently failed to obtain the necessary permits under the Washington Convention on International Trade in Endangered Species of Fauna and Flora (CITES).

Some of the plants confiscated, which were placed in the custody of Professor Rauh's Institute at Heidelberg University, were shown to your Editor, who is Chairman of the IOS Conservation Committee, on 14 May, following the Annual General Meeting of the German Cactus Society. They included many *Ariocarpus* spp., *Mammillaria* spp., *Strombocactus disciformis*, etc., and the total commercial value of the plants seized has been estimated at 60,000 DM (about £15,000).

This incident has publicly exposed a popular abuse of recent years, that of paying one's way to Mexico (and elsewhere) by looting suitcase-loads of wild plants and selling them back home. A seductive idea, but one which threatens the destruction of choice species in their habitats, flouts Mexican if not international law, and brings the collecting hobby into disrepute. Mexican law protects cacti and orchids by prohibiting the collection of wild plants except by permit, and their legal export is subject to the requirement of a further permit and health certificate.

Very few permits are in fact issued by the Mexican

authorities; so few that the odds are heavily against any imported wild specimens of Mexican species offered for sale having been obtained legally—something to bear in mind when visiting nurseries that sell wild plants. Those who buy 'habitat plants' should also reflect that their purchase ensures that more plants will be dug from the wild.

### IOS Congress in Mexico

Conservation measures will be among the topics to be discussed at the XVIth Congress of the International Organization for Succulent Plant Study, to be held 23–29 March 1980 in Mexico. The theme of the Congress will be 'Succulents and their Habitats' and the Congress itself will be preceded and followed by field-trips to some exciting areas—plant-collecting prohibited—and hotel/tour arrangements are being handled by Kuoni of Mexico.

Non-IOS members will be welcome at the Congress, but so that it is not over-subscribed a letter of invitation must be obtained from the Organizing Committee (British representative: David Hunt, 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA). For details of Group Travel arrangements, contact John Donald, 41 Mill Road, North Lancing, Sussex. The overall cost of attending the Congress and excursions (17 March–4 April) will be around £350, plus the return flight to Mexico.

## Grass-like to tree-like: the Sansevierias

by Horst Pfenning

Photographs by the Author

The title of this article\* will probably surprise most readers, for the only *Sansevieria* which is widely known is the sword-leaved *Sansevieria trifasciata* with its yellow-edged variety *laurentii* and some other cultivated forms. It is one of the least demanding of indoor plants, almost indestructible and therefore most widely cultivated. Few readers will be aware how many species are known and how varied their growth-forms are: ranging from small, tufted plantlets to tree-like—as is evident from their specific names.

In 1753 Linnaeus (Species Plantarum) still included the Sansevierias in the genus *Aloe*. Michel Adanson recognized them as a distinct genus in 1763 and in 1787 Vincentus Petagna christened them *Sanseverinia* in honour of Raimond de Sangro, Prince of Sansevero (1710-1774). The name was later changed by Thunberg in 1794 to *Sansevieria*, nowadays 'conserved' as the correct spelling.

The leaves of many *Sansevierias* contain tough fibres, locally used for making ropes, nets and bowstrings which explains the expression 'bowstring hemp'. Another term is 'mother-in-law's tongue'.

To date about 70 species of *Sansevieria* have been described. Their epithets span the entire alphabet, ranging from *abyssinica* via *liberica* and *rhodesiana* to *zeylanica*—indicating their geographical distribution: Tropical Africa, India and islands of the Indian Ocean. The region with the greatest number of species is undoubtedly East Africa, at present the focus of a steadily increasing tourist trade. The journey from Nairobi to the coast, a trip of about 500 km., leads through a veritable *Sansevieria*-paradise along which about a dozen species are encountered.

Some species are named after their discoverers, such as *S. ehrenbergii* after the German naturalist C. G. Ehrenberg, *S. schweinfurthii* after the well-known botanist G. A. Schweinfurth and *S. volkensii* after Professor G. Volken from Berlin who made a thorough study of the flora of Mt. Kilimanjaro just before the turn of the century. The epithets of most species are descriptive of their habit, such as *arborescens* (tree-like), *caespitosa* (tufted), *cylindrica* (cylindrical), *gracilis* (slender), *intermedia* (intermediate), *parva* (small), *robusta* (vigorous) and *suffruticosa* (shrubby)—an indication of the great variety of growth-forms that exist.

Similar, but often highly characteristic features of certain species permit a more or less satisfactory subdivision of the genus. The first division is based on the form of the inflorescence: branched, capitate or spike-like.

The section with branching inflorescences includes *S. pinguicula*, *S. arborescens*, *S. powellii*, *S. robusta* and, possibly identical with the latter, *S. ehrenbergii*.

Capitate inflorescences are found in *S. kirkii*, *S. braunii*, *S. singularis* and also in *S. stuckyi*.\*

The great majority of species have spike-like racemes and can be subdivided on various vegetative characters. First, the species with runners above the ground can be split off, such as *S. caulescens*, *S. suffruticosa* and *S. gracilis*.

For the classification of the remaining species the cross-section of the leaves provides a useful guide. More or less cylindrical leaves are produced by *S. cylindrica*, *S. schweinfurthii*, *S. sulcata* and also *S. canaliculata* which, incidentally, may be identical with *S. sulcata*. Species with leaves of a semi-circular cross-section but deeply channelled along the upper surface are *S. intermedia*, *S. volkensii*, *S. zeylanica*, *S. rhodesiana* and *S. deserti*. Species whose leaves show a compressed-flattened cross-section can also be subdivided into those with green soft margins and such with brown horny margins. To the former group belong *S. trifasciata*, *S. senegambica*, *S. parva* and *S. caespitosa*; to the latter, *S. conspicua*, *S. grandis* and *S. raffillii*.

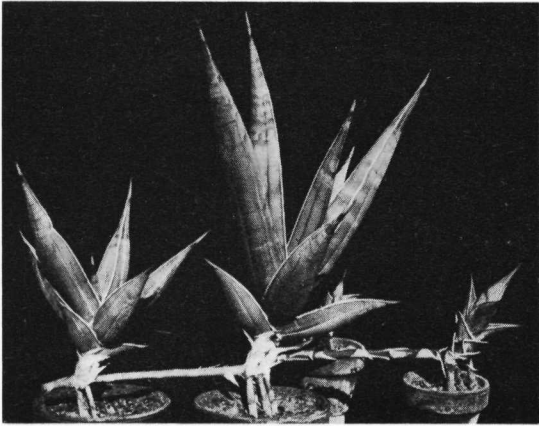
### Some interesting species

One of the most interesting species is undoubtedly *S. pinguicula* from N.E. Kenya, discovered by P. R. O. Bally and described by him in 1964. With its short, thick, wedge-shaped leaves terminating in a sharp spine it is almost reminiscent of an *Agave*. It is one of the few species which have so far refused to bloom in spite of many years of cultivation. With its compact rosette of leaves measuring about 30 cm. across it is a very attractive plant.

*S. arborescens* is found in East Africa along the coast between Malindi and Dar es Salaam to about 100 km. inland. The stem, 1.5 to 2 m. high, is covered on all sides with flattish, linear-lanceolate leaves up to 60 cm. long. Its very sharp leaf-spines and the large amount of space it takes up do not recommend this species for small

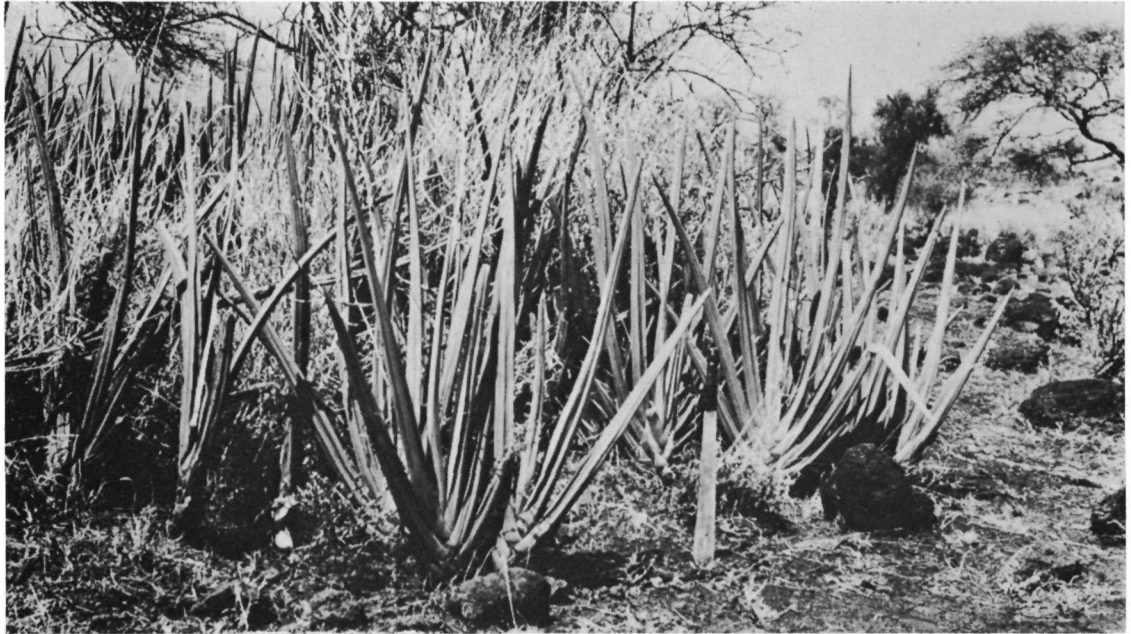
\*Translated by Horst Pfenning and Peter Bally from Dr. Pfenning's article 'Rasenbildend bis baumartig: die Sansevierien', in *Gartenpraxis* 1977, pp. 506-11. Author's address: Stieglitzweg 18, 4900 Herford, W. Germany.

\*The inflorescence of *S. stuckyi* was unknown until 1978. After fourteen years of cultivation a specimen flowered that year in the author's collection: Flower-stem 21 cm. tall; inflorescence 34 cm. in diameter; flower-tube 9-10 cm. long; lobes c. 4 cm. long.



Above, *Sansevieria pinguicula*, with stout runners  
Right, *S. powellii*, with branched inflorescence  
Below, left, *S. arborescens* near Mariakani, not far from the  
type locality; and right, the inflorescence





Near Makutano, amongst lava blocks from Kilimanjaro, one finds *S. robusta*

private collections in spite of its unusual and bizarre appearance.

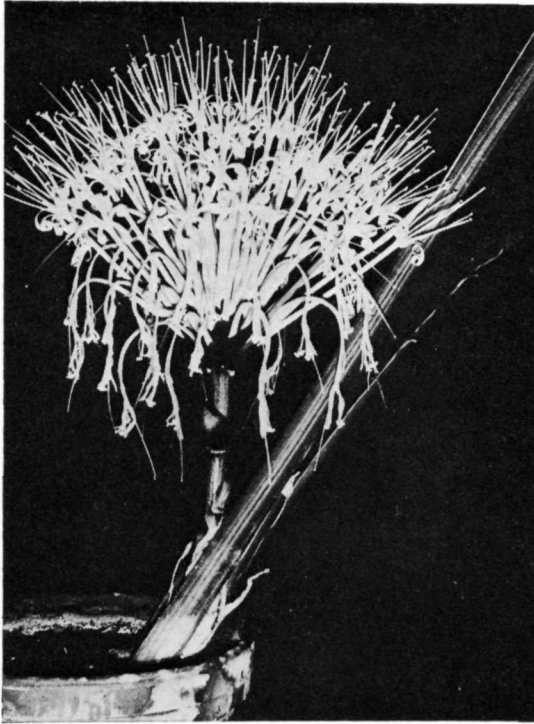
Ideally suited for cultivation on sunny windowsills is ***S. robusta***, found in many parts of East Africa. The fleshy leaves, to 2 m. long and arranged strictly fan-wise on a short stem are almost triangular in cross-section. Grown from seed, a leaf-cutting or from a small side-shoot, it may take as much as ten years before such a specimen is big enough to develop its inflorescence.

In some regions where *S. robusta* and *S. arborescens* occur together, natural hybrids have evidently arisen, one of them probably described as ***S. powellii***. Definite proof for this assumption is still awaited, for artificial hybrids of these two species are as yet only 10 cm. high. In *S. powellii* the fleshy leaves, up to 80 cm. long, are also arranged fanwise as in *S. robusta*, but they are more or less twisted along the stem which may reach a height of 2 m. in mature plants after many years. Should the plant grow too tall, one can cut the top off and re-root it.

Among the species with the most beautiful inflorescences, ***S. kirkii*** undoubtedly takes pride of place. It is found in the coastal region of East Africa from Mombasa to south of the Usambara Mountains, the home of the African violet. This species produces probably the largest flowers in the genus, almost 15 cm. long. They are dense and capitate arranged, forming a ball of flowers with a diameter of nearly 30 cm., borne on an erect flower-stem to 60 cm. long. The broadly strap-shaped, very stiff and dark green leaves, to 1.8 m. long, bear whitish-green markings. The variety *pulchra* from Zanzibar Island has slightly smaller leaves, more wavy

margins and buff-coloured or reddish markings. It is even prettier and has easily the most decorative leaves in this genus.

Almost twenty years before N. E. Brown described ***S. singularis***, G. Volkens had discovered it on his way from the coast to Mt. Kilimanjaro, mistaking it however—on account of the nearly cylindrical cross-section of its leaves—for *S. cylindrica*. His accurate description of the locality and of the plant's appearance are worth recording: "The scenery here is not attractive . . . yet for the botanist the most interesting locality along the entire route to Kilimanjaro is between Kihurio and Ndungu. It is a pure succulent-steppe, the most arid and infertile region imaginable, but just for this reason it has given rise to a freakish vegetation which I can compare only with that of the driest desert regions in Egypt. Each plant is really a caricature." And further: "There rise from the soil hundreds of thousands of sticks, green, smooth, to 2 m. long, as thick as one's arm beneath, slightly bent and tapering to a hard, sharp tip. No layman would suspect them to be leaves, which in fact they are, always produced singly at intervals of a hand's breadth, disposed in rows, sometimes for several metres in a straight line. Quite often four such rows are arranged in a square or a rectangle, as if planted by man as palisades to fence in his goats or sheep." Incidentally, the subterranean, white and non-stringy part of young leaves of this species is relished by the natives; it tastes somewhat like our kohlrabi. The capitate inflorescence, rarely seen in cultivation, is produced at ground-level and has a diameter of about 13 cm.



*S. kirkii* in flower

The species which form runners above the ground also have more or less cylindrical leaves with a thorn-like tip. At the end of such an 'aerial branch', up to 50 cm. long, densely beset with scale-like leaves, the new plant is formed, sending its roots in the ground and standing as if on stilts. The region where such species occur is again East Africa. *S. gracilis*, with leaves to 60 cm. long and not at all graceful, is not easy to find in its coastal belt habitat which is nowadays very densely populated and under cultivation. The sturdier *S. suffruticosa* was claimed by N. E. Brown to occur in the idyllic and almost unspoiled vicinity of the impressive but nearly unknown Nairobi River Falls. Specimens collected there in 1971 agreed with the description in leaf-characters and it was a surprise when the plants came into bloom because the flower-characters did not agree. Subsequently the confusion was sorted out with the aid of dried material in the Kew Herbarium, almost 70 years later.

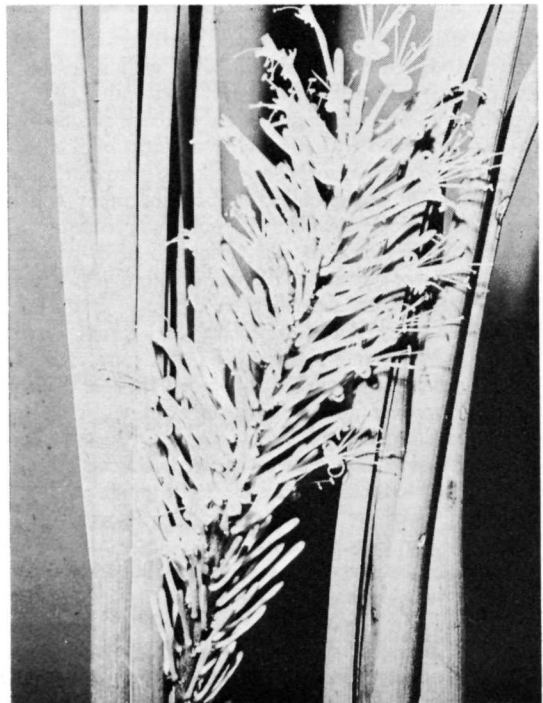
*S. cylindrica* is a native of Angola. As early as 1885 fibres obtained from this species were shown at the Paris World Exhibition as being used by the local tribes for the manufacture of strings and nets. The three to five leaves of a shoot are cylindrical in cross-section, two-ranked and usually arranged fanwise, up to 1.5 m. long and distinctly marked with bands of paler and darker green. In contrast, *S. schweinfurthii* from Eritrea produces at least twice this number of slightly

shorter, uniformly dark green leaves, lacking the hardened thorny tip, but terminating in a fleshy one with a flattened seam. Both species are attractive and very suitable for the succulent-grower.

*S. sulcata*, described as occurring on the Comoro Islands and on the east coast of South Africa, evidently extends northwards as far as Lindi (Tanzania); it is also recorded from Madagascar. In collections it is often found named as *canaliculata*, but of the latter, said to stem from Somalia, no authentic specimens are known. Both species agree in many of their characters. They are reminiscent of *S. singularis* in their growth-form, though both are far smaller. Weak or sparsely watered plants produce only a solitary leaf from each shoot, while under appropriate cultivation up to three leaves to 70 cm. long and 2 cm. thick may result.

Until recently no authentic material existed and only a few characteristics were known of *S. volkensii*, discovered by G. Volkens near Mt. Kilimanjaro and described by Gürke. Now it can be considered as very close to, if not identical with, *S. intermedia*. Both species usually produce 3-7 leaves to a stem, the outer semi-circular in cross-section, the inner cylindrical with a channel down the face. *S. intermedia* possibly has a more compact habit, with leaves about 2 cm. thick and usually up to 50 cm. long. The inflorescences of both species are splendid, dense, spike-like racemes, but for their formation they require good light and sparse watering.

Inflorescence of *S. volkensii*



Formerly, *S. trifasciata* was often erroneously called *S. zeylanica*. The genuine *S. zeylanica*, however, comes from Ceylon and has an entirely different growth-form: its 5–11 leaves per shoot are light- and dark-green banded, more or less reflexed, linear or narrowly lanceolate, to 75 cm. long, but very fleshy, forming a longitudinal channel up to 2.5 cm. wide. This species is only of interest for the reason mentioned.

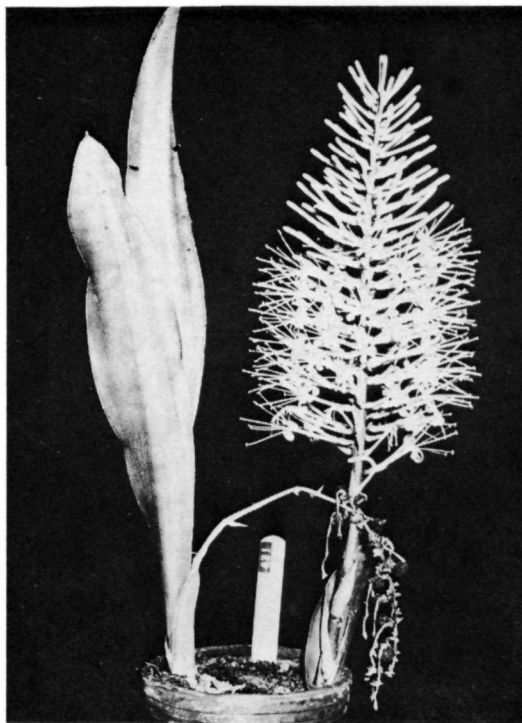
*S. trifasciata* is a native of Nigeria, and its yellow-margined variety *laurentii* occurs in the former Congo. Both are well-known. Among the numerous cultivars 'Silver Cloud' deserves special mention: like those already mentioned in growth-form, its leaves are whitish-green at first, later dark green with only a faint transverse banding. Then there are three cultivars analogous to the named forms just mentioned but forming a rosette of short elliptical leaves, 'Hahnii' (green), 'Golden Hahnii' and 'Silver Hahnii'. The last two are especially attractive, although 'Golden Hahnii' is slow-growing, delicate, and thus justifiably quite expensive.

A native of the former Senegambia is *S. senegambica* with 2–4 mostly lanceolate pale green and only slightly marked leaves up to 60 cm. long and 6 cm. wide, not particularly attractive, but easy to grow and to flower. It can be recommended, although the inflorescence is rather lax.

*S. parva* and the very closely allied *S. dooneri* occur in Kenya, roughly between Nairobi and Nakuru. According to growing conditions both produce up to 20 linear-lanceolate, handsomely marked leaves up to 40 cm. long and 3 cm. wide. The leaves of *S. parva* are deeply channelled, stiffer and more erect, those of *S. dooneri* flatter, therefore more flexible and more recurved. However, intermediate as well as extreme forms occur within their range of distribution. All are modest in their requirements, easily grown and flowering readily. Plants with more characteristics of *S. dooneri* are very pretty. It is surprising that this species, though represented in many collections, is not more widely used as a horticultural plant. It could well serve instead of ferns or begonias to add variety to bowl-gardens.

*S. caespitosa* is a rather inconspicuous plant from South West Africa, described by Dinter in 1926. Each shoot has 10–20 linear-lanceolate, dark green leaves, 10–20 cm. long and 1–2 cm. wide. In spite of many years cultivation it refuses to bloom. It is a difficult species, moreover, and therefore only of interest because of its grass-like habit.

*S. conspicua* was discovered in 1906 near Mazeras in Kenya. Described as a 'rare species' it remained almost unknown. Recently it has been collected several times in the coastal region from Malindi to Dar es Salaam and beyond. The usually rosette-like shoot is undistinguished, with 2–5 ovate-lanceolate leaves up to 60 cm. long and 12 cm. wide, but it produces a wonderful inflorescence, rather like a small Christmas-tree. For this reason it is one of the most exquisite *Sansevierias*, easy to grow and free-flowering.



*S. conspicua* in flower

*S. raffillii* was discovered at the beginning of this century in the Tsavo District, well-known because Kenya has a National Park with the same name. Its range of distribution is, however, very much wider, though not yet exactly determined. Shoots of mature plants produce 1–2 elongate-lanceolate leaves, 1 m. or more long and up to 15 cm. wide, conspicuously marked with large, pale green, elongated oval blotches or irregular transverse bands on a darker green ground. In spite of the considerable space it requires it is a very desirable species because of its spectacular dense inflorescence, about 1 m. high, and its beautifully marked leaves.

*S. grandis*, probably a native of South Africa, has a rhizome up to 3.5 cm. thick, from which it produces shoots with 3–5 elliptic leaves, up to 60 cm. long and 15 cm. wide, bluish-green in colour with paler transverse bands when young. Planted like an orchid in a hanging basket of wooden slats the rhizomes will grow vertically downwards, sometimes to a length of several metres, producing offshoots 20 to 40 cm. distant. This species, easy to grow and to propagate, though not readily flowering, is doubtlessly the most decorative one of the genus because of its exotic habit. Also known as the pendent *Sansevieria*, no large collection should be without it.

*A sequel to the above account of the more interesting and important species of Sansevieria will deal with the cultivation and propagation of these plants.*

## Mammillarias of Tomellin Canyon, Oaxaca, Mexico

by Alfred B. Lau

Apartado 98, Cordoba, Veracruz, Mexico

Tomellin Canyon derives its name from a tiny railroad station, surrounded by a cluster of houses south of Cuicatlan, Oaxaca. Most maps do not show the name or place of this insignificant village between Tehuacan and Oaxaca City. Yet this canyon is the train link between Oaxaca and Mexico City. Now a good road has been constructed through this same canyon which cuts the distance between Veracruz and Oaxaca by several hours. Travellers will see the kind of scenery which can be called breath-taking. Probably the huge trees of *Pachycereus weberi* will attract the eye more than anything else, interspersed with the ghost-like columns of *Cephalocereus hoppenstedtii* (syn. *Haseltonia columnatroyani*), large areas covered with *Mitrocereus fulviceps*, *Myrtillocactus eichlamii*, *Escontria chiotilla*, *Ritterocereus pruinosus* with its grey-green epidermis, *Stenocereus stellatus*, *Marginatocereus marginatus* and *Lemaireocereus hollianus*.

A closer examination reveals colonies of *Mammillaria carnea*, *M. viperina*, *Coryphantha calipensis*, *Ferocactus recurvus*, various species of *Hechtia*, beautiful specimens of *Agave potatorum*, *Echeveria nodulosa* and many other succulents in the semi-shade of xerophytic shrubs and trees. Burseras also are frequent. On the higher slopes grow palms and the cycad *Dioon purpusii*. This is a paradise for the botanist.

When a person drives down from Tehuacan to Teotitlan del Camino, he realizes that he slowly descends for about an hour, with increasing temperatures and changing vegetation. Indeed, when he arrives at the lowest spot, the bridge that spans the Rio Salado south of Tecomavaca, the altimeter shows only 500 m. altitude. A fiery desert wind blows into his face, disappearing through a deep gorge to the east. It is this gorge with which we want to begin our study. Standing on the bridge looking towards the east, one can see

looming precipices that almost touch one another. The rocks have a dark-red colour, probably from the high percentage of iron in these conglomerate formations. Just before one enters the gorge, the Rio Salado and Rio Quiotepec join and make a treacherous journey, creating waterfalls which no man could traverse, finally joining yet another river, Rio Grande, until they receive the name Rio Santo Domingo, a tributary of the famous Rio Papaloapan which flows into the Gulf of Mexico at Alvarado, Veracruz. Standing on the bridge near Tecomavaca, one cannot imagine that all the water here flows into the Atlantic Ocean. There are mountains all around, some as high as 3000 m. The lowest pass is that of Tehuacan (2000 m.). So we have a real basin with a vegetation all of its own. I believe that there are many mysteries still hidden in that impenetrable gorge.

Many of the hills in the Tomellin Canyon are similar to that of the habitat of *Mammillaria crucigera* (syn. *M. buchenauii*). This one is almost solid gypsum crystal. The clusters of this *Mammillaria* face the hottest sun imaginable, located to the north of Teotitlan del Camino. As many of the steep hills with precipices facing south are to be seen in the Tomellin Canyon, let us begin with this group. Returning to our famous gorge where Rio Salado joins Rio Quiotepec, one sees these beautiful red rocks. There is no gypsum, but the conditions otherwise are very much the same as for *M. crucigera*. Trying to climb some of these vertical rock formations, we had to circumvent the steep walls, tie a rope around one of the small trees, and lower one of our Indian children down the precipice. With the help of binoculars we had spotted plants very much like *M. crucigera*. Now, as we held the first plant in our hands, we saw that it was quite different. First of all, the plant does not form groups and grows singly. Let me give the differences from *M. crucigera*:

Lau 066: Radial spines 30, 2-3 mm. long, glassy white, dark brown in basal 1 mm. (*M. crucigera*: 1 mm. long, light brown in basal 0.5 mm.). Central spines 1-2, in the upper part of the areole, dark brown to black, 4 mm. long (*M. crucigera*: 5-6 in centre of areole, glassy white); the central spines grow vertically up, almost embracing the body. Very rarely, and only on the most exposed rocks facing southwest, there is one black central spine, 3-5 cm. long, but protruding from the centre of the areole, horizontally radiating, the end slightly curved. If exposed to full sun, these central spines are being preserved in cultivation. Areoles 1.5 mm. in diameter, light brown felt, later dark brown to black and naked (*M. crucigera*: 0.5 mm., light-brown, naked). Flowers and fruits as in *M. crucigera*, but larger; seed the same.

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*Author's Note:* This is only a very limited report which shall be submitted to Mr. David Hunt of Kew Gardens in London, England, together with the material that is obtainable. A minute description will follow after more study and experimentation. I have tried to give only the differences of the plants, without taking into consideration the flower structure, nectar chamber and fruit as well as seeds of the plants in this article, as they relate to the *M. buchenauii* (*M. crucigera*)—*dixanthocentron*—*lanata* and *elegans* complex. It is my sincere desire that this article may serve to reduce the great confusion in the genus *Mammillaria* and to help in taxonomy. As more plants are being discovered I shall co-operate with other well-known cactologists in publishing any new discoveries.

Above Cuicatlan, where the rocks are very similar, there grows what could be an ecotype of 066, to which I give the number 066a. Between the two habitats it is difficult to know whether the plants belong to 066 or 066a. The same experience I have had with *Mammillaria dodsonii* and *M. deherdtiana*. Examining the area between the two species, it is very confusing to know to which of the two species it belongs. Personally, I do not think it is justified to separate the two plants in two different species. The form at the locality of *Lau* 066a was mentioned first in an article of Felipe Otero in *Cactaceas y Suculentas Mexicanas* 14:27, fig. 8 (1969) under the title 'Excursion al Cañón de Tomellin, Oax.' Mr. Otero recognized the plant as probably a sp. nov., but he says that it is similar to *M. solisioides*. Probably he did not see the plant at the time in blossom, for it has nothing to do with *M. solisioides*. Here the differences from *Lau* 066:

*Lau* 066a: Radial spines 18–20, light brown with darker base; central spines 2, one facing up, the other down, close to the body, brown, sometimes dark brown with black tip. Plants also occur with the long central spines as in 066, but the colour is not as dark. Areoles 6–7 mm. apart (*Lau* 066: 3–4 mm.) not as broad as in 066, at first with white wool, later naked, but light brown. Because of the narrower areoles and the light brown foot of the spines, easily distinguished from 066.

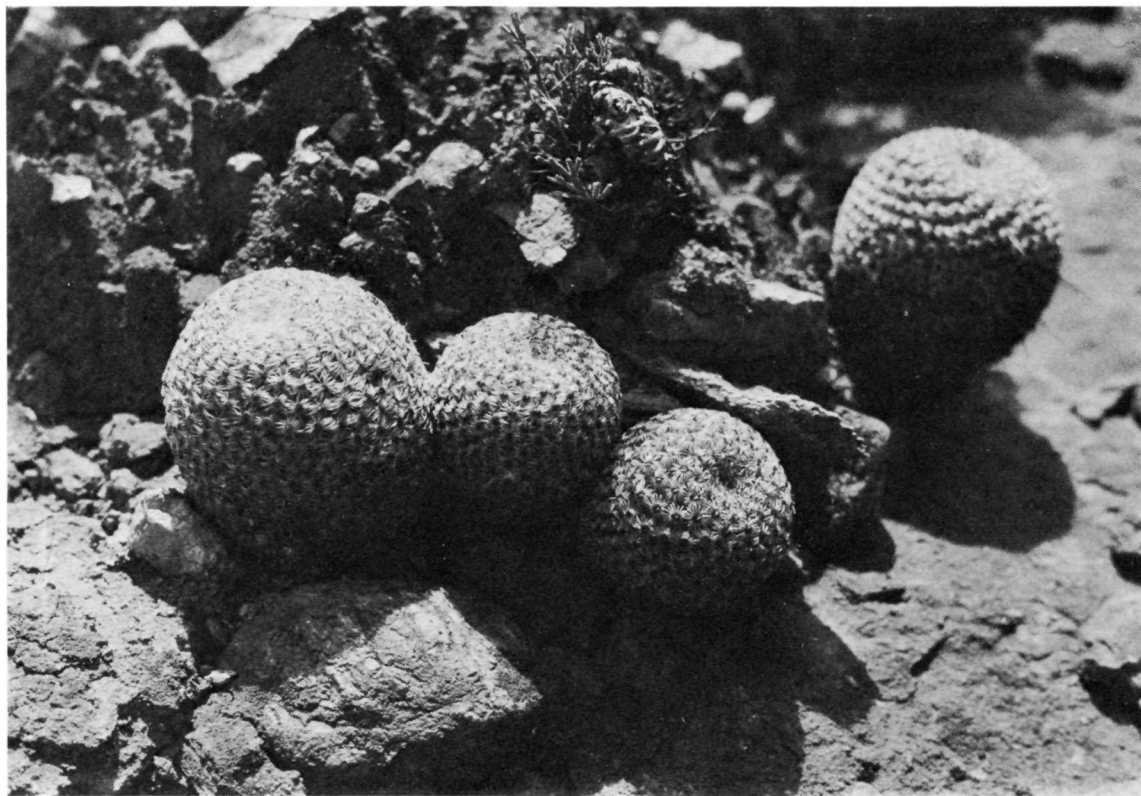
*Lau* 066 in habitat. The plants in the foreground have yet to develop the characteristic strong central spines, but they are just discernible on the plant in the background (photo: Alfred Lau)

To the north of Tecomavaca there are more of the same steep hills with conglomerate rock. Here we collected no. 681.

*Lau* 681: Radial spines 14–16, glassy white, central spine 1, 5 mm., curving upwards, black. Areoles very small, 0.5 mm. The radial spines have a very tiny light brown zone at the foot. All other details and particulars as in 066.

Now let us cross the valley and face west. Years ago it was endeavoured to build a road to Santa Maria Ixcatlan, beginning at the bridge of Tecomavaca. It was built by hand, and the workers reached about 7 km. to the east when the project was abandoned. Where the dirt road ends we again see the gypsum hills like in the habitat of *M. crucigera*. On the perpendicular walls, facing west, we meet another beautiful relative of *M. crucigera*, which is *Lau* 1109:

*Lau* 1109: Body 5–8 cm., tubercles in 25:30 [?] spirals, light grey-green. Radial spines 19–21, glassy-white, light brown colouring on foot hardly discernible, much white wool in the young areoles, later naked, but wool in axils. Areoles like *M. crucigera*. Central spines 2, one upward, one downward, light brown with dark tip. Flowers starting very low. This plant also grows single like all the previous ones. It is easily recognized because of the very short radial spines (1 mm.) which leaves the







The boys at the rim of the canyon where *Lau 1087* grows

(photo: A. Lau)

axils visible. The individual plants are much larger than *M. crucigera*. Another difference is the number of tubercle spirals. The size of tubercles is still smaller than *M. crucigera*, the shape the same.

From Teotitlan de Camino we shall go west and come to San Antonio. Crossing the Rio Salado, we enter a very narrow gulley which reaches at last a ranch called Calapa. After leaving the gulley, one can see again to the north the red rocks which have already been discussed in other areas throughout the Tomellin Canyon. On the level ground large colonies of *Mammillaria* [*elegans* var.] *schmollii*, a variety probably of *M. elegans*, adorn the valley, interspersed with *M. carnea*. However, as soon as the topography changes and one starts climbing the very steep hills, there grows a very thin and cylindrical *Mammillaria* which I found in June 1972. Mr. de Herdt in Belgium believes that this is the first and original *Mammillaria lanata* which was described by Britton and Rose as 2.5–3 cm. in diameter. Mr. Lindsey [Dr. George

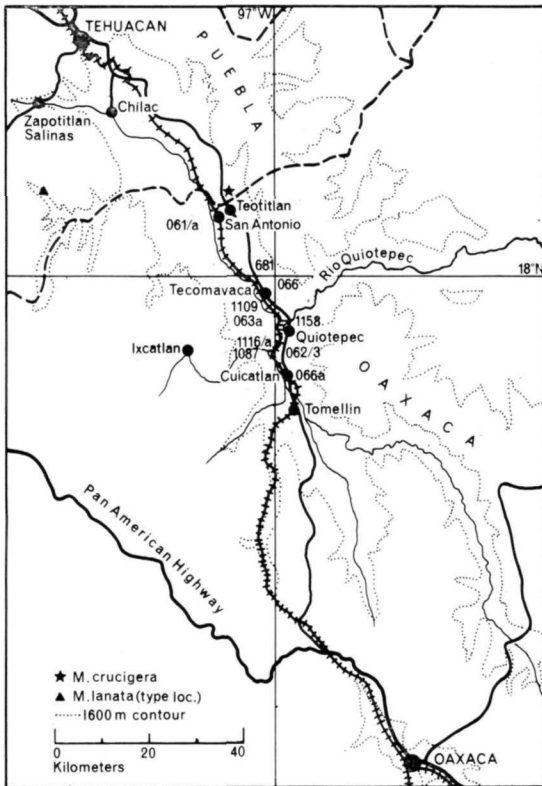
Lindsay?] found such a plant in the Tomellin Canyon which was then called *M. irregualis* [*M. irregularis* DC.?]

*Lau 061*: Body: light green, 2.5–3 cm. diameter; tubercles in 13:21, 21:34 spirals. Radial spines 25, white with brown foot. Most plants are branching, but there is a high percentage of single plants.

*Lau 061a*: Body 4 cm. in diameter; tubercles in 13:21 spirals. Radial spines 17, white. Central spines 2, 4–5 mm. long, upward and downward pointing, brown with black point.

Much further south, between Tecomavaca and Cuicatlan, one observes to the west a very interesting mountain with three towers of conglomerate rock. It is much more difficult to reach it than it seems from the road. One has to follow a creek bed all the way to an impenetrable gorge. As there are practically no trails, it is necessary to cut a way using machetes. Finally, after much hard work, one reaches the rim of the gorge. It is there that I found probably the most fascinating of all cacti in the Tomellin Canyon. But, so as not to confuse the reader, let us first consider another plant similar to *Lau 061*. On the other side of the gorge one descends steeply towards a lush valley with bananas, corn and beans growing for a Mixteco village about 10 miles upstream. We once scrambled down the mountainside with all our cooking gear and sleeping bags in the night. Bonifacio, a twelve year old Mazateco boy carried the camping stove. Now and then we heard the metal

\* The true *M. schmollii* (Bravo) Werdermann is a form of *M. discolor*. The plant referred to by Dr. Lau is *M. elegans* var. *schmollii* Craig which is a member of the *M. haageana* complex. The following new combination is needed: ***M. haageana* var. *schmollii*** (Craig) D. R. Hunt, **comb. nov.**; basionym: *M. elegans* var. *schmollii* Craig, *Mammillaria Handbook*, 283 (1945)—D. R. Hunt.



Sketch-map of the Tomellin valley, showing the localities of the plants described (series *Supertextae* only). Map drawn by Christabel King.

scratch the floor, and I was concerned about the possibility of cooking us a decent meal. We arrived at 11 p.m. and around midnight we ate fried potatoes and scrambled eggs with a full moon lighting up the area. Being very thirsty, we drank the water from the creek. We did not expect any contamination of the water, for who should live upstream in this wilderness? The next day we cut our way through underbrush with our machetes. It was three hours' steep climb, and the towers did not reveal anything new or exciting. It was from that most marvellous view that we detected the Mixteco village and could imagine that a day before the women there had been washing nappies in the creek! I swallowed hard at the thought. As we left before sunrise, we did not see the plants that grew almost by the creek, as soon as the incline started.

*Lau 1116* (Differences from 061): Radial spines 20. Central spines none. Compared with 061, plants are more globular and shorter, 5 × 5 cm., growing single, rarely branching. Tubercles in 13:21 spirals. Altitude 800–1300 m.

*Lau 1116a*: This plant grows very cylindrical, 3 cm. in diameter. Radial spines as in 1116. Central spine 1, very thin, brown with darker point, slightly curved. Soil clay.

Returning up the steep hill, there is a small *Mammillaria* from the *M. sphaclata* complex, mostly growing in

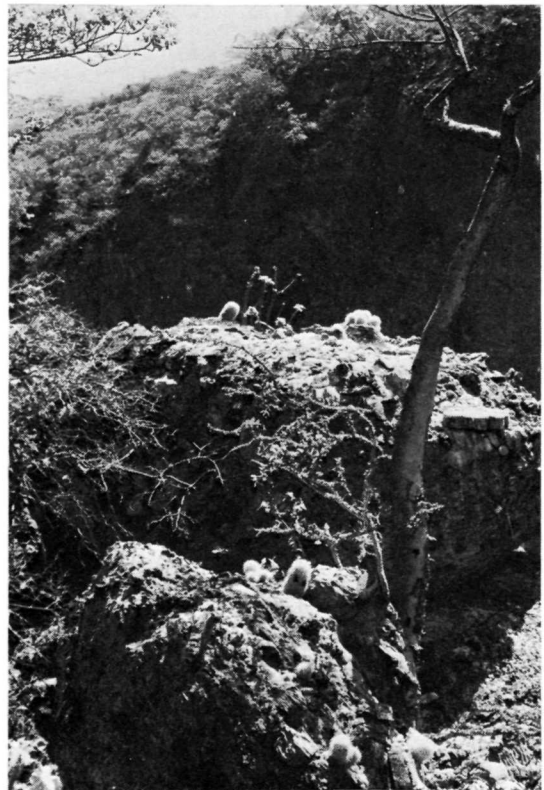
the shade:

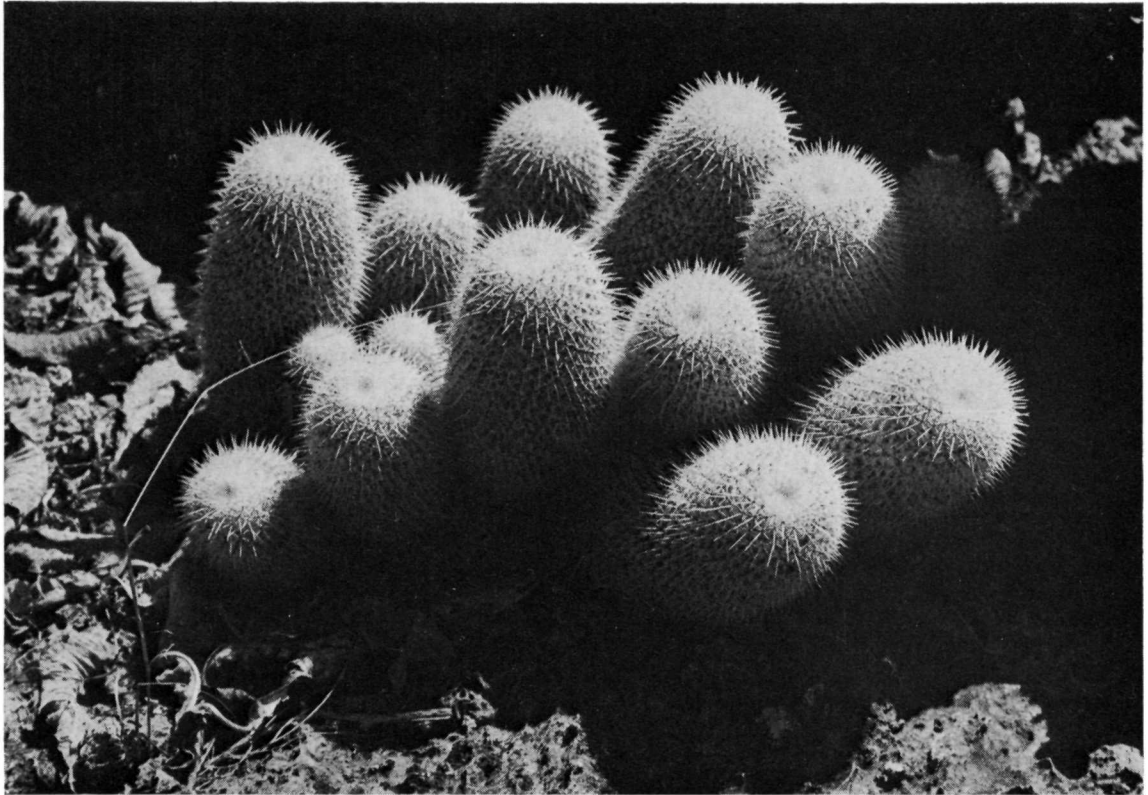
*Lau 1166*: Creeping and then producing two or three branches that grow erect, not more than 5 cm. tall, 2 cm. in diameter. Tubercles in 5:8 spirals, as in *M. sphaclata*. Radial spines 5–8, 7 mm. long, white with brown tips. Woll or bristles in axils, but only traces. Flower smaller than *M. sphaclata*. There are no central spines. Altitude 700 m.

There is another similar plant, *Lau 1167*, above the town of Tomellin, but with the usual count of 12–15 radial spines and 1–2 centrals. However, all these plants are much smaller than *M. sphaclata*.

The most beautiful and interesting plant of all the *Mammillarias* in the Tomellin area, in my opinion, is *Lau 1087*. When I took Mr. Reppenhagen and later Prof. Dr. Schreier to see the habitat they were both entranced by the plant and its awe-inspiring habitat. Both are men who are regarded as authorities on *Mammillaria*. Returning from the habitat of *Lau 1166*, one reaches again the rim of the canyon. One can throw a stone from one rim of the precipice to the other. Far down below gushes the river. The walls are vertical. We have reached 800 m., the river 200 m. below. There are few spots that I have seen in my life where I felt more elated. The *Mammillaria* that I at first diagnosed as a specially beautiful form of *M. elegans* was recognized by Mr. Maddams in Britain as close to *M. dixanthocentron*.

Another view of the habitat of *Lau 1087* (photo: A. Lau)





Lau 1087, identified as *M. dioxanthocentron*, in habitat

(photo: A. Lau)

Yet where do we draw the line between the two species? The colonies glisten in the hot sun and are often located in cushions of lichen and moss which in the rainy season envelop the colonies. There are those with pure white central spines and others with a honey-yellow colour. I do trust that this article will not cause this marvellous plant to be eradicated in its habitat, for the distribution is very limited.

*Lau 1087*: Body columnar, branching on the base, individual branches 10–15 cm. long, 5 cm. in diameter, tubercles in 13:21 spirals. White wool in the axils. Radial spines 20–22, 4–6 mm. long, white, black on base. Central spines 4–7, 2–3 cm. long, white or honey-yellow, when 4 then crosswise, more or less erect, when slightly curved, then only toward the convergence, spines more robust than *M. dioxanthocentron* which has central spines 3–4 cm. long, not 1.5 cm. as reported in the Kakteen Lexikon of Backeberg. The flower is darker than *M. dioxanthocentron*. There is a tiny dark tip on the central spine.

Now we are returning toward the highway. Little by little the plants are becoming single and the spines condensed.

*Lau 062*: The number of tubercle spirals is the same, but the plant is smaller, more compact, 6–8 cm. high. There are only two short central spines, white, 8–10 mm. long. Altitude 600 m.

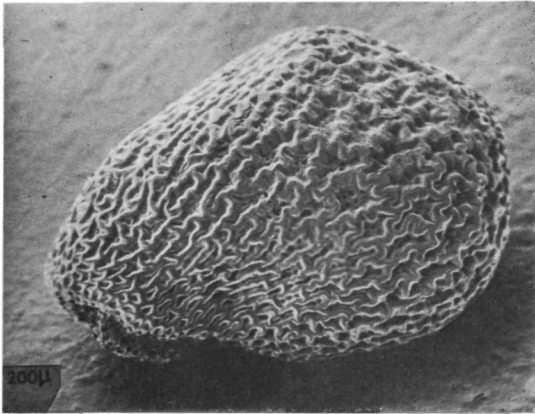
As we are returning toward Tecomavaca, we see close

to the road a very beautiful *M. dioxanthocentron* variety with strong central spines:

*Lau 063*: Size and number of tubercle spirals as in *M. dioxanthocentron*. Radial spines 16–18, white, much stronger than in *M. dioxanthocentron*. Central spines 2, one short (3 mm.) upward, and 1 long (3 cm.) downward as in *M. dioxanthocentron*, but much stronger, red-brown with dark brown at the tip. Altitude 600 m.

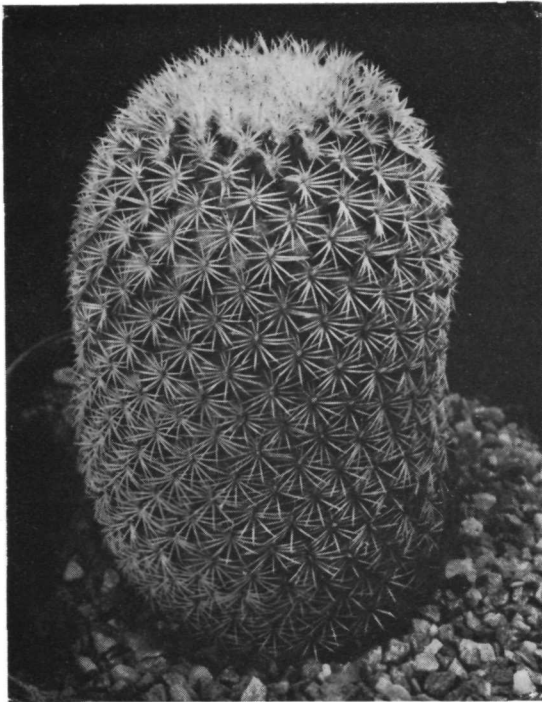
Once more we return to the west before reaching the Rio Salado to the place where we found *Lau 1109*. As we continue on the trail toward Santa Maria Ixcatlan, we shall soon reach a pass with the same rock formations as we have discussed earlier. Between 900–1000 m. we find an ecotype of *Lau 063* with more globular growth, robust spines of dark yellow to brown colour (central spines) and tubercles in 8:13 spirals. The radial spines are light-brown to white. The two central spines are slightly curved back, the upper 2.5 cm. long, the lower 1.5 cm. long. (*Lau 063a*).

It has been my ambition to explore the whole length of the Rio Quiotepec as far down as the desert reaches, where it slowly descends and meets the forest and with that the increased rainfall. Alas, in a small aeroplane I realized that this is impossible. The only hope consists that as the road link between Huautla and Jalapa de Diaz will materialize, certain borders of the gorge can be



Seed of *M. dixanthocentron*, Lau 1087  
(photo by courtesy of Dr. W. Barthlott)

reached from various points. The farthest spot I was able to reach gave me another interesting discovery, a *Mammillaria viperina* with many and long spines. As I looked up into a plateau which I could never reach I spotted again these low black cats, like a panther. This time it was a pair, puma-like and with a very long tail.



*Mammillaria* sp. Lau 1158, collected on gypsum hills near Quiotepec, Oaxaca. One of several plants obtained by Dr. Lau which closely resemble the original *M. supertexta*. (photo: R. Zabeau)

They watched me carefully for a short moment, then vanished.

Lau 1113: Areoles not as light as in *M. viperina*. Radial spines 22-24. Central spines 7-11, white at base, brown in the middle and black at its points, longest in the convergence area (1 cm.). Altitude 500 m.

The last plant that I should like to mention here is probably related to *Mammillaria martinezii*. It grows north of Quiotepec and again on steep gypsum hills.

Lau 1168 [1158]: Radial spines 16, 8 mm. long. Central spine 1, 4 mm long and with tiny black tip. Some plants have two central spines. The colour of the plants is white all the way through without the yellow base seen in *M. martinezii*. Altitude 600 m.

High above the Tomellin canyon, even higher than the *Pachycereus weberi* zone, and only on the east side, I could mention the beautiful yellow-centred *Mammillaria flavicentra*. I even saw plants in the oak and pine forests at 2800 m. altitude. As one stands beside the church of Concepcion Papalo, looking toward the west, the huge panorama unfolds in hundreds of yet unexplored canyons and valleys. The Tomellin Canyon is not yet fully known. Probably many other varieties and ecotypes will be added to those that I have tried to examine. As the area becomes more accessible, other discoveries will be made.

#### POSTSCRIPT by D. R. Hunt

Dr. Lau's article was received in February 1976. Publication has been deferred in hope of obtaining essential flower, fruit and seed data for many of the forms enumerated. These data are still not available in most cases, but with Dr. Lau's permission the article is now published in substantially its original form, with only minor agreed revisions and editorial footnotes.

My first comments to Dr. Lau (in litt., March 1976) have been superseded in part by my published remarks on *M. elegans*, *M. supertexta* and *M. celsiana* (CSJGB 40: 97-9. 1977). Further work in the field and greenhouse is needed on *M. supertexta*, *M. lanata* and allied forms, but I am venturing to describe the distinctive Lau 066 in a forthcoming issue of this journal. The numbered collections cited by Dr. Lau which are referable to series *Supertextae* then fall into four groups:

1. *M. sp. nov.* (Lau 066, 681, 066a)
2. *M. crucigera* Mart. (Lau 1109)
3. *M. supertexta* — *M. lanata* complex (Lau 061, 061a, 1116, 1116a, 1158 orig. cited by Lau and by Hunt, l.c. as '1168').
4. *M. dixanthocentron* Backeb. (Lau 062, 063, 063a, 1087)

The various forms of *M. sphaclata* enumerated by Dr. Lau do not, in my opinion, merit taxonomic recognition but blur still further the already indistinct boundary between *M. sphaclata* and *M. viperina*.

## Pterocactus and Floral Evolution in the Cactaceae

by Heimo Friedrich

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Translated by Lois Glass

Drawings by the author

There are strong indications that the family Cactaceae is derived from ancestral members of the *Centrospermae*, and that it is related to the *Phytolaccaceae*, *Aizoaceae* and *Didiereaceae*. Buxbaum (1950-4, 1962) has drawn attention especially to a number of links with the less specialized representatives of the *Phytolaccaceae*, and since then further similarities have been established.

Flower-form within the Cactaceae has undergone considerable evolution in a number of different ways. In the Subfamily of the *Pereskioideae* we can see approximately what the archetype must have been. These flowers—the most primitive within the Cactaceae—have a flattened-conical base consisting of a thickening of the pedicel, topped by a superior ovary. The 'calyx' has only a few segments arising spirally from bracts, the latter also sometimes petaloid in colour. A primitive *Pereskia* of this kind (*P. bahiensis?*), with large leaves, small flowers arranged in an umbel and an ovary which is unmistakably superior, is depicted in my semi-diagrammatic drawing (Fig. 1). Other *Pereskia* species, including those of the subgenus *Rhodocactus* where the ovary is inferior, are less primitive but basically similar in struc-

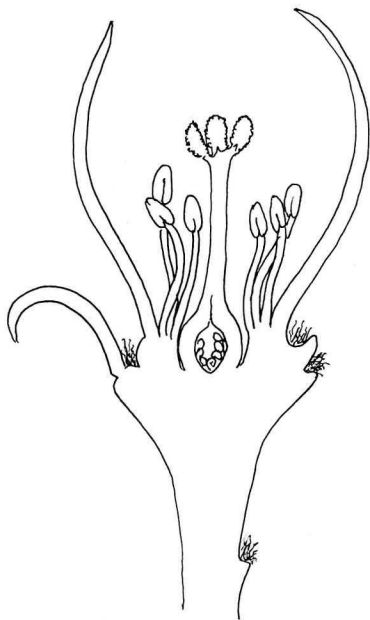


Fig. 1. Vertical section of flower of *Pereskia bahiensis*

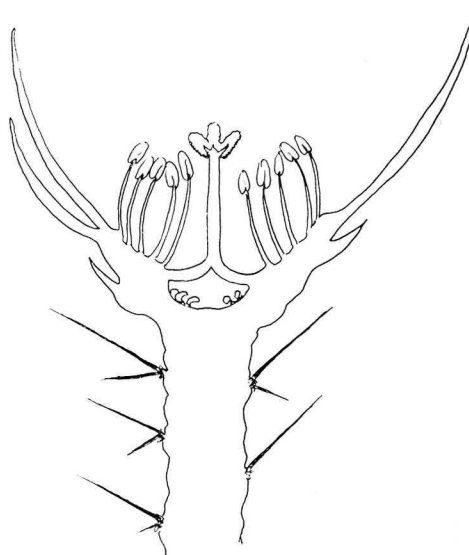


Fig. 2. Vertical section of flower of *Maihuenia* sp.

ture. In every case the flower, set on the top-shaped apex of its stalk, is a separate organ and clearly distinguishable from the vegetative stem-system.

Little development is seen in *Maihuenia* where the flower—in other respects similar to that of *Pereskia*—arises from the shoot-tip without any stalk or articulation; this is illustrated in Fig. 2 where the sketch has been adapted from Kiesling (1971). The section, and even more clearly the external view, show that here too the flower is clearly distinct from the vegetative shoot from which it differs even in the pericarpel region.

The position is quite different in *Pterocactus* which is obviously a very primitive genus of the *Opuntioideae*. My semi-diagrammatic illustration of the flower of *Pterocactus tuberosus* (Fig. 3) shows the stem-apex into which the terminal flower is wholly recessed. Here there is no longer any demarcation between floral region and vegetative shoot, and at the same time the inferior ovary, which is not recognizable externally, is situated deep within the stem-tip. If we want to use here the term pericarpel, then it must be understood it is in no way differentiated externally from the vegetative shoot with spiny areoles.

*Pterocactus tuberosus* puts out from its tuberous root

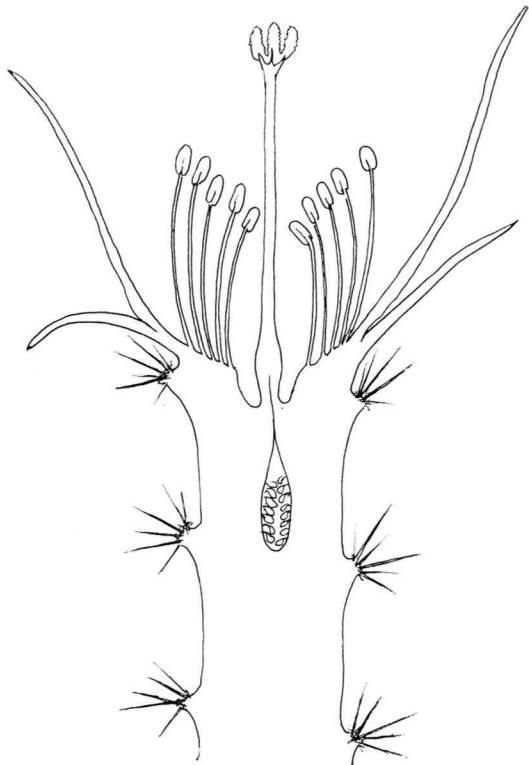


Fig. 3. Vertical section of flower of *Pterocactus tuberosus*

shoots which branch from the base and are of one type only, whereas *Pterocactus reticulatus*, which was described recently by Kiesling, has differentiated oblong primary shoots and short lateral shoots. Many of these secondary shoots bear a terminal flower which in some cases occupies entirely the short shoot and in some cases is differentiated by a slight narrowing from the rest of it. The fact that the short shoots here develop completely into the 'pericarpel' is confirmed by the fructification: the short shoot becomes the fruit (Fig. 4).

In *Cylindropuntia* (Fig. 5), *Quiabentia* and ultimately also all the other Opuntioideae, the conditions of flower and fruit development are almost identical with those in this species of *Pterocactus*. The difference is that, in the course of further evolution, the flowering short shoot develops as such a priori. Thus the shoot-character of the 'flower' while less obvious, still remains unmistakable when compared with the *Pereskia* flower.

In the preceding paragraph I have put the word 'flower' in quotes because of the line of evolution which has been shown above: *In more advanced members of the Cactaceae the flower is, in fact, a whole short shoot with a terminal flower recessed into its apex!* In the subfamily Cereoideae any primitive forms, such as *Pterocactus* provides for the Opuntioideae, are unfortunately missing. Nevertheless the most primitive flowers of recent Cereoideae retain the characteristics of vegetative shoot-

surfaces much more obviously than is the case with any of the more highly evolved genera (*Rhipsalis*, *Melocactus*, *Mammillaria*, etc.) where the flower has, in a derived way, regained the typical floral structure. Or, put another way, in the course of further phylogenesis the enveloping vegetative shoot is reduced to such an extent that it is no longer recognizable, and it merges into the floral structure. Thus when just one *Mammillaria* fruit among many thousands is found to possess spiny tubercles, this is quite simply an atavism recalling the evolutionary process.

The evolutionary series set out here: *Pereskia* → *Maihuenia* → *Pterocactus tuberosus* → *Pterocactus reticulatus* → *Cylindropuntia*, together with a corresponding evolution in the Cereoideae, where the final stages are more advanced, explains what has hitherto been an incomprehensible and improbable evolutionary reversion: first from an axial-cup floral type to a vegetative type, possessing spiny areoles and conspicuous succulence, and then again to a floral type. Buxbaum (l.c.) has suggested that the progressive down-growth of the floral axis (cupula), first seen in subg. *Rhodocactus* where the ovary acquires an inferior position, might be the

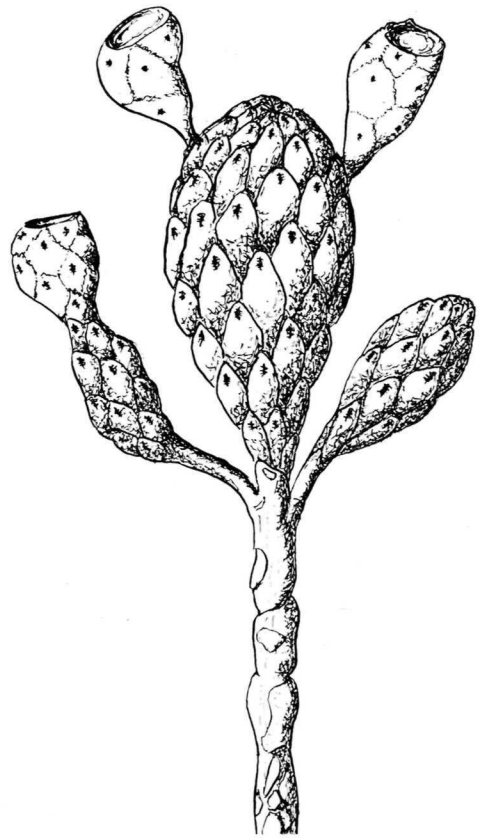


Fig. 4. *Pterocactus reticulatus*, shoot with fruits (after Kiesling)

origin of greater numbers of internodes; this is gainsaid by the fact that in primitive *Opuntia* flowers (Fig. 5) the axial cup is only moderately recessed, yet below the

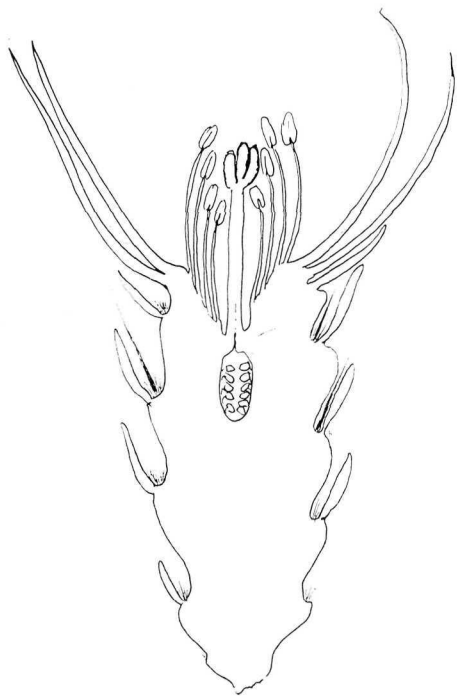


Fig. 5. Vertical section of flower of *Cyindropuntia subulata*

ovary there is still a large part of the axis which bears many nodes. Moreover an increase in node-numbers is not in itself a reason for their typically vegetative phenomena (spiny areoles, convex podaria).

The critical step in the evolution of the cactus flower may well have taken place in the original subfamily of the Pereskioideae, prior to further divergent advances in the Opuntioideae and Cereoideae. With increasing selective pressure towards xeromorphism the blossom came to be enclosed within the protecting tip of the vegetative shoot. The fact that protection of the delicate flower from transpiration losses is a particularly effective factor in selection is clearly demonstrated by the diversity of pertinent adaptations shown by the more highly evolved members of the Cactaceae: wool-development to protect buds and meristem; cephalia; small flower-size; rapid maturing of buds and short duration of anthesis; the protective sheath in *Calymmanthium*; the recessing of the *Lepismium* flower into the axis. In the author's view, the last-named instance, moreover, represents the remarkable repetition of an evolutionary step: initially the flower was sunk within the shoot-apex, while in a later development the entire flowering shoot is embedded in the flank of the stem which bears it.

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 — (1962). Die Stellung der Kakteen im Pflanzenreich. In Kak't. u. a. Sukk. 13: 194.  
 KIESLING, R. (1971). Two new species of the genus *Pterocactus* (Cactaceae). Bol. Soc. Argent. Bot. XIV: 111, 1971.

## Book Review

**E. W. Putnam.** *Gymnocalycium*. National Cactus and Succulent Society Handbook no. 5, 74 pp. Cover picture in colour, 37 half-tones, 1 map. Paperback, 7¼ × 4¾ inches (183 × 123 mm.) Price £1 (USA \$3).

So little has been written on the genus *Gymnocalycium* as a whole that the advent of this booklet is a very welcome addition to the literature. Mr. Putnam is well qualified to write on these his favourite plants as he has been growing and lecturing on them for fifteen years.

The booklet is a convenient size to slip in your pocket when visiting nurseries.\* It is well-illustrated with a coloured photograph of *G. quehlianum* on the front cover and a black and white frontispiece of *G. friedrichii*, both by Helmut Broogh who supplied the majority of the illustrations. Peter Chapman, John Donald, Walter Haage and Alfred Lau have supplied the remainder. A

\* Not intended as a hint for shoplifters, I think!—Ed.

map showing the provinces of Argentina is included as a rough guide but it is intended to be used in conjunction with a good atlas in order to find the exact localities.

Accepted species are arranged alphabetically (bold type) and authorities for each are given together with a short description and the habitat. Dubious names, synonyms or invalid epithets appear in italics. Seed-classification, historical notes, cultivation, pests and diseases, propagation, cultivars and hybrids are topics dwelt upon briefly but well. I quote from the preface; '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.' This booklet is indeed just the sort of helpful tool needed by all 'Gymnocalyciophiles' to enable them to add to their knowledge of this extremely interesting group of plants.

RICHARD STRONG

# Grow the better Mammillarias (1)

by John Pilbeam

with photographs by Bill Weightman

In a genus which sports some 200-odd 'different' species it pays to know what plants fit what names, and *Mammillaria* is as subject as any large genus to mislabelling and the perpetuation of names long since discarded. And there are too, constant additions being made to the genus, whose length of taxonomic life only time will tell.

In the last few years we have seen *M. ascensionis*, *M. beiselii*, *M. fittkaii*, *M. haudeana* (Lau 777), *M. heidiai*, *M. mathildae*, *M. meridiorosei*, *M. miegeana*, *M. pennispinosa* var. *nazasensis*, *M. reppenhagenii* and *M. xaltiangensis*, and lurking unpublished around the corner, or already 'in press', are several more, quite enough to keep the *Mammillaria* fancier busy scanning the lists for a few years to come, and, incidentally, the most encouraging recommendation for buying those enigmatic lists of *Mammillaria* under collection numbers seen in the more enterprising nurserymen's lists.

But the *Mammillaria* enthusiast will already be well on his way to acquiring at least some of those mentioned, and it is not my intention to harp on these new species, which are mostly difficult to obtain at present. Rather I should like to select some choice *Mammillarias* to bring to your attention, regardless of how long they have been known, in order to enable you perhaps to be discriminating in your purchase of species of this wide-ranging genus, which, with the welter of names can be so confusing, especially to newcomers to the hobby.

It may be that you like plants with long spines, or with white spines, or with large flowers, or with particularly coloured flowers. Certainly there is something for everyone's tastes in this genus, with flower colours ranging from deep purple through to white, and with spines of every conceivable length and colour, and for those who like a challenge there are some almost impossible to grow on their own roots.

To start the ball rolling, for such a subject cannot be adequately covered in one issue, I have chosen for this time to illustrate and to write a little about some of those *Mammillarias* which have comparatively large flowers for the genus. These fall almost without exception in the subgenus *Dolichothele*, in which some species have large yellow flowers, and in the series *Longiflorae*, with large flowers in varying shades of pink. There are too the controversial *Mammillaria senilis* (syn. *Mamillopsis senilis*) and the subgenus *Cochemia*, strangely reluctant to give up their generic status.

*Mammillaria senilis* (*Mamillopsis* for the die-hard) is a stupendous species raised extensively from seed in recent years and too good to ignore if seen on sale under either generic name. Without the flowers, which in some

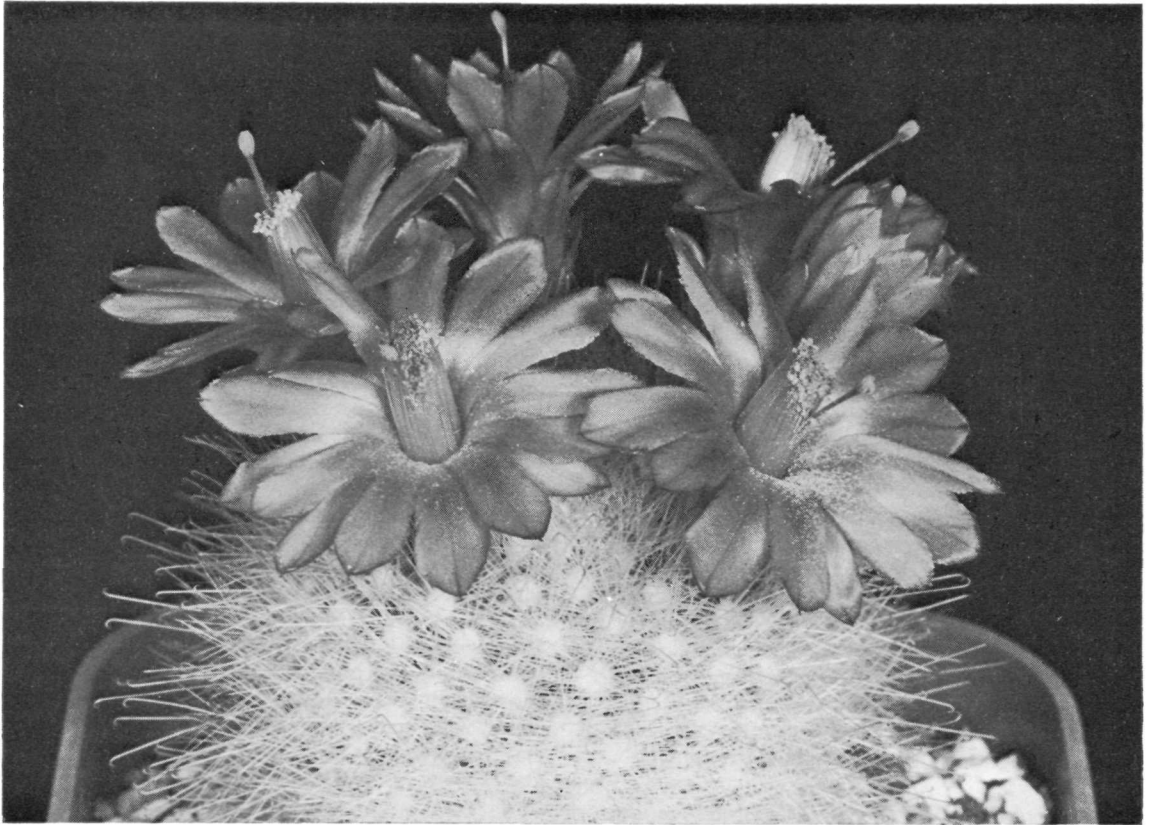
greenhouses are tardy in appearing, it is a species lovingly borne to shows to contend for the 'best cactus'. It is not surprising that it often is a contender for this title, with its dense, vitreous white spines completely hiding the plant body, making in time a large clump of apple-sized heads. The bright red reptilian buds push up well above the long, hooked centrals to crown the plant with wide-opening saucers of pillarbox red flowers with bunched stamens like paintbrushes.

With the exception of *M. marksiana*, no other *Mammillaria* species approaches the intensity of yellow found in the subgenus *Dolichothele* and that stray from *Dolichothele* the subgenus *Oehmea*, and without exception none has such large yellow flowers. In the species *M. longimamma*, *M. sphaerica* and *M. uberiformis* while the flowers are quite large I find the spines not very appealing, being inclined to be wispy and nondescript straw yellowish-brown. The one I would pick out from the *Dolichothele* with all the attributes—large yellow flowers abundantly produced, scented too, and with a web of interlacing fine white spines almost obscuring the plant body—is *M. baumii*. In common with others of this subgenus it forms large carrot-like roots and needs room to develop them properly. It comes from Tamaulipas in Mexico, near San Vicente.

Most members of the *Dolichothele* group come from the eastern side of Mexico, well separated from *M. beneckeii* (or *barkeri*, *balsasoides*, *nelsonii*, *aylostera*, *colonensis*—call it what you will), formerly in *Dolichothele* but now transferred in David Hunt's classification to the monotypic subgenus *Oehmea*, which is found on the western side of Mexico and down as far as that state of the bandits, Guerrero. Flowers are not easy to produce in cultivation in England in this species. The flowers are not 'orange-yellow' as sometimes described, rather they are a warm deep yellow. The species needs higher temperatures in the winter to be sure of survival, 50°F (10°C) plus.

The series *Longiflorae* contains some of the most breathtaking discoveries of recent years, as well as some celebrated species of yesteryear, which still elude our efforts to grow well for any length of time. The *M. longiflora* group contains its namesake, which sits like a distant second cousin next to the others: *M. goldii*, *haudeana*, *saboe* and *theresae*. I have grown *M. longiflora* for years, although I regret the passing a year or two back of my only specimen of the 'old-fashioned' sort of this species, with very long hooked centrals, paler coloured for at least half of their lower length, with paler pink flowers and less strong spines. Are there any still in collections I wonder? Perhaps it is the habit of this older form to have a short life and a merry one, that prompts Bill Weight-





*Above, Mammillaria—or Mamillopsis—senilis*

*Below, Mammillaria—or Dolichothele—baumii*



man, who took the photographs for this article, to wag a long face over my more modern specimen and forecast its future in terms of months rather than years. It has withstood his head-wagging for about five years, but the strain is showing, as it is now the largest I have ever had a specimen, at about 5 inches (12.5 cm.) tall.

Coming back to the other members of the *M. longiflora* Group, the other four are all well worth growing, the easiest being perhaps *M. saboae*, and because of its ease of propagation the most readily available. Incredibly these four were unknown before 1966, and yet have become probably the most sought after species of all, because of their diminutive size, attractive spination and amazingly large flowers, varying from clear rose-pink in *M. saboae* to lilac in *M. theresae*. All four species are pictured in a recent issue of the Mammillaria Society's journal.

The *M. napina* Group contains similarly long-tubed, large flowered species, doubtfully separated from each other in some authorities' view, but for the moment maintained as *M. napina*, *M. deherdtiana* and *M. dodsonii*. All three have large pink flowers, and varying spination, from creamy-white in *M. napina* to long, dark red-brown to nearly black central spines in *M. dodsonii*. They are not the easiest to flower in cultivation, especially *M. napina*, but they will do so if given full light.

*Mammillaria longiflora* flowering in David Hunt's collection



Standing on their own in the series *Longiflorae* are two of the most notoriously difficult in the genus, but the most rewarding if they can be persuaded to grow for you: *M. tetrancistra* (also known as *M. phellosperma* or *Phellosperma tetrancistra*) is from a broad band of country in the southern United States as well as Sonora and Baja California in Mexico, and *M. guelzowiana* comes from Durango in Mexico. The former is really one which in my opinion is better grown on a graft, which does not seem to encourage such outrageous growth and off-setting as sometimes seen. The flowers are large and pink, and push with difficulty through the many hooked, black central spines, which make this species a strong candidate for being carried off by visitors unwittingly on their sleeves. It is a difficult plant to establish or to grow from seed, but well worth the effort.

*M. guelzowiana*, praised in a recent issue of this journal by Jackie Panter, can easily be passed over in the seedling stage as it so closely resembles *M. bocasana*; the unknowing will view the name with suspicion and take it as another odd name dug up to sell him yet another of the latter species. But if he has succumbed to the name game, and it is correctly named, he is due for one of the most delightful surprises of his *Mammillaria* addiction, which will ensure continued enslavement to the genus. (to be continued)

## Historical Notes on Echeveria (1)

by J. C. van Keppel\*

Had it not been for one of the tragedies of botanical history, the name *Echeveria*, now attached to a well-known genus of the Crassulaceae, might have been linked with the spiny *ocotillo*, which became, instead, *Fouquieria*. The botanical explorers Martin Sessé y Lacasta (d. 1809) and José Mariano Mociño (d. 1820), who spent fifteen arduous years from 1789–1803 describing and illustrating the Mexican flora, chose to commemorate one of their artists, Atanasio Echeverría, by naming the *ocotillo* in his honour. But their great work was fated to be unpublished until so out-of-date as to be of historical significance only, and the *ocotillo*, meanwhile, was dedicated to a Paris professor of medicine, Pierre Fouquier. It was left to the Swiss botanist De Candolle, who met Mociño after Sessé's death and realized the importance of their work, to make the happy choice of *Echeveria* for the colourful and ornamental genus with which we associate the name today.

The Sessé & Mociño *Flora Mexicana* was to have included three species later referred to *Echeveria*. These, like many other of the early discoveries, even after the description of *Echeveria*, were placed in *Cotyledon* and *Sedum*. Their '*Sedum spicatum*' was to become *Cotyledon coccinea*, described by Cavanilles in 1793 from seed they sent to Madrid; *Cotyledon gibbiflora* is now well-known as *Echeveria gibbiflora*; and the third species '*Sedum teretifolium*' has not been precisely identified for lack of basal leaves.

In a letter dated December 1826, A. H. Haworth, one of the leading authorities on succulents, wrote to the editors of the Philosophical Magazine that 'In all probability . . . *Cotyledon coccinea* of Cavanilles will be the type of another new genus . . . but these speculations must at present be relinquished for want of sufficient specimens' (Haworth in Phil. Mag. n.s. 1(4): 272. 1827). It was not long before his prediction was fulfilled: *Cotyledon coccinea* was designated type of the new genus *Echeveria* by De Candolle in 1828. Besides the other two Sessé & Mociño plants, *E. gibbiflora* and *E. teretifolia*, De Candolle included one more species, *E. caespitosa*, which had been described by Haworth in 1803 as *Cotyledon caespitosa*. (This species is nowadays included in *Dudleya*).

\*Freely adapted and condensed from the author's series 'Echeveria, Historie en Nomenclatuur' published in the Dutch Journal *Succulenta*, 1976–7, and translated by Susan Roach. A complete translation of the series, without illustrations, has appeared in the *New Zealand Cactus and Succulent Journal*, 1977–8. Author's address: Jonkerlaan 14, Wassenaar, Netherlands. The illustrations, by F. Noltee and the author, are reproduced by kind permission of the editors of *Succulenta*.

Haworth (in Phil. Mag. n.s. 5: 262. 1828) himself followed up De Candolle's work with 'A New Account of the Genus *Echeveria*' and added a fifth species, *E. grandifolia* Haw. This was being grown by the London nurseryman Tate, of Sloane Street, from Mexican seed. It is almost identical with *E. gibbiflora* and is regarded by many writers as a synonym. In my opinion it is a somewhat atypical form of *E. gibbiflora*.

By this time, two South American species had also been described. Discovered by Alexander von Humboldt (1765–1859) and Aimé Bonpland (1773–1858) during their epic expedition through South America, these were published in 1823 in their *Nova Genera et Species Plantarum* under the names *Sedum bicolor* (*E. bicolor* (Kunth) Walther) and *S. quitense* (*E. quitensis* (Kunth) Lindley). The first was found near Caracas in Venezuela, the second near Quito in Ecuador.

In 1830 Schlechtendal and Chamisso described *Echeveria racemosa* (in *Linnaea* 5: 554), and this was followed in 1831 by *E. lurida* Haworth. Even now experts are not in agreement as to whether *E. lurida* should be regarded as a synonym of *E. racemosa* or whether it really is an independent species. D. F. L. von Schlechtendal (1794–1866) was professor of botany and director of the botanical garden in Halle, founder and editor of the journal *Linnaea*. From 1830–1858 he published work on Echeverias in various journals and in the *Hortus Halensis* (1853) he was the first to produce a monograph of the genus, in which the species known at that time were subdivided into five groups. He described a total of four new species: *E. racemosa*, *E. bifida*, *E. pubescens* and *E. mucronata*. Of these, *E. pubescens* is regarded as a synonym of *E. coccinea* (Van Keppel in *Succulenta* 53: 16–18. 1974; Moran in *CSJA* 48: 225–9. 1976). In 1858 he reported 24 species, including five nowadays referred to *Dudleya*.

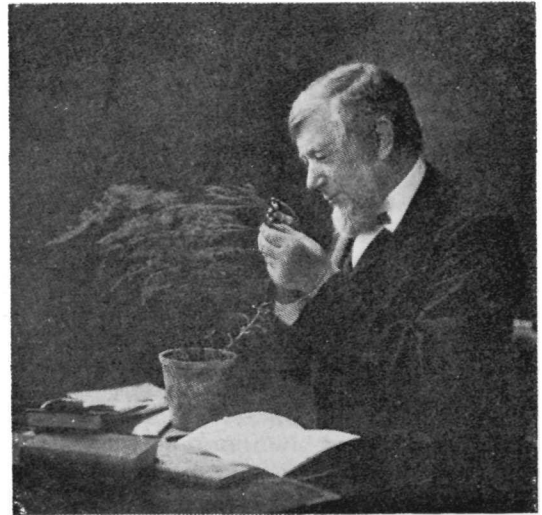
John Lindley (1799–1865), Professor of Botany at London, editor of the *Botanical Register* from 1829–1847 and the first editor of the *Gardeners' Chronicle*, described seven species of *Echeveria* in the first of these journals, including five which were new: *E. secunda* Booth, *E. acutifolia*, *E. rosea*, *E. retusa* and *E. scheeri*. Of these *E. retusa* is now regarded as synonymous with *E. fulgens* Lem. which had already been described by Lemaire in *Hort. Van Houtte* fasc. 1, 8 (1845). Other species described between 1830 and 1860 were *E. peruviana* Meyen (another S. American species); *Pachyphytum bracteosum* Klotzsch a plant often included in *Echeveria* by later writers but now accepted as meriting separation; *E.*

*paniculata* and *E. strictiflora* Gray, the latter species being the most northerly of the genus and the only one to extend into the USA (Texas); and *E. canaliculata* Hooker, which is no longer found in cultivation.

The *Echeveria* species described up to 1863 were summarized by Charles Lemaire (1801–71), Professor at Gent, in *L'Illustration Horticole* 10: 76–84 (1863). Two new species were included: *E. agavoides* and *E. linguifolia*. Amongst the 35 species mentioned, sixteen are now regarded as belonging to other genera. Additionally, Moran (in *Baileya* 19: 145, 1975) has transferred *E. linguifolia* to the genus *Cremnophila* Rose.

With Lemaire, the period in which the genus *Echeveria* was exclusively an object of interest for scholars more or less came to an end. Except for Dietrich, *Synopsis Plantarum* (1840) and Bentham & Hooker, *Genera Plantarum* (1862), who regarded *Echeveria* as a subgenus of *Cotyledon*, the name *Echeveria* was given practically universal acceptance. By 1870 *Echeverias* had become popular plants and an object of interest for amateurs as well as professionals.

With the Englishman John Gilbert Baker (1834–1920), who was employed at the Kew library and herbarium from 1866–99, latterly as Keeper of the Herbarium, we step into a new era with regard to knowledge of the genus. Baker was a very versatile botanist and wrote, amongst many other things, handbooks on the *Amaryllidaceae*, *Bromeliaceae*, *Iridaceae*, *Liliaceae* and ferns, and a

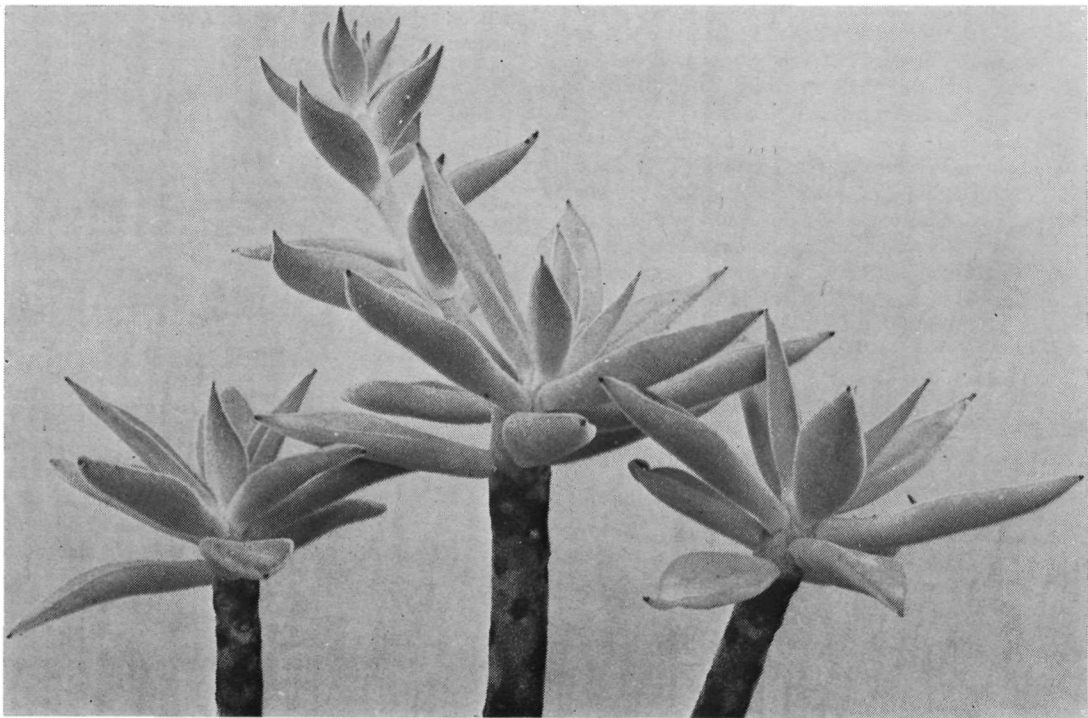


J. G. Baker (1834–1920)

*Flora of Mauritius and the Seychelles*. Of special importance to us is his account of *Echeveria*. That this came into being is in no small way thanks to W. Wilson Saunders, nurseryman and great plant-enthusiast of Reigate, Surrey, who seems to have had what was for that time a very considerable *Echeveria* collection and published Baker's monograph as part of the first volume of his

*Echeveria coccinea*, type species of the genus

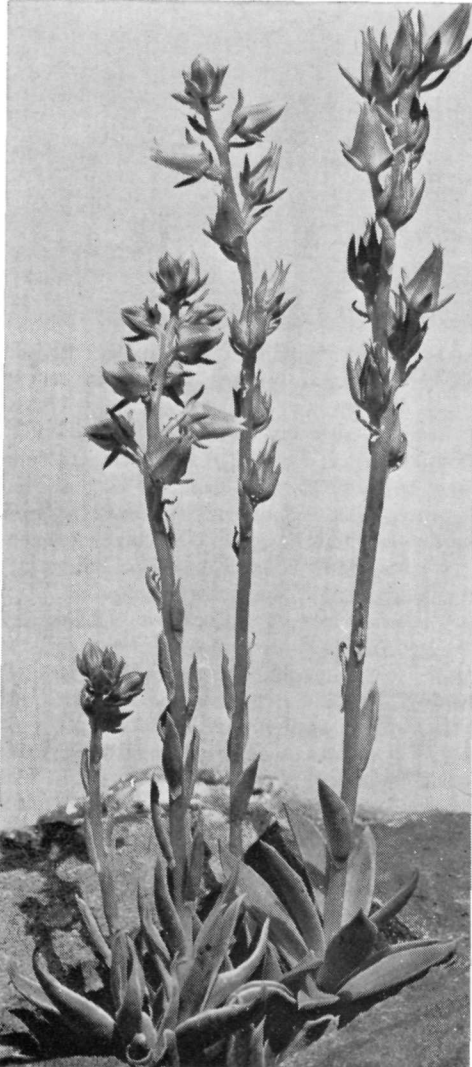
(photo: Buining)





Left, *E. racemosa*  
(photo: Buining)

Below left, *E. paniculata*  
(photo: Buining)  
Below right, *E. bicolor*  
(photo: Noltee)



periodical *Refugium Botanicum* (1869), with eighteen partly coloured plates, mostly of lesser known species. Following Bentham and Hooker, Baker considered the genus to be only a subgenus of *Cotyledon*. New species he described which are recognized to this day were *C. agavoides*, *C. nodulosa* and *C. nuda*, and he divided the (sub)genus into five groups whose names, except the last, also continue in use: *Spicatae*, *Racemosae*, *Secundae*, *Gibbiflorae* and *Caespitosae* (*Dudleya*). In 1870 he described *C. carnicolor* and *C. atropurpurea*, and in 1874 *C. peacockii* and *C. justus-corderoyi*, the latter now treated as a variety of *E. agavoides*.



*E. elegans*

(photo: Noltee)

The period 1870–1900 did not produce many other new species, but surveys of the genus were given by E. Otto in the *Hamburger Garten und Blumenzeitung* (1873) and by E. Morren in *La Belgique Horticole* (1874). This account also appeared in translation in *The Garden* (1874) with comments by J. Croucher, who had at one time looked after Saunders's collection and was also the first to exhibit *E. peacockii*. A large number of hybrids were produced at this time of which a few, such as *E. × scaphylla* and *E. × mutabilis* are still grown, but most have disappeared from cultivation. Their nomenclature still requires a great deal of research because the descriptions are often brief and the same crossing sometimes received several names.

Prior to 1900, few species had been described by Americans, but from about 1890 American expeditions and individual collectors were active in Mexico and further south. Two of the most important plant-collectors of the time were Carl Anton Purpus (1853–1914), a German who spent the last fifty years of his life in Mexico and sent the plants he found to the United States and to his brother Joseph Anton Purpus (1860–1932) who was head of the botanical garden in Darmstadt for 44 years up to his death; and Cyrus Guernsey

Pringle (1838–1911), whose name lives on in *E. pringlei* and who, like the Purpus brothers, was in close contact with Joseph Nelson Rose (1862–1928) at the United States National Herbarium. Rose himself made many expeditions and wrote a monograph of the American *Crassulaceae* as co-author with Nathaniel Lord Britton (1859–1934), founder and director of the New York Botanical Garden. Many new species and several new genera were described by Britton and Rose, and in their monograph *Echeveria* itself numbers 59 species. With the species described under *Oliveranthus*, *Urbinia* and *Courantia*, genera which are not now recognized, the total comes to 62 species. Most of the species are accepted as distinct, but there are a few exceptions: *E. subsessilis* is, in my opinion, a synonym of *E. peacockii*; *E. scopulorum* is a variety of *E. obtusifolia*; *E. pinetorum* is a variety or synonym of *E. sessiliflora*; *E. toluensis* and *E. byrnesii* are varieties of *E. secunda*; *E. purpusii* Britton, which was not the same as *E. purpusii* K. Schum. (*Dudleya purpusii*) was re-named *E. microcalyx* Britton & Rose; *E. gloriosa* is the same as *E. rubromarginata*. According to Walther, *E. holwayi* is synonymous with the little known *E. acutifolia* Lindley. In 1974 I received a cutting from the Royal Botanic Garden, Edinburgh under the



Three species named by J. N. Rose: top left, *E. subalpina* (photo: Noltee); top right, *E. lutea* (photo: Buining); bottom right, *E. holwayi* (photo: van Keppel)

name *E. holwayi* (no. 124/43) supposed to originate from Dr. Rose. This plant has since flowered and is clearly a form of *E. gibbiflora* and totally different from the *E. acutifolia* distributed by ISI, no. 172. *E. hoveyi*, described as a species, is a bright-leaved hybrid.

C. H. Thompson (1870-1931) of the Missouri Botanical Garden, who is commemorated in the generic name *Thompsonella* Britton & Rose, described *E. fimbriata* in 1911. This member of the *Gibbiflorae* is well-marked by its glaucous fimbriate leaves and has been in cultivation for several years. Hybrids of American origin are also distributed under this name.

In 1930 a new survey of the genus was included in a monograph of the Crassulaceae by Alwin Berger (1871-1931). Berger was a famous German expert on succulents who was in charge of the Hamburg Garden 'La Mortola' at Ventimiglia, Italy. Notwithstanding his great knowledge of succulents, it must be said that his work on *Echeveria* is nowadays of little significance. The novelties he described were mostly of hybrid origin.





*E. albicans*,  
first described as  
*E. elegans* var.  
*kesselringiana* by  
von Poellnitz  
(photo: Noltee)

Karl von Poellnitz (1896–1945) published two articles in *Feddes Repertorium* in 1935–6, followed by a monograph of the genus. A German, like Berger, he took his subject very seriously and revised the genus with great thoroughness. But he was more a theorist, working from herbarium material and most of his ‘new’ species had been described already or belonged to other genera. Some of his more noteworthy novelties are as follows: *E. chihuahuaensis*; *E. elegans* var. *kesselringiana* (upgraded to a species, *E. albicans*, by Walther—in my opinion correctly so); *E. columbiana* which has been re-collected in Colombia, and, I think, a separate species, though *E. chihuahuaensis* (photo: Noltee)

united with *E. quitensis* by Walther. *E. backebergii* probably belongs to *E. chilensis*; *E. cuencaensis*, of Peruvian origin is not in cultivation, but is probably a distinct species. Von Poellnitz’s views on synonyms and on named hybrids, with information about their origin are very valuable. He undoubtedly read many old catalogues of succulent growers and this part of his work is, for me, the basis for studies of *Echeveria* hybrids.

The second part of this article will review the work of the *Echeveria* expert, Eric Walther, who died in 1959, and some subsequent discoveries.





# Taking cuttings

by John Pilbeam

Whether you like it or not sooner or later someone will covet one of your plants with offsets or shoots there to be taken, and it may seem unreasonable to refuse to take the knife to your beloved plant. It behoves you therefore to know what you are doing in this matter, so that you have the control, and do not feebly say 'You take the piece off.' When the latter is suggested the beneficiary-to-be is usually stricken with conflict: he feels obliged to take the smallest piece, with probably not the best chance of survival, and may endanger the main plant by removing part of it in the attempt to take a piece not properly ready for separation from the parent; or, of course, there is the other sort of beneficiary, who, on such an open invitation, promptly beheads the main stem, to your everlasting chagrin, and the distinct disadvantage of the next person who timidly asks for an offset.

So—how to go about the operation. The first consideration must be whether you should take the cutting at all: some plants' side shoots are firmly part of the main plant, with a large area of attachment. Those species of *Echinocereus* for instance, where the offset bursts through the epidermis of the main stem from within. To remove offsets like these will leave large scars on the parent, which will take a long time to heal, and may forever ruin the appearance of the plant. Plants which form narrow-necked offsets, and plenty of them, are those more readily lending themselves to removal, both by the ease of detachment and by the readiness of the remaining offsets to crowd in and fill the gap; such offsets in addition often root readily, sometimes before they are detached! Some of the clumping *Mammillaria* species may year after year have a crop of offsets removed with no real detraction from the appearance of the main plant. And some in fact fall apart as you repot.

Another consideration which might persuade you not to remove an offset, is the time of year. June and July seem to be the optimum months, the rootability of cuttings and safety of parent plants decreasing with every foolhardy month away from that time, although in this respect spring is safer than the autumn.

*The mechanics.* The first thing you must have for the best results is a really sharp blade to minimize the damage to the tissues in the cut area. Old (or new) scalpels are ideal, but not easily obtained, and my favourite implement is a penknife with an extremely pointed blade, kept regularly sharp and clean. After the amputation dust both surfaces with a fungicidal powder—the hormone rooting powders usually contain a fungicide (and may or may not help rooting)—before placing the cutting in a dry place out of direct sunlight, but in light conditions. Cuttings which bleed, like *Euphorbia* or *Stapelia*, should be dipped or lightly splashed with clean water before dusting with fungicide to staunch the flow of sap.

Harden your heart, and keep them for a week at least (the larger the cut surface the longer) in dry conditions away from soil. After this drying period they should be placed on or barely in dry compost, withholding water for another couple of weeks at least, by which time roots will probably have appeared at the base of the cuttings. Once roots do appear watering may begin (season allowing) in earnest, or if they are slow to root they may be encouraged by dampening or heavy spraying, but check frequently for any signs of rot, and remove or cut back and start again. Finally, do not pot up if rooted in trays until the root system has developed well, or disturb at all for the first few months.

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## Book Reviews

**Helia Bravo Hollis.** *Las Cactaceas de Mexico*. Second Edition (Collaborator: **H. Sanchez-Mejorada**). Volume 1. Pp. 743, 504 illustrations, many in colour; hard-back 10×6½ inches (255×165 mm.). Universidad Nacional Autónoma de México, 1978. Price about £15. We warmly welcome this first volume of the second and completely revised edition of the standard work on the Cactaceae of Mexico, and congratulate its author, the doyenne of Mexican cactologists, Helia Bravo, and her collaborator at the Botanic Garden of the University of Mexico, Hernando Sanchez-Mejorada, on their great accomplishment.

Modestly described in the preface as only a guide, in Spanish, for students of Mexican cacti, this first volume alone contains 743 pages and 504 illustrations, with introductory chapters on the ethnobotany, morphology, chemistry, ecology, distribution and classification of cacti running to more than 130 closely printed pages. The text of the introductory has been wholly rewritten and much amplified and the systematic treatment has been rearranged according to Buxbaum's classification\*, which replaces that of Britton & Rose used in the first edition.

The first volume covers the Pereskioideae, the Opuntioideae and all the cereoid genera except *Echinocereus* and *Bergerocactus*, 36 of the total 67 genera to be treated in the whole work. There are 271 numbered species, compared with 214 in the corresponding genera of the first edition, and many other species, not yet recorded from Mexico or dubious, and hybrids are described in greater or lesser detail in unnumbered sequences at the end of genera. As in the first edition, the descriptions are

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\*Various nomenclatural errors in the Buxbaum system are reproduced by Bravo without comment. For instance: The family name Cactaceae is attributed to Lindley (pp. 131, 139) not to A. L. de Jussieu (cf. ICBN, Appendix II); subfamily Cereoideae should be Cactoideae (ICBN, Art. 19.3); the names of certain tribes are mis-spelt: 'Hylocereae' should be *Hylocereae*, etc. (ICBN, Art. 19.2); the correct name of the type species of *Wilcoxia* is *W. poselgeri* (Lem.) B. & R., not '*W. tuberosa* (Poselger) Berger', the basionym of the latter being illegitimate (ICBN, Arts. 45.3, 64.1 and cf. example under Art. 72, Note 1).

comprehensive and there are well-constructed identification keys and full synonymy. Geographical data are given in a more general way than might be desirable in a formal monograph, and nomenclatural types and other preserved specimens with collector's numbers, etc., are not cited. Valuable diagrams help comprehension of the floral characters of the different genera. The book is well-printed and most of the photographs, including more than 120 in colour printed in the body of the text, are well-reproduced.

It goes without saying that this book is an essential work of reference for all students of the Mexican Cactaceae. The second and complementary volume will be eagerly awaited.

D.R.H.

**Wilhelm Barthlott** (trans. **Lois Glass**). *Cacti. Botanical Aspects, Descriptions and Cultivation*. Pp. 264, incl. 84 pages in full colour and 10 pages of half tones; 8 × 5½ inches (205 × 136 mm.). Stanley Thornes (Publishers) Ltd. Cheltenham, 1979. Price £7.95.

Lois Glass, who briefly reviewed the original German edition of this admirable introductory text in our November 1977 issue (CSJGB 39: 107) subsequently undertook the English translation and has added a short chapter of her own on 'How Hardy are Cacti in Britain?' English readers also benefit from a slightly larger page-size, providing margins to frame and enhance the superb photographs which are a notable feature of the book.

Like the late Vera Higgins, to whose 'Study of Cacti' the new book seems a worthy successor, Wilhelm Barthlott is a true plantsman, with a keenly critical scientific mind and an intense enthusiasm for collecting and growing the plants. A former student and now colleague of Professor Dr. Werner Rauh at Heidelberg, he has become well-known in recent years for his work with the scanning electron microscope and is also studying the taxonomy of *Rhypsalis* and other epiphytic cacti, of which he has built up probably the finest living collection in the world.

The microscopic structure of spines, seeds and pollen grains, a novel topic for a 'popular' book, occupies a fascinating chapter aided by 20 SEM photographs; other chapters find new paths through relatively well-trodden ground, including the history of collecting and research, the uses of cacti ('Fish Hooks and Narcotics'), morphology, distribution, classification and cultivation. The colour section follows, and the half-tones, and the book concludes with descriptions and remarks on the plants depicted in colour, plus a bibliography and index.

Apart from one or two corrections and the chapter on hardy Cacti, the principal textual revision from the German edition is the re-written chapter on classification which has been up-dated in the light of information from SEM studies to include the outline of a new system for the subfamily Cactoideae. This system is neatly tabulated on the book's endpapers and embodies several

stimulating ideas on the phylogeny of the subfamily and genera to be 'lumped'.

So well-concealed is Mrs. Glass's art that were it not for her notes here and there one might overlook that this is a fluent and idiomatic translation and not the original version. Author, translator and publisher deserve every success with this excellent book.

D.R.H.

**Werner Rauh**. *Bromeliads for Home, Garden and Greenhouse*. Pp. xiv+431, with 134 colour plates, 315 black-and-white plates and 90 line drawings; 9 × 6¼ inches (228 × 160 mm.). Translated by Peter Temple and Harvey Kendall. Blandford Press, Poole. 1979. Price £18.

Some may resent reference to Bromeliaceae in a journal devoted to succulent plants, and few of the nearly 2,000 species have any claim to be succulent: if they store water, it is usually externally in 'tanks' of overlapped leaf rosettes rather than internally. But the Family has certain features in common with succulents, notably the occurrence of Crassulacean Acid Metabolism (CAM), and certainly the more xerophytic species form ideal companions to true succulents in a mixed collection, as well as providing us with some of the most popular, durable and adaptable of house plants.

Werner Rauh has devoted to the Family the same intensive study that he has lavished on succulents, and has built up an equally fine living collection of them for study at Heidelberg University, stocked from his extensive travels in the natural habitats in South America. Now we are offered an English version of the splendid systematic account of bromeliads that first appeared in two volumes in German in 1970 and 1973, beautifully presented as a single volume by Blandford Press with all the original illustrations. It is difficult to praise these too highly.

The opening chapters cover the habitats and peculiar morphology of bromeliads and their cultivation. In the systematic part there are keys to genera, and each genus and species is described in full, with synonymy and cross references to the illustrations. *Tillandsia* occupies no less than 128 of the 327 pages in this part of the book—a piece of favouritism that we readily forgive in so distinguished and respected an author.

Translating a botanical book from one language to another requires skill and dedication. Not only must one be familiar with all the subtleties of the language but equally with botanical terminology and its precise usage. I have not seen the German original of this work, but Mrs Lois Glass, a master of the art, has kindly made comparisons for me and confirmed my worst suspicions in several cases. Alas that she was not asked to translate for Professor Rauh! Not only are there errors of interpretation, but neither translator is strong in basic botany, and the proof-reading has overlooked some misprints as well. Even the spelling has lapses: 'colouration' through-

out, and four different attempts at 'asymmetric'!

If you want to kill off your *Fascicularias*, follow the advice at the bottom of p. 318! Rauh's original states that they are NOT tolerant of long periods of dryness—the very opposite of what the English text has. Such errors are maddening since it is always the unfortunate author who gets the blame. 'Axis' and 'Axil' (or a new term 'Axel'!) are muddled up, and idiotic phrases like 'ovary semi-posterior' make the keys suspect throughout—a great shame, since these are the only modern keys in English. We have two 'new' genera of Cactaceae: 'The genus *Pilo* . . .' on p. 123, and 'neobux trees' on p. 8—a literal translation of *Neobuxbaumia* (baum = tree in German)! I could quote many more examples, but desist since it would paint too black a picture. But I do feel that a strong protest should be registered that so important a landmark in bromeliad literature was not checked by a botanist and an expert in scientific German before being offered to an unsuspecting public.

This apart, there can be only the heartiest recommendations, and a further vote of thanks to Prof. Rauh for adding to his own laurels and providing the greatest stimulus to bromeliad collectors everywhere.

G. D. ROWLEY

## The wordy wars of nomenclature and other horror stories

by D. C. Speirs

'Not recommended for children, parental discretion advised' is a phrase showing up with increasing frequency on the television and movie screen. This hobby we indulge in, far from being a refuge for the clergy and gentlefolk, is just as bad as what appears on celluloid. It starts with telling others what we collect, namely 'cacti and other succulents' or 'succulents including cacti', depending on one's bias. But not all cacti are genuine succulents, or even xerophytes. On the other hand, most orchids are succulent, as are begonias, watermelons and apples!\* Anyone for the word 'xerophyte'? And how do we convince the general public, firm in their belief that all fat prickly plants are cacti, never need water, and flower only once every seven years?

Leaving behind this thought, one descends, in more ways than one, to the generic and specific level, where variability is the essence of nature, part-and-parcel with evolution and natural selection. This creates a continuum, rather than discrete taxa, but Linnaeus & Co. demand that every plant be wedged in somewhere. Regardless of which philosophy one chooses to define a species with, the name will in practice be established on the basis of one individual plant, the type specimen. This plant may or may not be representative of the population it was taken from. The South American cacti provide an excellent example. One suspects that botanists have

[\*The views expressed in this article are not necessarily those of the Management!—Ed.]

climbed different sides of the same mountain and thereupon described different species from one population of plants.

For all their complaints, collectors are splitters of the worst kind, and generally refuse to accept variable species, while criticizing taxonomists who are splitters likewise. Perhaps good reason exists for this contrary behaviour since one feels cheated when one learns that a 'definitive' collection of species in the greenhouse has been reduced to synonymy and now consists of half-dozen or so plants of *one* species. The numerous varieties and/or species of *Lithops* presents a good example of this, whereby plants from the same colony were placed into different varieties or species (Cole, 1973).

Varieties, it should be noted, are often the last refuge of the splitter. On seeing their species shattered by well-aimed salvos from the lumper faction, splitters will often reinstate their beloved taxa, but at the varietal level. Failing that, it is a poor author indeed who cannot contrive to clutter up the literature with subvarieties, forms and subforms. A Name is Forever; it may soar to generic heights or plunge to the most obscure depths of synonymy, but once published it is eternal.

Crests and monstrose forms are always popular among collectors. They are not varieties as often said to be, but forms or cultivars based on an individual clone or some of its progeny by seed. Plants such as *Opuntia linguiformis* cv. 'Maverick' are hardly even eligible for cultivar status because they are diseased, either infected by viruses or mycoplasma-like organisms (as in the case of the aforementioned). A great deal of ink and paper has been used up on the why and how of crests and it seems likely there are several causes (Boke & Ross, 1978).

While reading through some recently purchased back issues of the CSJGB, I came across a brief letter by A. G. Rivett (1967) on his discovery that *Cereus* is also the name for a sea anemone. Rivett was concerned as to whether or not this was a typographical error and what effect the name would have on cactus nomenclature should it prove to be correct. Needless to say, this would further snarl up those who delight in prickly things. The splitters, an unruly variety (or subspecies) of taxonomist, seem to have a special affinity for the Cactaceae and one shudders to think of the damage they could do.

But not to worry! On the second page of the International Code of Botanical Nomenclature is Principle 1, which states explicitly *Botanical nomenclature is independent of zoological nomenclature*. The situation of identical generic names for an animal and a plant is fairly common, but the work of zoologists and botanists seldom overlaps, and one need not worry of *Cereus* growing side-by-side with *Cereus*.

Issues subsequent to Mr. Rivett's letter showed no reply to his request for information on *Cereus* (the other kind). While not being a marine biologist (as a Canadian prairie dweller, I have only been to salt water once or twice), a brief search of the University of Alberta

library turned up two books on sea anemones, one by Stephenson and the other by Carlgren. *C. pedunculatus* is mentioned as being the British representative (Carlgren, 1949; Stephenson, 1935).

A check of references on the Cactaceae failed to turn up the name *C. pedunculatus*. Perhaps any taxonomists working on *Cereus* (the green kind) would do well to avoid this specific epithet as a *spec. nov.*, on the grounds of Better Safe than Sorry.

So then, twelve years after posing the question, Mr. Rivett has the answer!

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## Show Scene

### AUTUMN SHOW

**Saturday 29 September at St. Saviours Hall, St. Georges Square, Pimlico, London S.W.1 from 2-6 p.m.**

**Closing date for entries:** 24 September

**Staging of exhibits:** On the day, from 9.30-10.30 a.m.

**Presentation of Awards:** 5.30 p.m.

**Trade Stand:** Jumanery Cacti

**Admission:** 10p (children 5p); free if you enter five or more classes.

If you require a Show Schedule, please send a stamped foolscap self-addressed envelope to Mrs. Hodgson, 16 The Braid, Chesham, Bucks. HP5 3LU as soon as possible. Notes on the schedule are as follows:

In line with the new 'Guide to the Genera of Cacti and Other Succulents for Show Purposes' (available from the Publicity Officer at 30p including postage; special arrangements for Branches) some of the class descriptions have changed but this will in practice make little difference to the plants acceptable in the classes.

Class 1 for three Cacti remains the same and here is the chance to show a range of specimen plants. Class 2 now reads: One plant from the Mammillaria Group and two from the Coryphantha and/or Thelocactus Groups. Apart from *Coryphantha* itself that group includes *Escobaria*, *Cochemica* and *Mamillopsis* and the Thelocactus Group includes *Gymnocactus* and *Normanbokea* amongst others.

Class 3 will now be 'One plant from the *Cereus* Group' and, here again a wide choice is possible. Class 4 and 5 are now three plants from the *Echinocactus* Group, the latter with a 3½" pot restriction, and here *Pelecyphora* is now eligible. The class for six cacti in six inch pots gives a chance for plants in other Groups to be shown.

The succulent classes remain the same but the 'Succulent from Seed' must have been raised on or after January 1977. From the new list you will see a greater range of genera is now included in all the families.

The 'intermediate' classes are retained in this Show, so those who gained first prizes in the Novice sections last year and have not won one in the open classes yet have another chance here. We hope, too, that there will be more entries in the Novice Section and if sufficient Juniors enter, their plants will be judged in a separate class.

As usual, help with setting up the Show from 9-10 p.m. on the Friday evening and from 8.30 a.m. on Saturday would be much appreciated as well as assistance in many ways in the afternoon. The Warrington and District Branch have kindly offered to look after the refreshments this time but they would like offers of cakes and savouries from members in other Branches and, no doubt, a few extra hands will be welcome in the kitchen in the afternoon (please contact Mrs. Pritchard if you are willing to help in any way).

Finally, do not forget the Tombola; if all the exhibitors would bring along a few items for this we should be well-stocked for the afternoon. Anyone who would like to contribute but is unable to be there in the morning please send your gifts to the Publicity Officer in good time.

### Summer Show Prizewinners

*Best Exhibit (Amateur Gardening Red Ribbon), Best Other Succulent (for Euphorbia didierioides), Ibbotson Cup, Sarah Cutler Cup and Best Cactus (for Echinofossulocactus ochoterenaus):* Mr. and Mrs. Maddams

*Luty Wells Cup, Shurly Cup:* Mr. D. Bowdery

*William Denton Memorial Award:* Mrs. M. Dennard

*Flora Award (for Miniature Garden):* Mrs. J. Ellis

*Novice Awards & Diploma:* Mr. D. Hooker

Other winners of First Prizes were: Mrs. Edmonds, Mr. Read, Mr. Cryer, Mr. D. Stevenson.

### Results of Prize Draw

*Stainless steel tea set:* Miss S. Binks, Bracknell; *Woolworth token:* M. Sherman, Gorton, Manchester; *Graham Kerr Cookbook:* P. Blackman, Birmingham; *Liebfraumilch in basket:* R. Andrews, Cheam; *Carters seed packs:* W. A. Schrifft, Wigan; *Broadleigh Gardens Token:* E. Barker, Wheatley, Oxford; *Wicker bag:* Mrs. Boote, Wirral; *Tray:* Mr. O' Connell, Ewell, Surrey; *Notelets:* P. Bint, Manchester; *Breadboard:* N. Bentley, Cheam, Surrey; *Pen-holder:* Mrs. J. Ellis, Cheam, Surrey.

## Branch Activities

Items for inclusion in the next issue must reach the Editor not later than 7th September.

### Essex

**Secretary:** F. Braun, 63 Heighams Road, East Ham, E6 2JJ.  
**Meeting Place:** Room A3 (film room), Little Ilford Comprehensive School, Church Road, Manor Park, London E.12.  
**Time:** 1st Saturday in month, 7 for 7.30 p.m.

Forthcoming meetings:

- |             |                                |
|-------------|--------------------------------|
| 1 September | Annual Slide Competition       |
| 6 October   | Baja California (David Minion) |
| 3 November  | Phil and Mel in Uruguay        |
| 1 December  | Annual Social Evening          |

### North London

**Secretary:** Mrs. B. Massey, 86 Auckland Road, Potters Bar, Herts.  
**Meeting Place:** Capel Manor Primary School, Bullsmoor Lane, Enfield.

**Time:** 3rd Friday in month, 7.30 p.m.

- |              |                               |
|--------------|-------------------------------|
| 21 September | The Mini Show                 |
| 19 October   | A.G.M.                        |
| 16 November  | Peru Habitat (Paul Sherville) |

### North Surrey

**Secretary:** W. F. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG.

**Meeting Place:** Adult School, Benhill Avenue, Sutton.

**Time:** 1st Tuesday in month, 7.45 p.m.

The 'Branch Restricted' Competition in June produced a record number of entries and Mr. and Mrs. Maddams had some plants of high standard to judge. Dr. & Mrs. Smale gained the highest number of points and retained the Mellins Trophy.

The Branch Show will be held in conjunction with the Carshalton Show at the new venue, The Westcroft Centre, off Carshalton High Street, on Saturday 1 September from 2-6 p.m. This is an Open Show and anyone requiring a schedule should send a stamped addressed foolscap envelope to Mrs. Maddams as soon as possible.

Other future events:

- |             |                                                                       |
|-------------|-----------------------------------------------------------------------|
| 4 September | Barranca de Venados (John Hughes)                                     |
| 2 October   | Interesting Newer Mammillarias (Bill Maddams)                         |
| 6 November  | Members' evening: Bring along or talk about your 'Top Twenty' plants. |

### Warrington & District

**Secretary:** Mrs. D. Pritchard, 81 Birdwell Drive, Great Sankey, Warrington, tel. no. Penketh (092572) 4699.

The Branch was very fortunate to have the opportunity to meet the President of the Mexican Society, Sr. Sanchez-Mejorada, accompanied by Mr. David Hunt, on 20 May, and enjoyed his talk on the Sierra Madre Occidental very much. Another highlight of the programme has been the visit of the Chairman and his wife, Mr. and Mrs. Maddams, and their most informative talk on Mammillarias.

As a follow-up to the special meeting last November, when Mr. T. Jenkins visited Warrington, the Branch will be pleased to welcome Mr. Henk de Looze (Holland) on 14 October, when, accompanied by Mr. Jenkins (who will also lecture) he will speak on his visit to Mexico this year.

Future Meetings:

- |              |                                                    |
|--------------|----------------------------------------------------|
| 12 September | Unusual Succulents (Keith Grantham)                |
| 10 October   | Introduction to the 'Coryphanthanae' (Robert Holt) |
| 14 October   | Henk de Looze and Tom Jenkins (see above)          |
| 14 November  | The Opuntia family (Gilbert Leighton-Boyce)        |
| 12 December  | Winter care of your plants (Dr. R. Allcock)        |

## Nursery List

Nurserymen and others who regularly offer plants or seeds for sale are listed below as a service to members, but this does NOT imply the Society's approval or recommendation of plants or other goods offered.

### North & South Yorkshire

**Cruck Cottage Cacti** (Dorothy & Ronald Wood), Cliff Road, Wreilton, Pickering, North Yorkshire YO18 8PJ. Tel. no. Pickering (0751) 72042. Open daily except Sat. morning. No lists. Nursery in garden setting.

**Whitstone Gardens Ltd.**, The Cactus Houses, Sutton-under-Whitstonecliffe, Thirsk, North Yorkshire YO7 2PZ. Tel. no. Sutton (08456) 467. Open daylight hours every day throughout the year. Send 4×7p stamps (UK) or 3 international postal reply coupons for list. Everything for the cactophile; plants, seeds, books, sundries; substantial stocks and extensive collection on view.

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### Merseyside

**Jim Bolton**, Southview, 39 Altcar Road, Formby, Liverpool L37 8DR. Tel. no. Formby (07048) 73187. Open all day Sundays, advisable to telephone for weekday visits. Large selection of seedlings, etc., all at reasonable prices. No list.

### North Wales

**Jolly's** (G. A. & M. A. Coombes), Glanrafon, Talsarnau, Gwynedd LL47 6YD. Tel. Penrhyndeudraeth (076674) 643. Open any time by appointment. No orders by post; no list. Warm welcome to holidaymakers—we are in the Snowdonia National Park.

### Derbyshire

**Abbey Brook Cactus Nursery**, Old Hackney Lane, Matlock, Derbyshire. Tel. no. Matlock (0629) 55360. Open every afternoon 2-6 except Tuesday (closed all day). List free on request, stamp appreciated. Mail order catalogue illustrated in colour lists over 1700 species of nursery-grown cacti and other succulent plants.

### Nottinghamshire

**Carlton Forest Cacti**, Carlton Forest, Blyth Road, Worksop, Notts. S81 0TP. Tel. no. Worksop (0909) 731642. Almost always open but please telephone to avoid disappointment. S.A.E. for list. Mainly cacti, very few succulents.

**Woodside Nurseries** (Stuart Dixon), 173 Main St., Burton Joyce, Notts. Tel. no. Burton Joyce (060231) 2142. Closed Mondays, open 10-4.30 other days. S.A.E. for list. Nursery-grown seedlings, specimen plants.

### South Humberside & Lincolnshire

**Southfield Nurseries** (B. Goodey), Louth Road, Holton-le-Clay, Grimsby, South Humberside DN36 5HL. Tel. no. Grimsby (0472) 822157. Open daily 10-5 (closed for lunch 12.30-1.30). Send stamp for list. Seed-grown cacti, Lithops, succulents.

**Glenhirst Cacti** (N.C. & S.A. Bell), Station Road, Swinehead, near Boston, Lincs. Tel. no. Swineshead (020582) 314. Open most days ('phone call advisable if travelling far to ensure someone available). S.A.E. for list. Lithops, Epiphyllums Asclepiadaceae.

**Jumanery Cacti** (June & Tom Jenkins), St. Catherine's Lodge, Cranesgate Road, Whaplode St. Catherine, Nr. Spalding, Lincs PE12 6SR. Tel. no. Holbeach St. Johns (040634) 373. Open 9-5 Sunday-Friday, closed Saturday. S.A.E. for list.

### Norfolk

**Richard & Wendy Edginton**, The Vines, 2 Green Man Lane, Kirstead, Norwich, Norfolk NR15 1EP. Tel. no. Brooke (0508) 58113. Open most mornings and weekends. S.A.E. for list. Seedling cactus plants 35p upwards.

**Barleyfield Succulent Plant Nursery** (Victor & Heather Graham), Southburgh, Thetford, Norfolk. Tel. no. Dereham (0362) 820457. Nearly always open, but telephone call appreciated. S.A.E. for list. 'Other' succulents, handmade plant pots.

#### Bedfordshire

**A. & V. Parker**, 31 Southill, Nr. Biggleswade, Beds. SG18 9HU. Tel. no. Hitchin (0462) 814022. Open evenings and weekends ('phone first). No list. Seed-raised plants.

**Southwest seeds** (Doug. Rowland), 200 Spring Road, Kempston, Bedford MK42 8ND. Tel. no. Bedford (0234) 58970. Open Sunday afternoons. S.A.E. for comprehensive seed list.

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**R. F. S. & B. R. Dale**, Thurnlea, 14 Buttodene Crescent, Old Nazeing Road, Broxbourne, Herts EN10 6RH. Tel. no. Hoddesdon 63234. Open almost any time but write or 'phone. No list. Full range B.E.F. pots, labels, top dressing, etc.

**Terry Douglas**, 28 Shephall Lane, Stevenage, Herts. SG2 8DH. Tel. no. Stevenage 53876. Telephone to arrange a visit. S.A.E. for list.

#### Essex

**M. L. Fussell**, 29 The Readings, Harlow, Essex CM18 7BT. Tel. no. Harlow (0279) 23246. S.A.E. for list. Service by return of post.

**The Cactus Place** (David & Barbara Brewerton), 33 Bridge Avenue, Upminster, Essex RM14 2LX. Tel. no. Upminster 29911. No list. Open 9 till dusk, but 'phone first. Large and medium sized specimens.

**H. Guirl**, Glenholme, Nursery Road, Nazeing, Essex. Tel. no. Hoddesdon 62291. Visitors and parties welcome. A prior telephone call would be appreciated. No list.

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**The Lithops (Living Stones) Specialist Ltd.**, (Roy & Sheila Young), 79 Pearcroft Road, Leytonstone, London E11 4DP. Tel. no. 01-556 8048. Visitors by appointment. S.A.E. (A4 size) for comprehensive list of Lithops plants and seeds available.

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**Mrs. Yvonne Warrick**, 122 Barnhorn Road, Little Common Bexhill, E. Sussex, Tel. no. Cooden (04243) 4726. Not open. S.A.E. for list. Rare succulents and Epiphytics.

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**Holly Gate Nurseries Ltd.**, Billingshurst Lane, Ashington, Sussex RH20 3BA. Tel. no. (0903) 892439. Open 9-5 every day, incl. weekends and Bank Hols. S.A.E. for list. Colour Catalogue 35p. Reference collection, entry 25p each.

#### Dorset

**Pine Ridge Cacti** (Joan & Dick Smeaton) 197 Ringwood Road, Verwood, Wimborne, Dorset BH21 6AG. Tel. no. Verwood (020123) 2796. Open 10-6, Closed Saturday and Monday. Choice and rarer 'other succulents'.

**Shires Mead Cactus Nursery** (D. W. & C. E. Sargant) Hampreston Village, Wimborne, Dorset BH21 7LX. Tel. no. Northbourne (02016) 3829. Not open Sundays and Mondays. List 9p. Plants and seeds.

#### Devon

**G. N. Short**, Greenshaws, 7 Reabarn Road, Brixham, Devon TQ5 9DU. Tel. no. Brixham (08045) 2878. Open by appointment. S.A.E. for list. The Devonia Collection of Cacti & Succulents; over 4000 species. Surplus plants for sale or exchange.

#### Cornwall

**The Cactus Nursery** (Mrs J. Osmond), Brandy Lane, Rosudgeon, Penzance, Cornwall TR20 9QB. Tel. no. Germoe (073676) 2397. Open 9 till dusk, Spring Bank Holiday to end of September. 'Phone in winter. List 10p. Large selection succulents. Cornish cream teas June-Sept. incl.

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Volume 41/Number 4  
November 1979

# The Cactus and Succulent Journal of Great Britain



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Cheques, etc., should be made payable to the Society and not to individual officers. When remitting in a currency other than sterling, please add the equivalent of £0.70p to cover currency negotiation charges.

**Cover:** Multi-coloured *Lobivia* hybrids in the collection of Erich Haugg, Altmuehldorf, Germany. Photo by David Hunt.

The Journal is published quarterly by the Society, price £1.25 (ISSN 0007-9375).

# The Cactus and Succulent Journal of Great Britain

Volume 41 Number 4 November 1979

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## Membership Secretary

To our great regret, Jackie Panter retired as Hon. Membership Secretary and Asst. Treasurer on 31 July. She wants to spend more time studying and writing about her collection, and we are very grateful for all the time she has given to the Society's affairs during the past two years.

With our present membership of about 1100, and not taking into account the busy renewals period (November–February), the post of Membership Secretary demands an almost daily sacrifice of an hour or more of one's time to clerical duties. Over the past decade a succession of devoted and hard-working members have all found the burden one which they were unable to shoulder for more than a couple of years, and Council now feel that it would not be unreasonable to offer to pay for our 'office work' by way of honoraria if necessary, and to ask members to contribute a little towards this through subscriptions. If any member, preferably with secretarial and/or book-keeping experience and living within reach of the Society's office at Kew, Surrey, would like more information about the post, they are invited to contact David Hunt. (Arrangements for handling renewals for 1980 have already been made, by the way, so whoever takes over will not have to deal with these.)

## American agent appointed

Members in the U.S.A. and Canada are asked to note that Mr. Dana D. Craig, 67 Hill Street, Norwood, MA 02062, U.S.A., is now acting as Hon. American agent for the Society and will be handling your 1980 renewals.

## Subscription increased by £1

Budgeting to meet higher running costs is one of two factors behind Council's decision to increase the ordinary subscription rate for next year to £5. (Joint-membership is also increased by £1 and the Senior rate by 50p, but the Junior rate remains at £2.50.) Printing costs for the 'basic' Journal were raised by 15% at the beginning of 1979 and by a further 12½% in August. Postage has also gone up by more than 15%.

Half the subscription increase, i.e. 50p, has been made to keep pace with inflation. What about the other 50p? Partly, this will be to pay honoraria for routine office work, as mentioned above, and partly (assuming 1. it is not swallowed up by inflation, and 2. membership does not decline) to sustain improvements to the Journal. The 'basic' Journal of 20 or 24 pages and few illustrations up to 1976 expanded to an average of 28 pages in 1978, and is now averaging 32 pages, with many more illustrations. The recent August issue actually cost the Society 81.5p per copy to print, including the stock held as 'Back Numbers'; distribution costs (postage, envelopes, packing and despatch) amounted to a further 16.5p per copy—leaving very little change out of £1 to finance the Society's other services!

Of course, we could cut back to 24 pages next year or economize with pictures, but would readers wish us to: To print the longer and more serious articles and yet maintain an adequate balance with non-technical features and cultivation notes, etc., we need as many pages as possible. The £5 subscription should enable us to average 32 pages per issue next year—if you will continue to back us.

## Your colour views, please!

Colour printing is notoriously expensive, especially on 'short run' publications like ours, and sadly the only British succulent plant journal to use colour other than very occasionally (or with individual colour prints) seems to be going, going, or gone, out of production. Your Editor, turning his back on the Treasurer, would like to see colour in every, or nearly every, GB issue. What would it cost? Well, the coloured illustrations in this experimental issue, plus the coloured cover, add about 40p per copy to the cost. Part of this will, on this

occasion, be paid by private sponsors, but how many subscribers would be willing to pay more for a Journal with colour? Or is there anyone else who would like to sponsor coloured plates?

### **GB Show Secretary's Luton triumphs**

Some exceptional plants and long experience of both sides of the game carried Hazel Hodgson to several splendid victories at the NCSS National Show at Luton on 25 August. She won the Sheffield Cup (Haworthias), Vera Higgins Bowl (Adromischus), Edith Ginns Cup (Lithops), Southwest Essex Cup (Conophytum/Ophthalmophyllum) and Hermann Jacobsen Memorial Trophy, five trophies in all.

Congratulations too to Joan & Dick Smeaton, who took home a large quantity of silverware from the cactus classes!

The National Show was an even greater success than the last event (in 1975) and reputedly earned the NCSS well-deserved profits of around £2000. We are grateful to their Show Committee for providing space free-of-charge for a GB stand (prominent in the photo, below) where we enrolled 30 members during the course of the afternoon.

### **GB Autumn Show Award-Winners**

At our Autumn Show, held at Pimlico on 28 September, the award-winners were as follows:

*Best Cactus*: Mr. & Mrs. Maddams

*Best Succulent*: Mrs. M. Dennard

*Sir William Lawrence Cup*: Mr. & Mrs. Maddams

*Evelyn Theobald Cup*: Mr. & Mrs. Maddams

*Collings Cup*: Mr. & Mrs. Maddams

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*Pryor Award*: Mr. D. Hooker

*R.H.S. Banksian Medal*: Mr. D. Bowdery

### **Those undercactussed countries**

*(with apologies to Professor Nodrog Yelwor)*

1980 is to be International Year of the Cactus—a happy idea from one of the regular contributors to these columns. Preparations are already in hand, assessing how best to combat the appalling lack of cactivity in many

NCSS National Show, 25 August

*(photo: Peter Chapman)*



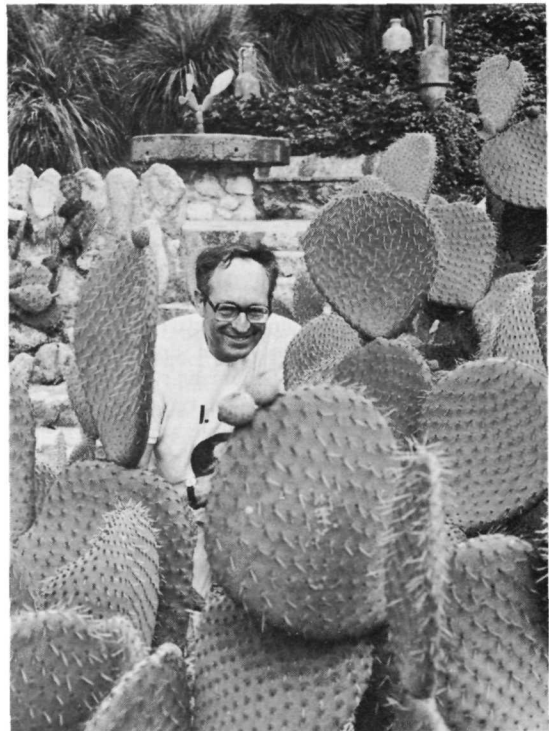


Tom Lavender's Creeping—and flowering—Devil (*Machaerocereus eruca*) on display at the NCSS National Show  
(photo: Peter Chapman)

parts of the world. Did you know, for instance, that less than one inhabitant in 73 interviewed in Alaska had ever seen *Gymnocalycium horridispinum* (see p. 112), and not a single resident on Ascension Island knew the difference between *Encephalocarpus* and *Echinofossulocactus*? Maps are being drawn up of the most undercactused regions of the fourth, fifth and sixth worlds, and relief in the form of prepacked seedlings will be dropped by helicopter.

Prof. N. Yelwor brings equally disturbing news on his return from a six-hour tour of Mexico and South America. Many of the wild cacti are growing in quite unsuitable soil that would never be tolerated by any well-read English cactarian. He recommends (in an 83 mm. thick white, pink and pale mauve paper) that the undernourished plants should be flown in for a free holiday in Europe before returning them sufficiently well-fed to the habitats. In March, Prof. Yelwor, who is President of the newly formed BURPS (British Union for the Relief of Plant Suffering) will unveil a new botanic garden in Wembley Stadium, which is being suitably glassed over and filled with John Innes Compost for receipt of these plants.

Following the success of his Punk Science Festival at Reading in 1978, Prof. Yelwor is planning a year of cactus-oriented films and other entertainments. Sally Cornier, the succulent heart-throb of Hollywood, has been signed up for a Metrowl-Gordwyn-Rollei remake of 'Caesar and Cleopuntia'; the 'Desert Song' will be revived with real deserts, and the season will end with two spine-chilling pantomimes: 'Cinderaloe' and 'Aloebaba and the Forty Thieves' (in three cacts).



On location for 'Caesar and Cleopuntia'. Friends, romans and countrymen press forward to lend Caesar their cars. Et tu Brute is the sinister-looking one on the right, but there are no ASPS in sight!

## Notes on *Ferocactus* B. & R.

by N. P. Taylor

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**Summary.** K. Schumann's treatment is considered preferable to that of Britton & Rose as a basis for the classification of the North American species of *Echinocactus* Link & Otto *sensu lato*. The amplification of *Ferocactus* B. & R. to correspond broadly with *Echinocactus* subg. *Ancistrocactus* K. Schum. is proposed. New combinations are made at subgeneric and sectional rank and for 13 species transferred from *Ancistrocactus*, *Coloradoa*, *Sclerocactus* and *Thelocactus*. Nomenclatural notes are appended on three untenable names (*Ferocactus acanthodes*, *F. emoryi* and *F. crassihamatus*).

### Introduction

The publication of Britton & Rose's monograph, *The Cactaceae* (1919–23), saw the fragmentation of the long-established hold-all genera *Cereus*, *Echinocactus*, *Mammillaria* and *Opuntia*. The American authors seldom used the category of subgenus but preferred instead to establish more numerous but often poorly differentiated genera where the previous monographer, Karl Schumann, in his *Gesamtbeschreibung der Kakteen* (1897–9) had used subgenera or series. The attitude of Britton & Rose has been criticised as 'the height of a local liberalism' by Benson (1969a), whilst their segregation of the North American echinocactoid genera into two subtribes 'Echinocactanae' and 'Coryphanthanae' is rejected as artificial by most modern authors. It follows that, despite its earlier date, Schumann's classification may be a better foundation on which to build than that of Britton & Rose.

The North American echinocactoid species were largely distributed by Schumann between the broadly circumscribed genera *Mammillaria* and *Echinocactus*. Hunt (1971) has shown how Schumann's classification of the former with slight modification, can be brought up-to-date, and used with considerable advantage today. The advantages of this broader attitude to genera, taken in the past by Schumann and Vaupel, and more recently by Benson, Kimmach, Moran, Hunt, Rowley, Barthlott and others are (Hunt, *loc. cit.*), that with fewer genera, classification is more readily comprehensible to someone without specialist knowledge, and the nomenclature of species is more stable, since it is not affected by minor changes of classification. Examination of Schumann's classification of *Echinocactus* in respect of the North American species, shows that with slight modifications, including the upgrading of certain subgenera to genera, it is possible to adapt it conveniently for use today.

### Schumann's subgenera of *Echinocactus*

The relevant subgenera of Schumann's classification are

listed below along with suggestions of how the arrangement of species might be improved. Subgenera I, II, IX and X, and the species nos. 9, 10, 13–15 of subg. III, are South American and are not considered here.

Subg. III. *Cephalocactus* K. Schum.\*

Species nos. 6, 7, 11 and 12 are transferred to subg. VII.

8. *E. horizonthaloni* Lem.

16. *E. grusonii* Hildmann

17. *E. ingens* Zuccarini (*E. platyacanthus* Link & Otto, lectotype of *Echinocactus* Link & Otto *sensu* B. & R.).

To be added here from subg. VII series II are:

36. *E. texensis* Hopffer (type species of *Homalocephala* B. & R.)

40. *E. polycephalus* Engelm. & Bigelow

Subg. IV. *Lophophora* (Coulter) K. Schum.

One species only:

18. *E. williamsii* Lem. (type species of *Lophophora* Coulter)

Subg. V. *Astrophytum* (Lem.) K. Schum.

Species 19–22 (including *E. myriostigma* (Lem.) Salm-Dyck, type species of *Astrophytum* Lem.); no changes proposed.

Subg. VI. *Euechinocactus* K. Schum.

Species 23–28; amalgamated with subg. VII. Series II. *Cornigeri*.

Subg. VII. *Ancistrocactus* K. Schum.

Series I. *Hamati* (Salm-Dyck) K. Schum.

Species no. 34 is transferred to series II.

29. *E. scheeri* Salm-Dyck (*E. brevihamatus* Engelm.)

30. *E. whipplei* Engelm. & Bigelow

31. *E. polyancistrus* Engelm. & Bigelow (type species of *Sclerocactus* B. & R.)

32. *E. setispinus* Engelm. (type species of *Hamatocactus* B. & R.)

33. *E. pubispinus* Engelm.

\*This subgenus contains *E. platyacanthus* Link & Otto which was formally designated as the lectotype of *Echinocactus* Link & Otto by Britton & Rose (1922), p. 166. Schumann (1898) had earlier implied lectotypification of *Echinocactus* with *E. robustus* Link & Otto (*Ferocactus robustus* B. & R.), the first species in his subgenus 6. *Euechinocactus*, but this was not amongst the species originally published in the genus by Link & Otto in 1827. If used as a subgenus of *Echinocactus* today, subgenus 3. '*Cephalocactus*' must be renamed subg. *Echinocactus*.

35. *E. uncinatus* Galeotti (type species of *Glandulicactus* Backeb.)

To be added here from subgenera III, VII ser. II, and XI are:

6. *E. heterochromus* A. Weber
7. *E. bicolor* Galeotti ex Pfeiffer
42. *E. mathssonii* Berge ex K. Schum. (*E. crassihamatus*; see p. 90)

121. *E. leucacanthus* Zuccarini

122. *E. ehrenbergii* Pfeiffer

124. *E. glaucus* K. Schum.

135. *E. johnsonii* Parry ex Engelm.

Series II. *Cornigeri* (Salm-Dyck) K. Schum.

Species 36 and 40 are transferred to subg. III, and no. 42 to ser. I above.

37. *E. emoryi* Engelm. (*Ferocactus covillei*; see p. 92)

38. *E. recurvus* Link & Otto

39. *E. macrodiscus* Mart.

41. *E. parryi* Engelm.\*

43. *E. corniger* DC. (*Cactus latispinus* Haw.)

44. *E. orcuttii* Engelm.

45. *E. peninsulae* A. Weber

46. *E. viridescens* Torrey & Gray

47. *E. cylindraceus* Engelm. (*Ferocactus acanthodes* auct.; see p. 91)

48. *E. wislizeni* Engelm. (type species of *Ferocactus* B. & R.)

To be added here from subgenera III, VI and VII ser. I are:

11. *E. pilosus* Galeotti

12. *E. haematacanthus* Monville ex A. Weber

23. *E. robustus* Link & Otto

24. *E. pottsii* Salm-Dyck

25. *E. pfeifferi* Zuccarini (*E. glaucescens* DC.)

26. *E. flavovirens* Scheidw.

27. *E. electracanthus* Lem. (*E. hystrix* DC.)

28. *E. echidne* A. DC.

34. *E. longihamatus* Galeotti (*E. hamatacanthus* Muehlenpfordt)

Subg. VIII. *Stenocactus* K. Schum.

Species 49–66 (including *E. coptonogonus* Lem., selected by Britton & Rose as the lectotype of *Echinofossulocactus* Lawr.); no changes proposed at present.

Subg. XI. *Thelocactus* K. Schum.

Species 121, 122, 124 and 135 are transferred to subg. VII ser. I.

117. *E. tulensis* Poselger

118. *E. lophothele* Salm-Dyck

119. *E. rinconensis* Poselger

120. *E. phymatothelos* Poselger

123. *E. hexaedrophorus* Lem. (type species of *Thelocactus* B. & R.)

125. *E. papyracanthus* Engelm. (type species of *Toumeyia* B. & R.)

126. *E. saussieri* A. Weber

127. *E. smithii* Muehlenpfordt (a poorly typified name)

128. *E. macdowellii* Rebut ex Quehl

129. *E. unguispinus* Engelm.

130. *E. beguinii* A. Weber ex K. Schum.\*

131. *E. horripilus* Lem.

132. *E. sileri* Engelm. (type species of *Utahia* B. & R.)

133. *E. intertextus* Engelm.

134. *E. krausei* Hildmann

136. *E. simpsonii* Engelm. (type species of *Pediocactus* B. & R.)

137. *E. durangensis* Runge

138. *E. turbiniformis* Pfeiffer (*Mammillaria disciformis* DC., type species of *Strombocactus* B. & R.)

## Discussion

As understood here, subg. III corresponds with *Echinocactus* Link & Otto sens. str. (B. & R.), but including *Homalocephala* B. & R.; subg. IV with genus *Lophophora* Coulter, and subg. V with *Astrophytum* Lemaire. These three have been accepted at generic rank by both Buxbaum (1962) and Hunt (1967), though Benson (1969b) includes the last with the first. Their circumscription has been dealt with by Hunt, loc. cit., pp. 460, 463.

Subgenus VII (including subg. VI) contains the elements of five Britton & Rose genera: *Ancistrocactus*, *Hamatocactus*, *Sclerocactus*, *Thelocactus* (in part) and *Ferocactus*. It may be circumscribed and distinguished from subgenera III–V as follows: stems ribbed or distinctly tuberculate-ribbed; at least the flowering or fruiting areoles with nectar-secreting glands; ovary scaly, scales glabrous in their axils or with short inconspicuous felt; fruit normally dehiscent, scaly but otherwise  $\pm$  glabrous; seeds various, but never cup-shaped (as in *Astrophytum*). Schumann's two series represent the small- and large-growing species respectively. In series I. *Hamati* the seeds have either tuberculate testa surfaces, or a reticulate patterning of raised testa cell-walls, but are never pitted; in series II. *Cornigeri* the testa of the seed is either smooth, pitted or reticulate, but never tuberculate. If, like the foregoing subgenera, this subgenus is given generic rank, then the most suitable generic name is *Ferocactus* B. & R. (1922). The two series recognized by Schumann can be conveniently raised to subgeneric rank within *Ferocactus*, the first becoming subg. *Ancistrocactus*, while the second must be subg. *Ferocactus* as it contains Britton & Rose's type species *F. wislizeni* (Engelm.) B. & R.

Subgenus VIII (*Stenocactus* K. Schum.) is equivalent to *Echinofossulocactus* Lawr. (1841). It differs from *Ferocactus* (subg. VII) only in the frequent absence of the areolar nectar-secreting glands, and, but for the nomenclatural priority of Lawrence's generic name, there would be

\*The exact affinity of *E. parryi* Engelm. is uncertain, since it is very poorly known; Britton & Rose (1922) referred it to the synonymy of *E. horizontalonius* Lem. (see subgenus 3).

\*Schumann includes here *E. erectocentrus* Coulter, a distinct species belonging in this subgenus, which was selected as the type of *Echinomastus* B. & R. (1922), pp. 148–9.

every justification for its inclusion in *Ferocactus* as subgenus *Stenocactus*. A proposal for the conservation of *Ferocactus* B. & R. (1922) versus *Echinofossulocactus* Lawr. (1841) and the allied *Leuchtenbergia* Hook. (1848), is being formally drafted.

Subgenus XI (*Thelocactus* K. Schum.) remains the most diverse of Schumann's North American divisions, but its contents hardly merit the seven genera to which they were referred by Backeberg. This subgenus may be distinguished from the above by the following: stem tuberculate, or indistinctly tuberculate-ribbed; areolar-glands seldom present; ovary with only a few scales or naked. The oldest generic name for this group is *Pediocactus* B. & R. (1913), however, if all the species listed by Schumann are included under this name a somewhat ill-assorted genus will be the result. Further research is needed into the classification of subgenus *Thelocactus*, before it can be accepted as a useful taxonomic unit.

To summarise the amendments to Schumann's infra-generic classification of the *Echinocactus* spp. of North America, it may be said that it represents five generic units: *Echinocactus* sens. str., *Astrophytum*, *Lophophora*, *Ferocactus* and *Pediocactus* (s.l.). The first three of these require little further comment as their species are but few, and are well understood. However, *Ferocactus* and *Pediocactus* are large genera to which are allied many new species described since Schumann's time. A 'Review' of *Ferocactus* is planned for a forthcoming issue of this journal, and for this a number of new names are required:

**Ferocactus** B. & R. subgenus **Ancistrocactus** (K. Schum.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus* subg. *Ancistrocactus* K. Schum., *Gesamtb. Kakt.* 334 (1898). Lectotype: *Echinocactus brevihamatus* Engelm.\* in *Proc. Amer. Acad.* 3: 271 (1856) et *Cact. Mex. Bound.* 19, tt. 18 and 19 (1859).

Species referable to sec. **Ancistrocactus**:

**Ferocactus scheeri** (Salm-Dyck) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus scheeri* Salm-Dyck, *Cact. Hort. Dyck.* 1849, 155 (1850).

**Ferocactus tobuschii** (W. T. Marshall) N. P. Taylor, **comb. nov.** Basionym: *Mammillaria tobuschii* W. T. Marshall in *Saguaroland Bull.* 6: 79 (1952).

**Ferocactus hastifer** (Werderm. & Boed.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus hastifer* Werderm. & Boed. in *Notizbl. Bot. Gart. Berlin* 11: 274 (1931).

**Ferocactus heterochromus** (A. Weber) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus heterochromus* A. Weber in *Bois, Dict. hort.* 1: 466 (1896, fide Britton & Rose (1923)).

\*The well-typified *E. brevihamatus* Engelm. (1856) has been selected for the purpose of a lectotype, in preference to the inadequately typified *E. scheeri* Salm-Dyck (1850). The former is treated as a synonym of the latter by Schumann who lists this species first in his subgenus *Ancistrocactus* Reihe 1 *Hamati* (Salm-Dyck) K. Schum. It should be noted that the genus *Ancistrocactus* B. & R. is not strictly equivalent to Schumann's subgenus of the same name, since the American authors designate *Echinocactus megarhizus* Rose (1909) as their type species, and obviously this taxon was not amongst those listed by Schumann in 1898.

**Ferocactus leucacanthus** (Zuccarini) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus leucacanthus* Zuccarini in *Pfeiffer, Enum. Cact.* 66 (1837).

**Ferocactus** subg. **Ancistrocactus** section **Sclerocactus** (B. & R.) N. P. Taylor, **comb. et stat. nov.** Basionym: *Sclerocactus* B. & R., *The Cact.* 3: 212 (1922). Type: *Echinocactus polyancistrus* Engelm. & Bigelow in *Proc. Amer. Acad.* 3: 272 (1856) et *Descr. Cact.* 29, t. 2 figs. 1 and 2 (1856).

Species referable to sect. **Sclerocactus**:

**Ferocactus polyancistrus** (Engelm. & Bigelow) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus polyancistrus* Engelm. & Bigelow in *Proc. Amer. Acad.* 3: 272 (1856) et *Descr. Cact.* 29, t. 2 figs. 1 and 2 (1856).

**Ferocactus whipplei** (Engelm. & Bigelow) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus whipplei* Engelm. & Bigelow in *Proc. Amer. Acad.* 3: 271 (1856) et *Descr. Cact.* 28, t. 1 (1856).

**Ferocactus parviflorus** (Clover & Jotter) N. P. Taylor, **comb. nov.** Basionym: *Sclerocactus parviflorus* Clover & Jotter in *Bull. Torr. Bot. Cl.* 68: 419 (1941).

**Ferocactus glaucus** (K. Schum.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus glaucus* K. Schum., *Gesamtb. Kakt.* 438 (1898).

**Ferocactus mesae-verdae** (Boissev. & C. Davidson) N. P. Taylor, **comb. nov.** Basionym: *Coloradoa mesae-verdae* Boissev. & C. Davidson, *Colorado Cacti*, 55 (1940).

**Ferocactus pubispinus** (Engelm.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus pubispinus* Engelm. in *Trans. Acad. Sci. St. Louis* 2: 199 (1863).

**Ferocactus wrightiae** (L. Benson) N. P. Taylor, **comb. nov.** Basionym: *Sclerocactus wrightiae* L. Benson in *Cact. Succ. J. Amer.* 38: 55 (1966).

**Ferocactus spinosior** (Engelm.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus whipplei* var. *spinosior* Engelm. in *Trans. Acad. Sci. St. Louis* 2: 199 (1863); *Sclerocactus spinosior* (Engelm.) Woodruff & L. Benson in *Cact. Succ. J. Amer.* 48: 131 (1976)

## NOMENCLATORIAL NOTES

### **Ferocactus crassihamatus**

According to Britton & Rose, *The Cactaceae* 3: 144 (1922), the name *Echinocactus crassihamatus* A. Weber was published in 1896 in Bois' *Dictionnaire D'horticulture*, vol. 1, p. 468. Britton & Rose evidently assumed that Weber's name was published at specific rank and thus believed it to be the oldest name for the species of *Ferocactus* with which they were concerned. However, the rank of this basionym is far from clear since Weber publishes the name beneath the entry for another species, *E. uncinatus* Galeotti, and says, 'L'E. *crassihamatus* Web. (Syn.: E. Mathsoni Hort.), de Queretaro, est une forme plus trapue, à aiguillons plus épais et . . . etc.' *E. uncinatus* is printed in bold type but *E. crassihamatus* is in italic. Elsewhere in the same work Weber variously treats other binomials as 'formes' or 'variétés' in italic type beneath the names of species he obviously accepts which are set in bold type. However, his use of these infra-specific ranks for binomials is questionable since he also gives a few varieties as trinomials. In some instances Weber mentions a taxon set in italic as an 'espèce' but places it beneath one of the species he clearly accepts in bold type.



Studying the various accounts by Weber for the Cactaceae in Bois' Dictionary it soon becomes apparent that his designations of rank for the taxa printed in italic type are equivocal and non-committal. Thus I feel that *E. crassihamatus* A. Weber is without definite rank and should not be considered for the purposes of priority (see ICBN Art. 35). The first authors definitely to assign a rank to this name were Britton & Rose, loc. cit., who published the combination *Ferocactus crassihamatus* (A. Weber) B. & R. in 1922. This means that the epithet *crassihamatus* has priority at specific rank only from this date and is antedated by another name, *Echinocactus mathssonii* Berge ex K. Schum., *Gesamtb. Kakt.*, 351 (1898). The following new combination is required:

**Ferocactus mathssonii** (Berge ex K. Schum.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus mathssonii* Berge ex K. Schum., *Gesamtb. Kakt.*, 351 (1898); *E. Matsonii* Berge in *Monatsschr. f. Kakteenk.* 3: 45 (1893) nom. nud.; *E. Mathssonii* Berge, loc. cit. 7: 76 (1897) nom. subnud. Further synonymy is as follows: *Echinocactus crassihamatus* A. Weber in Bois, *Dict. hort.* 1: 468 (1896, fide Britton & Rose), rank not clearly indicated (Art. 35); *Ferocactus crassihamatus* (A. Weber) B. & R., *The Cact.* 3: 144 (1922); *Glandulicactus crassihamatus* (A. Weber) Backeb. in *Beitr. Sukkulenteenk.* u.-Pflge, 1940, 6 (1940); *Thelocactus crassihamatus* (A. Weber) W. T. Marshall, *Cactaceae*, 169 (1941); *Hamatocactus crassihamatus* (A. Weber) F. Buxb. in *Osterr. Bot. Zeitschr.* 98: 60 (1951); *Ancistrocactus crassihamatus* (A. Weber) L. Benson in *Cact. Succ. J. Amer.* 41: 188 (1969).

### **Ferocactus acanthodes**

Dr. George Lindsay (1956) in his little-known (but most valuable) doctoral thesis on the taxonomy and ecology of *Ferocactus*, has cast doubt on the currently accepted identity of *Echinocactus acanthodes* Lemaire (1839). At present Lemaire's epithet is familiar in the combination *Ferocactus acanthodes* (Lem.) B.&R. (1922), and its use has continued unquestioned, presumably through the lack of publicity accorded to Lindsay's views. Since *E. acanthodes* Lem. is ostensibly the oldest name for a complex taxon involving numerous other names, it is essential that its status should be clarified. The following account reviews what is known about the plant Lemaire had in mind, and offers a solution to the dilemma of its true identity.

#### *Lemaire's 'superb' Echinocactus*

The above adjective was used by Lemaire, loc. cit., in praise of the dead plant on which the name *E. acanthodes* was based. He had received it from a Mr. Courant, who kept a collection of cacti at Le Havre. Courant's plant is said to have come from 'California', which may mean either the State of the USA or Baja California, Mexico. Weber (1898) and Lindsay (1956) suggest that the plant was grown from imported seed, but there seems to be no evidence to support this. Furthermore, Lindsay states that the plant was juvenile, but, Lemaire never actually said this; on the contrary he described the specimen as having a one-inch scaly fruit; presumably therefore it was mature. It seems just as likely that the plant

was imported in fruit, since ferocacti seldom set seed in cultivation as they appear to be self-sterile. Thus the earlier suggestion of a seed-raised plant would have required Courant to have flowered a number of such seedlings at once in order to obtain fruits; Lemaire makes no mention of other specimens having existed.

The very fact that the plant described had produced a fruit when only '4½ inches high and 6 inches broad' suggests that Lemaire was observing one of the smaller-growing species of *Ferocactus* and not the large plant for which we currently use the name *F. acanthodes*.

The most persuasive argument in favour of a different identity for Lemaire's plant has been given by Lindsay himself, loc. cit., p. 285. Lindsay reasonably suggests that it is unlikely that in the 1830's the collector of Courant's plant had travelled far inland through the desert regions and mountains of SE. California, to the habitat of the plant we know today. Much more likely is that the specimen was collected near the coast and represented one of the littoral species such as *F. viridescens* (Torrey & Gray) B.&R., *F. fordii* (Orcutt) B.&R. or *F. chrysacanthus* (Orcutt) B.&R. Unfortunately, in the absence of any illustration of Lemaire's plant, its description alone is not sufficient to permit positive identification of one of these coastal species.

#### *The trusted opinion of Dr. Weber*

The present use of the epithet '*acanthodes*' can be credited to Weber (1898), whose opinion was subsequently uncritically accepted by Britton & Rose (1922). Before Weber, the plant now known as *Ferocactus acanthodes* was usually called *Echinocactus cylindraceus* Engelm. (1856), as in Foerster (1885) and Schumann (1898). Weber, loc. cit., states that he had compared plants of Engelmann's species with a preserved specimen of an *Echinocactus* that had flowered in the collection of Monville in 1846. The preserved specimen compared favourably with those of *E. cylindraceus*, and Weber implies that this specimen was conspecific with the one Lemaire had earlier received from Courant. Monville and Courant were certainly contemporaries, but Weber does not explain why he supposes they both possessed Lemaire's species. It seems unlikely that Monville possessed specimens of the Courant-Lemaire plant in 1839 since, surely Lemaire, who worked extensively with Monville's collection would have mentioned their existence. Weber's interpretation of the preserved Monville specimen is, in any case dubious, since, once again there is the difficulty of collecting '*acanthodes*' in the 1840's. Engelmann's *E. cylindraceus* had remained unknown until it was discovered by a US. Army expedition between 1849-50. The type specimen was collected by C. C. Parry, the officer in charge, from a place called San Felipe in a desolate area of SE. California. Did the collectors that Monville had sent out in search of new cacti reach the inaccessible haunts of this species before the US. Army? Even if they did, there is still no evidence that Courant's plant had had the same origin.

### Conclusion

Though it is difficult to suggest a certain identity for *E. acanthodes* Lem., it does seem most unlikely that the name was originally proposed for the plant known as *F. acanthodes* today. The loss of the epithet 'acanthodes' is unfortunate in view of its considerable usage since 1922. However, much worse would be the confusion should the name ever be re-applied to one of the coastal taxa to which it probably relates. To this end its future use can be prevented if the name *Ferocactus acanthodes* is rejected as having been 'persistently used for a taxon not including its type' (ICBN, 1978, Art. 69). Therefore, I propose that *Ferocactus acanthodes* (Lem.) B.&R. be placed on the list of *nomina rejicienda*, as provided for under Art. 69.

The correct name for *Ferocactus acanthodes* auctt. is then **F. cylindraceus** (Engelm.) Orcutt (1926), based on *Echinocactus cylindraceus* Engelm. in Proc. Amer. Acad. 3: 275 (1856); *E. viridescens cylindraceus* Engelm. in Amer. J. Sci. ser. 2, 14: 338 (1852); type: Parry, s.n. (MO).

### *Ferocactus emoryi*

In 'Die Cactaceae', and the various editions of the Kakteen Lexicon, Backeberg (1961, 1966, 1978) uses the name *Ferocactus emoryi* for the species correctly known as *F. covillei*.<sup>\*</sup> As other authors have been aware, the original *Echinocactus emoryi* Engelm. was a form of *F. wislizeni*, of which the name must be treated as a synonym. The background to this is as follows:

The name *Echinocactus emoryi* Engelm. first appeared in print on page 157 of Col. W. H. Emory's report of an expedition of military reconnaissance, published after 18 May 1848. Engelm. had been sent material of a large barrel-cactus collected by Emory on 25 October 1846. At this time the expedition was heading west, following the Gila River, having just crossed what is now the eastern border of Arizona. Thus the type locality of *E. emoryi* Engelm. (1848) is in Greenlee County, Arizona (Benson, 1969a). Today we know that the only large barrel-cactus found in this part of Arizona is *Ferocactus wislizeni* (Engelm.) B.&R. (*Echinocactus wislizeni* Engelm.) The name *E. wislizeni* Engelm. in Wislizenus (1848) was published before *E. emoryi* in 1848 (cf. Benson, 1975), for a plant that normally has 12–20 slender, white radial spines, and 4 strong, reddish-brown central spines. Unfortunately the plant collected by Emory must have been an aberrant example of *E. wislizeni*, for it had only eight spines per areole. This caused Engelm. to think it was a new species, which he named after Emory.

<sup>\*</sup>*F. covillei* B. & R. (1922) seems closely allied to *F. rectispinus* (Engelm.) B. & R. from the E. coast of Baja California. *F. rectispinus* may represent the Baja component of the more widely ranging, mainland *F. covillei*. If these taxa are treated as conspecific, then the correct name for the united taxon will be that of the Baja plant, which was the first to be given a valid specific name: *Echinocactus rectispinus* (Engelm.) B. & R., in Journ. N.Y. Bot. Gard. 12: 269 (1911); based on *E. emoryi rectispinus* Engelm. in Coulter, Contr. U.S. Nat. Herb. 3: 362 (1896).

Britton & Rose (1922), Lindsay (1956) and Benson (1969a) rightly cite *E. emoryi* Engelm. (1848) as a synonym of *F. wislizeni* (Engelm.) B.&R. However, after 1848 Engelm. became acquainted with a barrel-cactus that normally has only 8–9 spines per areole. He made the forgivable mistake of thinking that this plant, which came from much further south in S. Arizona and Sonora, was the same as his *E. emoryi* of 1848 from E. Arizona. Subsequently he applied the name *E. emoryi* to this second plant, initially in his 'Synopsis' (1856), and then again in the famous 'Cactaceae of the Boundary' (1859), where he provided an excellent illustration of the areole, spines, areolar-glands and flower.

Britton & Rose, loc. cit., pp. 132–3 were well aware of Engelm.'s two usages of this name, and re-described his second plant as *Ferocactus covillei*.

The nomenclature of the two species involved may be summarized thus:

**Ferocactus wislizeni** (Engelm.) B.&R., The Cact. 3: 127 (1922).

*Echinocactus wislizeni* Engelm. in Wislizenus, Mem. Tour. North. Mex. 96 (March–April 1848).

*E. emoryi* Engelm., in Emory, Mil. Recon. 157 (after 18 May 1848).

**Ferocactus covillei** B.&R., The Cact. 3: 132 (1922).

*Echinocactus emoryi* Engelm. in Proc. Amer. Acad. 3: 275 (1856), and Cact. Mex. Bound. 23–4, t. 28 (1859); non Engelm. (1848).

*F. emoryi* Orcutt, Cactography, 5 (1926).

(?) *F. emoryi* Y. Ito, Cacti 1952, 104 (1952).

*F. emoryi* Backeb., Die Cact. 5: 2719–9, figs 2581–2 (1961), and Das Kakteenlexicon, 155 (1966).

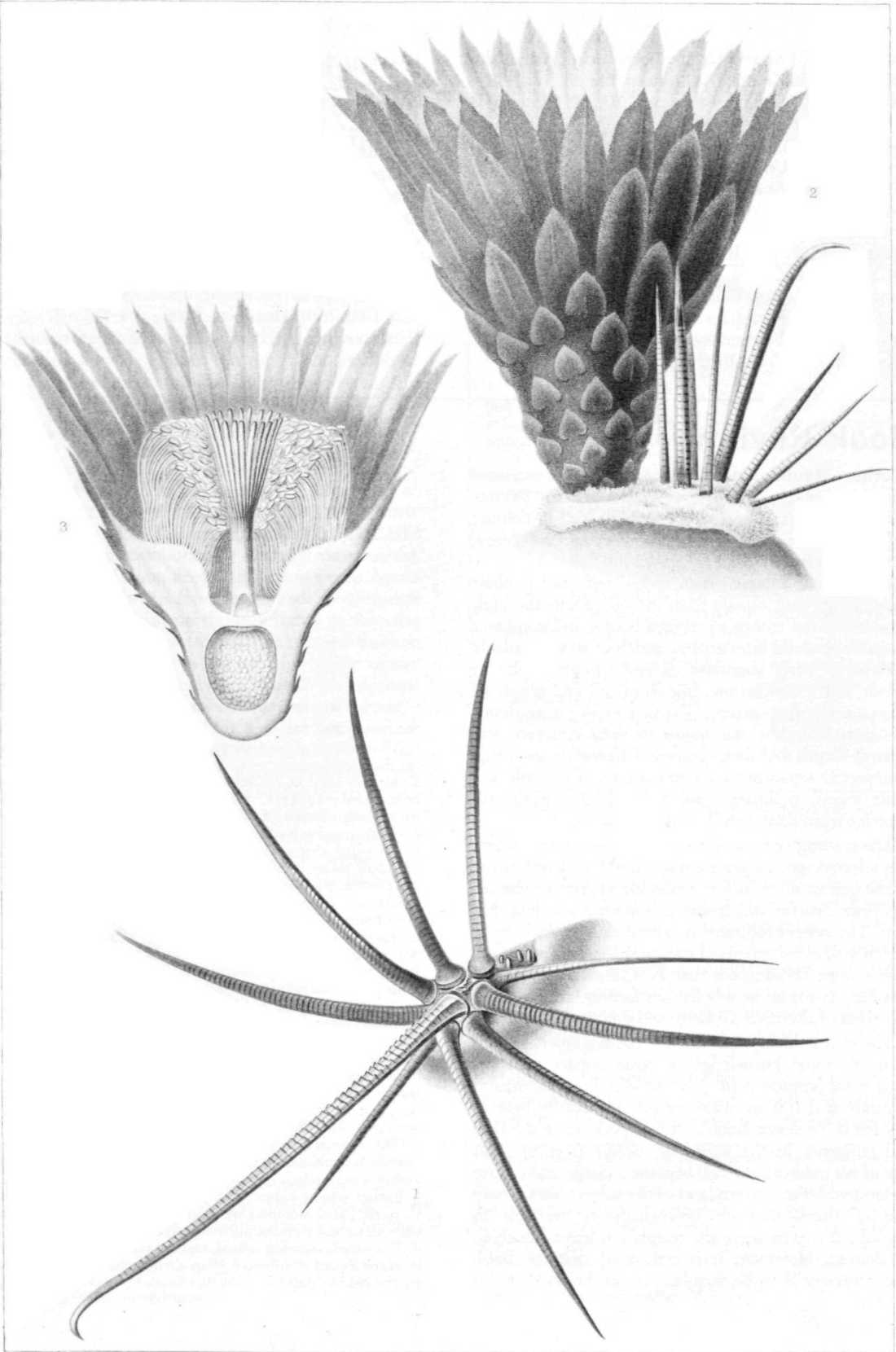
N.B. (i) As it is a later homonym, *E. emoryi* Engelm. (1856, 1859) is illegitimate under ICBN Arts. 45 and 64, and is not taken into account for purposes of determining priority.

(ii) The name *Ferocactus emoryi* is treated as a new name with priority from 1926 only.

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Facing page. The plate of '*Echinocactus emoryi*' in Engelm.'s *Cactaceae of the Boundary*, subsequently identified by Britton & Rose as *Ferocactus covillei*.



P. Roetter del.

Picart sc.

ECHINOCACTUS EMORYI

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## Book Review

**Werner Rauh.** *Kakteen an ihren Standorten unter besonderer Berücksichtigung ihrer Morphologie und Systematik.* 230 pp., 784 illustrations, including 72 in colour; 10 $\frac{3}{4}$  x 9 $\frac{1}{2}$  inches (270 x 215 mm.) Verlag Paul Parey, Berlin 1979. Price DM 98 (c. £25).

'Cacti in their habitats, with special reference to their morphology and classification' is well up to the high standard of the author's previous books, and combines a wealth of useful information, much of it not available elsewhere, with abundant original photographs in colour and monochrome, line drawings and maps, all of an equally fine quality. The first 85 pages introduce the cacti from the standpoint of their structure and growth forms, and their ecology. Fascinating and often unexpected topics include comparisons of juvenile and adult forms, pollination mechanisms, parasitism and habitats, from alkaline soils to flooded areas.

The ensuing systematic section documents the genera and selected species, with a novel key for identification of the genera using as far as possible vegetative characters since flowers and fruits are sometimes not readily seen. The system followed is nearest that of Backeberg, which will cause groans in certain quarters, but in fairness it must be admitted that Prof. Rauh considers no existing classification wholly satisfactory, and includes mentions of alternative systems and synonyms.

The text is meaty and not for the beginner, since it demands some knowledge of basic botany, and the high price (common to all textbooks from Germany) reminds us that if we want the best we usually have to pay for it. Professor Rauh's wide experience in the field and eminence in the world of succulents ensure that any of his publications will become a classic and cannot be ignored by serious students of the subject. So far only one of them—that on bromeliads—is available in English, and even there the translation leaves much to be desired. However, it is rumoured that the book under review is to be translated. One hopes that this

will take place and make its worthy contents accessible to a wider audience: they certainly deserve it.

G. D. ROWLEY & LOIS GLASS

### SHURLY AWARD, 1980

As announced in our August issue, this new annual award commemorating Ernest and Dora Shurly, late Presidents of the Society, will take the form of a cash prize for an article embodying original ideas, observations or research, to be published in the Journal. The winner will also be eligible to receive a silver cup, presented by the Shurly family, to be retained for one year.

Entries are now invited for the first award, for which the cash prize will be £20. The rules are as follows:

1. All members of the Society, other than members of Council, are eligible to enter.
2. Articles must be entirely the work of the entrant and must be sent to the Editor, CSSGB, 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA, England, marked 'Shurly Award', to arrive not later than 30 June 1980.
3. Provided that they relate to the cultivation or study of succulent plants, subject matter and title will be the choice of the entrant, but the judges will give credit for original ideas, reports of observations or experiments made in the field or greenhouse, etc.
4. Entries must be type-written, or clearly hand-written, double-spaced and with wide margins (at least 1 $\frac{1}{2}$  inches) on A4 or foolscap paper, on one side of the paper only. Illustrations should be in a form suitable for publication (e.g. good quality glossy prints of black and white photographs, colour transparencies suitable for reproduction in black and white, line-drawings, diagrams or maps drawn in black ink.).
5. There is no restriction on length of articles or on number of illustrations (if any), but credit will be given for conciseness and layout as well as for substance and style, and the Editor reserves the right to abridge or edit texts prior to publication, and to omit or replace illustrations as may seem desirable.
6. The submission of an entry will be deemed as giving consent for its publication in the Journal, without prejudice to the author's copyright.
7. Entries will be judged by a panel appointed by the Society's Council. Panel members will include experienced contributors on both technical and popular aspects of the hobby.
8. The panel's decision is final, and the right is reserved to withhold the award if no entry of an adequate standard is received by the closing date.

## Recent Mammillaria Discoveries

by D. R. Hunt

Royal Botanic Gardens, Kew  
Richmond, Surrey

### Introduction

Such is the diversity of the genus *Mammillaria* in Mexico that after nearly two centuries of botanical exploration new species are still being discovered or named almost every year. In this paper I shall mention some thirty taxa introduced to cultivation during the 1970s, including some to be formally named and described for the first time. At the outset, I should like to acknowledge and applaud the continuing tradition of study and exploration by German-speaking devotees of the genus, which is reflected in the high proportion of the new species which have been named in their honour, or have been discovered or described by them.

It is not my intention simply to catalogue the novelties in alphabetical or chronological order but to try also to take a longer perspective and consider how they broaden our overall knowledge of the genus and fit into the patterns of evolution and speciation it appears to display. To do this, I first need to remind you briefly of the classification of the genus, which gives me an opportunity to acknowledge the debt of all students of *Mammillaria* and of the Cactaceae as a whole to the first President of the Gesellschaft für Kakteenfreunde, later the Deutsche Kakteen-Gesellschaft, Karl Moritz Schumann (1851-1904), who laid stable foundations for the classification of the genus, and to Dr. Franz Buxbaum (1900-1979), for many stimulating ideas, based on intensive morphological studies, on the possible nature and direction of evolution in the family, notably its North American echinocactoid segment.

### Classification

The major species groups which I include in *Mammillaria* are listed in Table 1. Each group is formally typified by the species named on the right. The system is based on Schumann's, with modifications made in the light of work by Buxbaum and others.

The major groups of the scheme may be envisaged as having evolved from a common ancestral stock with *Escobaria* (in which I include *Neobesseyia*, *Cochiseia*, etc.) (Table 2). I may observe in passing that I agree with Buxbaum that *M. candida* must have had a different phyletic origin from the rest of *Mammillaria* and that *Escobaria* is of quite separate evolutionary lineage from *Coryphantha*. It would be more plausible in my opinion

Based on a lecture delivered at the Annual General Meeting of the Deutsche Kakteen Gesellschaft at Nuremberg, 12 May 1979, with additions and amendments.

Subdivisions	Type species
subgenus MAMMILLOYDIA	<i>M. candida</i>
subgenus DOLICHOTHELE	
series LONGIMAMMAE	<i>M. longimamma</i>
DECIPIENTES*	<i>M. decipiens</i>
subgenus OEHMEA	<i>M. beneckeii</i>
subgenus COCHEMIEA	<i>M. halei</i>
subgenus MAMILLOPSIS	<i>M. senilis</i>
subgenus MAMMILLARIA	
section HYDROCHYLUS	
series LONGIFLORAE	<i>M. longiflora</i>
ANCISTRACANTHAE	<i>M. dioica</i>
STYLOTHELAE	<i>M. wildii</i>
PROLIFERAE	<i>M. prolifera</i>
LASIACANTHAE	<i>M. lasiacantha</i>
SPHACELATAE	<i>M. sphacelata</i>
LEPTOCLADODAE	<i>M. elongata</i>
section SUBHYDROCHYLUS	
series HETEROCHLORAE	<i>M. discolor</i>
POLYACANTHAE	<i>M. spinosissima</i>
SUPERTEXTAE	<i>M. supertexta</i>
section MAMMILLARIA	
series LEUCOCEPHALAE	<i>M. parkinsonii</i>
MACROTHELAE	<i>M. mammillaris</i>
POLYEDRAE	<i>M. polyedra</i>

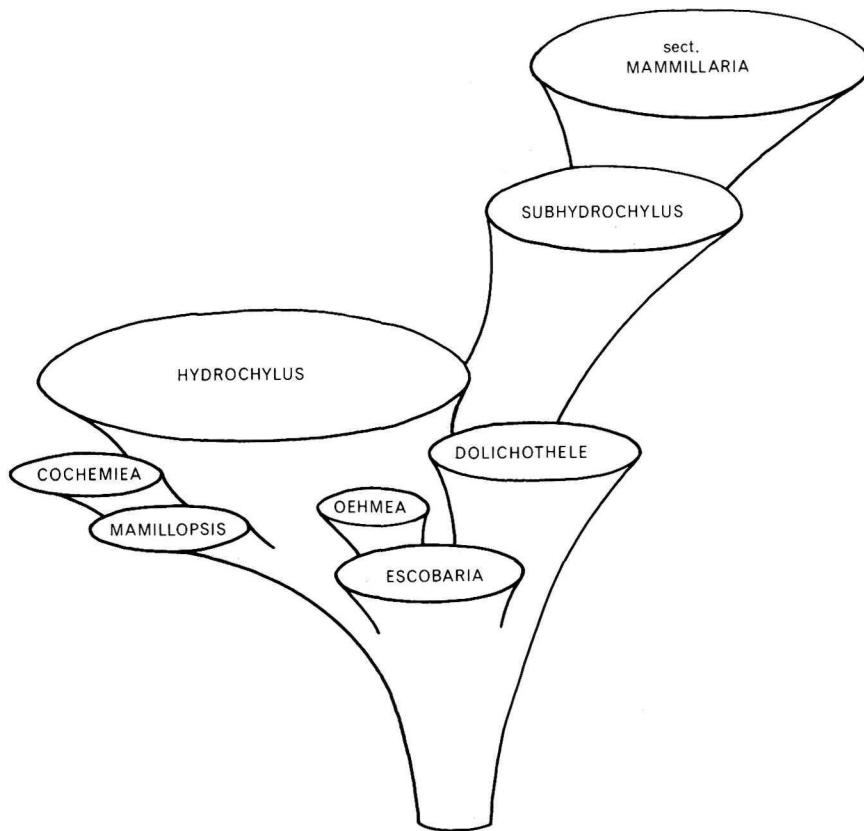
Table 1. Subdivisions of the genus *Mammillaria*

to treat *Escobaria* as a subgenus of *Mammillaria* than to combine it, as Benson, Glass & Foster, and recently Zimmerman, have done, with *Coryphantha*.

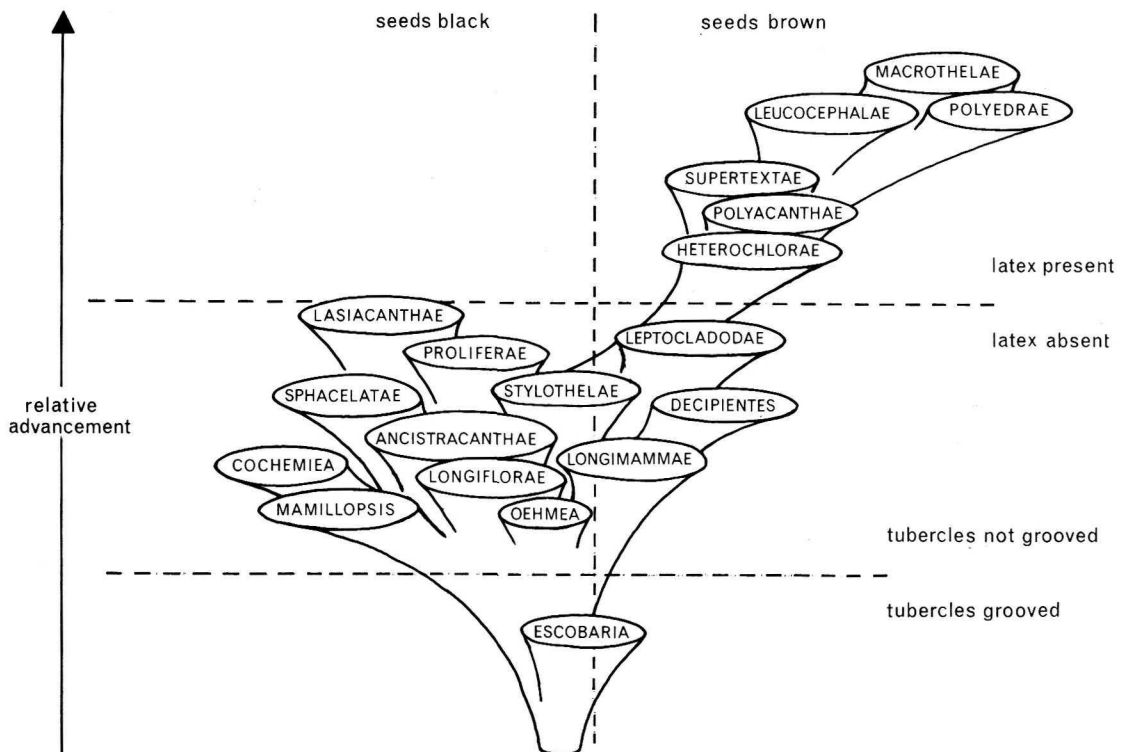
The next diagram (Table 3) attempts to indicate hypothetical relationships and relative advancement of the individual species-groups or series (Reihen) with the dimension of time represented by the axis of projection and the relatively advanced groups toward the top of the diagram.

Following Buxbaum, the diagram suggests that the principal developments in the history of the *Mammillaria* group, after the loss by neoteny of the tubercular groove,

\***Mammillaria** (subg. *Dolichothele*) series **Decipientes** D. R. Hunt, **series nova**; plantae pro subgenere parviflorae, floribus albidis; semina brunnea pyriformia, cellularum parietibus radialibus sinuatis. Species typica: *M. decipiens* Scheidw. Syn. *Pseudomammillaria* F. Buxb. in Oesterr. Bot. Zeitschr. 98:84 (1951), pro gen. (typ. *M. camptotricha* Dams); gen. *Dolichothele* ser. *Microfloridae* Tieg. in Jahrb. Deutsch. Kakt. Ges. 1: 103 (1936), nomen tantum, ex Backeb., Die Cact. 5: 3517 (1961), in clavi, sine descr. lat.



**Table 2.** Hypothetical phylogeny of the principal *Mammillaria* groups and *Escobaria*



**Table 3.** Hypothetical evolutionary trends and series-interrelationships in *Mammillaria*

have been the development of laticifers (latex bearing cells), recently the subject of detailed study (Mauseth in Amer. J. Bot. 65(4): 415-420. 1978) and changes in seed-structure. The conspicuous floral modifications seen in *Cochemia* and *Mamillopsis* are regarded as peripheral specialisations, if not eccentricities.

Against this perspective, we may now tabulate the new *Mammillarias* in their appropriate series (Table 4).

Series	Taxon
LONGIMAMMAE	1 <i>heidiae</i>
LONGIFLORAE	2 <i>saboeae</i> f. <i>haudeana</i>
	3 <i>longiflora</i> f. <i>stampferi</i>
ANCISTRACANTHAE	4 <i>meridiorosei</i>
	5 <i>wrightii</i> f. <i>wolfii</i>
STYLOTHELAE	6 <i>fittkau</i>
	7 <i>oteroi</i>
	8 <i>mathildae</i>
	9 <i>pennispinosa</i> var. <i>nazasensis</i>
	10 <i>ascensionis</i>
	11 <i>sp.</i> (Lau 1186: Cerro Viejo)
PROLIFERAE	12 <i>sp.</i> (Lau 1063: Aramberri)
LASACANTHAE	13 <i>carmenae</i>
	14 <i>lauri</i> f. <i>lauri</i>
	15 f. <i>dasyacantha</i>
	16 f. <i>subducta</i>
SPHACELATAE	17 <i>kraehenbuehlii</i>
	18 <i>tonalensis</i>
HETEROCHLORAE	19 <i>sp.</i> (Otero: Toluca)
POLYACANTHAE	20 <i>centraliplumosa</i>
	21 <i>ernestii</i>
	22 <i>virginis</i>
	23 <i>xaltianguiensis</i>
	24 <i>sp.</i> (Lau 1055: Yolox)
SUPERTEXTAE	25 <i>reppenhagenii</i>
	26 <i>huitzilopochtlii</i>
MACROTHELAE	27 <i>miegiana</i>
	28 <i>tayloriorum</i>
	29 <i>rubrograndis</i>
POLYEDRAE	30 <i>beiselii</i>

Table 4. The new *Mammillarias* in their appropriate series

#### Enumeration of new and recently described taxa

##### Subgenus *Dolichothele*

##### Series LONGIMAMMAE

1. *M. heidiae* Krainz in Kakt. u. a. Sukk. 26(10): 217, with fig. (1975). Type: Mexico, Puebla, north of Acatlan, near El Papayo, alt. 1600 m, Jan. 1974-March 1975, H. & F. Kraehenbuehl (ZSS 280174).

A very interesting species whose tubercles, yellow flower and green to dull red fruit indicate that it is allied to the *M. longimamma* complex and to *M. surculosa* and its allies, all of which occur to the north of the Trans-Mexican Volcanic Belt. Geographically, the nearest ally of *M. heidiae* is *M. zephyranthoides*, a species which may be one

of the most ancient in the genus, judging by its possession of various assumedly primitive features and by its occurrence with only slight variation both north and south of the Volcanic Belt.

##### Subgenus *Mammillaria*

##### Section *Hydrochylus*

##### Series LONGIFLORAE

2. *M. saboeae* Glass & Foster f. *haudeana* (Lau & Wagner) D. R. Hunt, **stat. nov.** Basionym: *M. haudeana* Lau & Wagner in Kakt. u.a. Sukk. 29(11): 253 (1978). Type: Mexico, Sonora, Yecora, Lau 777 (in HEID 46636).

This is an interesting and attractive member of the *M. saboeae* group but scarcely merits recognition as a distinct species. It is better known by its easily remembered collection number (Lau 777) and is, by general consensus, I think, a form or 'topotype' of *M. saboeae* (with which *M. goldii* may also be combined). Reduction to varietal rank has been proposed by Rowley in J. Mamm. Soc. 19: 30 (1979) and by Glass & Foster in CSJA 51(3): 124 (1979), but both reductions are regarded at Kew as invalidly published under ICBN Art. 33.2.

3. *M. longiflora* (B. & R.) A. Berger f. *stampferi* (Reppenhagen) D. R. Hunt, **stat. nov.** Basionym: *M. stampferi* Reppenhagen in Kakt. u.a. Sukk. 30(8): 187 (1979). Type: Mexico, Durango, near El Salto, alt. 2,600 m, 16 February 1978, Reppenhagen 1358 (ZSS). Also collected by Lau, no. 1250.

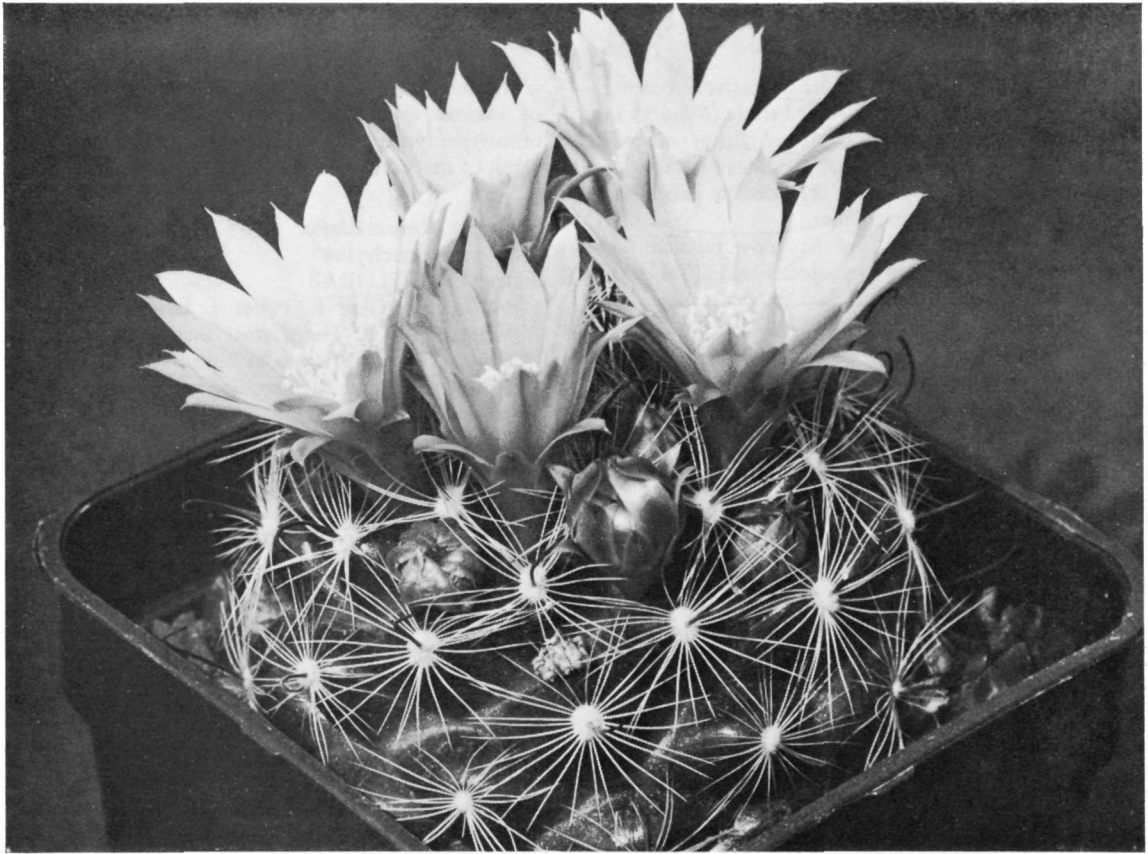
Flowering slightly earlier than the usual cultivated forms, and with relatively short-tubed, uniformly coloured flowers, this population of *M. longiflora* was discovered by Josef Stampfer, an Austrian who works in the forest service of the Mexican Government.

##### Series ANCISTRACANTHAE

4. *M. meridiorosei* Castetter, Pierce & Schwerin in CSJA 50: 176-8, figs. 1-5 (1978); and in J. Mamm. Soc. 19(4): 45 et seq. (1979). Type: USA, New Mexico, Hidalgo County, Clanton Canyon, Guadalupe Mts., 1 mile E. of Arizona border, 11 miles N. of Mexican border, at 6,000 ft, 30 November 1974, Brack 4335 (in UNM 63436) New Mexico, S. Arizona and Mexico (Sonora and Chihuahua).

*M. meridiorosei* is merely a new and probably superfluous name for what has been known as *M. wrightii* var. *wilcoxii*. The segment of this complex in the United States has been studied in great detail by D. and A. Zimmerman (in CSJA 49: 23-34, 51-62. 1977), but the more extensive Mexican segment in which several species have been named awaits analysis.

5. *M. wrightii* Engelm. f. *wolfii* D. R. Hunt **forma nova**; a *forma typica flore albo usque 6 cm diametro distinguenda*. Typus: Mexico, Chihuahua, near Santa Clara Canyon, Menonite settlement, 6 March 1974, Lau & Schreier in Lau 1042 (K). (*M. wilcoxii* var. *wolfii* Schreier in Kakt. u.a. Sukk



*M. longiflora* f. *stampferi* (Lau 1250)

(photo: Weightman)

27(1): 9–10, with fig. (1976), nom. inval.)

This distinctive white-flowered form belonging to the *M. wrightii* complex is known from only a single collection and clearly needs further study in the context mentioned under *M. meridiorsei*.



*M. wrightii* f. *wolfii* (Lau & Schreier 1042) (photo: Schreier)

#### Series STYLOTHELAE

Although so many species belonging to the Stylothelae were described by Boedeker and others earlier this century, it still seems one of the richest sources of novelties. Part of the reason for this could be that many of the earlier species were insufficiently well-described or typified to permit definite identification or evaluation. Many of the Boedeker species are finding their way into synonymy. The first three of the recent species listed below seem distinct enough.

6. ***M. fittkai*** Glass & Foster in CSJA 43: 115–117, figs. 1–3, 5 (1971). Type: Mexico, Jalisco, N. of Lake Chapala, c. 1968, *Fittkau*; cult. in Mexico City and USA. AbG 69–1169 (POM). Also coll. Barranca de Guadalajara, *Kimmach*.

The particular interest of *M. fittkai* is that it is equivocal in characters between the Stylothelae and the Ancistracanthae, both morphologically and geographically. It has the relatively few acicular spines and tendency to form cylindrical stems of the latter series, but the smaller flower and more compact, free-flowering habit of the former. It grows in Jalisco, where its nearest neighbour in the Ancistracanthae is *M. occidentalis*, and its neighbours in the Stylothelae are *M. jaliscana* and *M. zeilmanniana*, not themselves intimately related.



7. **M. oteroi** Glass & Foster in CSJA 47: 24, with figs. (1975). Type: Mexico, Oaxaca, Alta Mixteca, near Buenavista de la Concepcion, alt. c. 1,800 m, under oak trees in black humusy soil with *Agave gilbeyi* and *Yucca sp.*, 1971, Otero in AbG 72-003 (POM, holo., MEXU, 'clonotype').

*M. oteroi* is remarkable in being the first and so far the only member of the series discovered south of the Trans-Mexican Volcanic Belt. It is very distinctive in its proliferous habit and peculiar fruits.

8. **M. mathildae** Krachenbuehl & Krainz in KuaS 24(12): 265 (before 11 December 1973) and in Krainz, Die Kakteen Lfg. 55 (3 December 1973). Type: Mexico, Querétaro, SE. of city, near La Canada, amongst stones and shrubs with *Ferocactus latispinus*, 1968, *M. Wagner* (ZSS 9668).

Like *M. oteroi* and *M. fitzkau*, *M. mathildae* is strangely without obvious allies. The tubercles are reminiscent of *M. decipiens*, but the seeds are very dissimilar. Unlike the members of the *M. wildii* group, which occur in this part of Mexico, the tubercular axils are naked and without bristles.

The three other members of the Stylothelae to be mentioned are of much more uncertain status at present.

9. **M. pennispinosa** Krainz var. **nazasensis** Glass & Foster in CSJA 47: 96, with figs. (1975). Type: Durango, about six miles W. of Highway 45 near the Rio Nazas, 30 October 1968, G. & F. 802 (ZSS, holotype).

Seemingly equivocal between *M. pennispinosa* and the *M. mercadensis* complex.

10. **M. ascensionis** Reppenhagen in KuaS 30(3): 61-2, with figs. (1979). *M. glassii* var. *ascensionis* (Reppenhagen) Glass & Foster in CSJA 51(3): 126 (1979). Type: Mexico, Nuevo Leon, near Ascension, alt. 2,400 m, 11 November 1975, *Reppenhagen* 1062 (ZSS).

11. *M. sp.* (Cerro Viejo). Collected in Mexico, Tamaulipas, between Jaumave and Ciudad Victoria, Cerro Viejo, *Lau* 1186 (living plants).

I take these two together as they appear to belong to the same complex. They are probably related to *M. glassii*, but have larger flowers. I will return to this point in my discussion later.

#### Series PROLIFERAE

12. *M. sp.* (Aramberri). Collected in Mexico, Nuevo Leon, near Aramberri, *Lau & Schreier* in *Lau* 1063 (living plants).

This thick-rooted plant with its depressed habit seems closely allied to the caespitose, pale yellow-spined plant from across the mountains in the Jaumave valley (Tamaulipas) which is usually identified as *M. viereckii*. It is debatable, however, whether this identification of *M. viereckii* is correct. The original *M. viereckii* may have been no more than a redescription of *M. picta*, in which case the other plant from Jaumave and its new ally from Aramberri may deserve a new name.



*M. pennispinosa* var. *nazasensis*. A plant raised by the author from G. & F. seed (photo: Weightman)

Series LASIACANTHAE

13. **M. carmenae** Castañeda in An. Inst. Biol. Mex. 24: 233, with figs. (1953). Neotype: Mexico, Tamaulipas, between Ciudad Victoria and Jaumave, N. of La Reforma, vertical limestone cliffs, 1,300–1,500 m.s.m., 28 January 1977, *Lau* 1192 (MEXU); vide Ahuatzin Tonix in Cact. Suc. Mex. 22(4): 85–7 (1977), et Meyran, l. c. 23(1): 21 (1978).

Although *M. carmenae*, which many regard as the Queen of Mammillarias, was first described in 1953, it was only finally tracked down again by the tireless Alfred Lau in 1977 (see Lau in KuaS 28(12): 280–283. 1977, and in CSJA 50: 180–183. 1978). Its affinity to *M. schiedeana* from further south is fairly obvious.

- 14(–16). **Mammillaria laui** D. R. Hunt **species nova**; *inter species seminibus nigris ob corpus subglobosum flores mediocres kermesinos et spinas numerosissimas typice albas M. humboldtii* Ehrenb. *solum aemulans, sed caulibus, tuberculis, floribus et seminibus minoribus axillis subnudis stigmatibus albis praeclare distincta*. Typus: Mexico, Tamaulipas, between Ciudad Victoria and Jaumave, La Reja, near asbestos mine, alt. 1,000 m, *Lau* 1171 (K).

DESCRIPTION. Caespitose, the individual stems depressed globose to globose or shortly oblong, cultivated specimens having reached up to 6 cm in height and 4.5 cm in diameter. Tubercles terete, about 8 mm long and 6 mm diam. at base, dark green, in 8:13 spirals, largely hidden by the spines; sap watery; axils naked or sparsely woolly; areoles large, 3 mm diam., very shortly and densely woolly. Central spines none or numerous, more or less intergrading with the radials; radial spines 35–60 or more, in several series, about 6–9 mm long, setaceous to hair-like, white, glabrous. Flowers campanulate-funnel shaped c. 15 mm long and 12 mm in diameter expanded, carmine, pollen yellow, stigmas white. Fruit cylindrical-clavate c. 1 cm long, white or pale pink with dried perianth persisting; seeds obovate, 1 × 0.75 mm, slightly constricted above broad basal hilum, testa pitted, black. 2n = 22 (M. A. T. Johnson, ined.).

(14) forma **laui**

Central spines white, up to 12, 7–10 mm long, more or less intergrading with and indistinguishable from the radials; areoles 2–2.5 mm in diam.

In the type locality, at altitudes of c. 1,000–1,600 m, *Lau* 1171; the same, *Lau* 1224.

- (15) f. **subducta** D. R. Hunt, **forma nova**; *spinis centralibus perspicuis, usque 10–12, 7–10 mm longis, acicularibus, flavescens interdum ferrugineis saltem apicem versus, radialibus robustioribus et paucioribus quam aliis in varietatibus; areolis 3–4 mm diametro*. Typus: l.c., alt. c. 800 m, *Lau* 1222 (K).

Central spines well-marked and more or less outstanding, 7–10 mm long, pale yellow or sometimes brown, at least in the upper half, acicular, intergrading

with the radials, these fewer and stronger than in the other varieties; areoles 3–4 mm in diam.

In the type locality, at c. 800 m, *Lau* 1222 (K)

- (16) f. **dasyacantha** D. R. Hunt, **forma nova**; *spinis centralibus tenuibus albis, a radialibus non vel vix dissimilibus, radialibus permultis; areolis 1.5 mm diametro*. Typus: l.c., alt. 1,400–1,700 m, *Lau* 1219 (K).

Central spines very slender, scarcely or not distinguishable from the radials, these very numerous; areoles 1.5 mm in diam.

In the type locality, at c. 1,400–1,700 m, *Lau* 1219 (K).

An account of the discovery of this distinct and variable species has been given by Dr. Lau in CSJA 50: 180–3 (1978) with photographs of the three forms.\* Other photographs of the yellow-spined form, which Lau records as the lowermost altitudinally of the three principal ecotypes, have been published by Riha in Kaktusy 14(4): 78 (1978) and in Mitt. Arbeitskreis Mamm. 1978 (6): 186 (1978). It is greatly to be regretted that a large number of the wild plants have now been illegally removed from their natural habitat. Riha also illustrates f. *dasyacantha*.

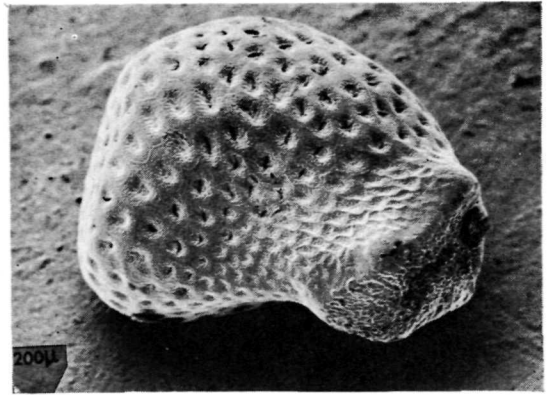
Although close relationship with *M. humboldtii* is disclaimed by Lau (l.c.), it is next to this species that, on present knowledge, I would classify *M. laui*. From the point of view of distribution, it is interesting to note that *M. schiedeana* and *M. humboldtii* are close neighbours in Hidalgo, and *M. carmenae* and *M. laui* correspondingly close in Tamaulipas. This is not to minimise the obvious dissimilarities between *M. humboldtii* and *M. laui* in the stem, spines, flower and seeds.

The yellow-spined form is at present the most familiar, partly because of these illustrations mentioned and partly through importations. I have, however, preserved a specimen of the intermediate form, the first to be submitted to me by Dr. Lau, as the holotype of the name *M. laui*. Another plant of *Lau* 1171 is depicted in the accompanying illustration.

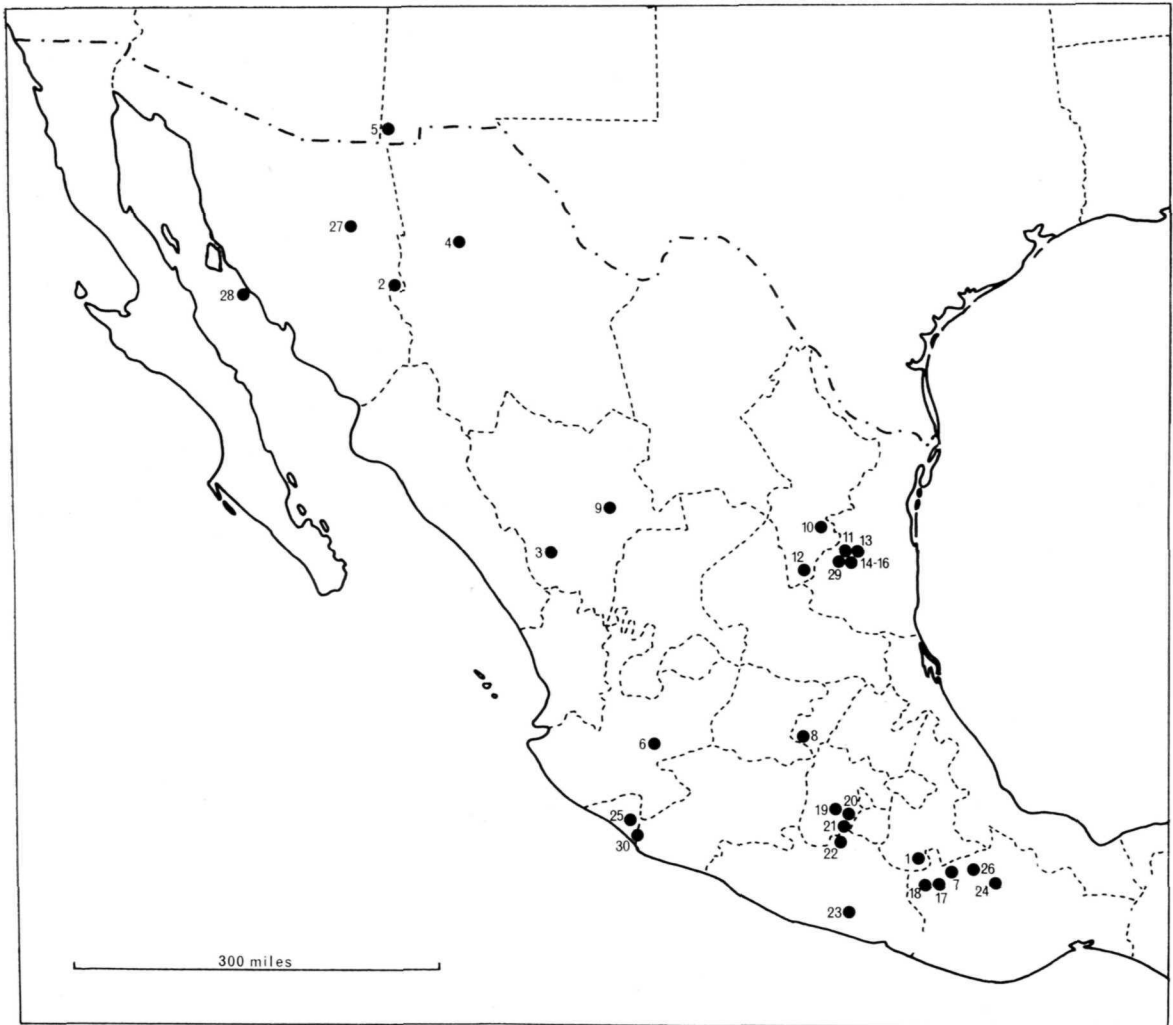
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\*Dr. Lau (in litt., 8 August 1979) has made the following further comments: 'Number 1224 has centre spines like 1171, but the plants are smaller and very softly spined. I mentioned earlier that it grew at 1300 m. altitude. Now I found out that the whole ridge has this plant, all the way up to 1600 metres. This one and number 1219 grow only in shade, mostly on vertical rocks in fissures. The soil is very black humus, of oak leaves. 1224 and 1219 are different populations, and there is intermixing. One has centre spines and the other has not. Let me be more precise, if there are centrals, they are arranged in horizontal position while at 1224 they are radiating into every direction. Number 1222 grows under very different conditions. The soil is of high mineral content. Asbestos and iron ore is abundant. Associated with this plant in short grass is a very thin-leaved *Agave* which even Reppenhausen did not know. *M. rubrograndis* and *Dolichothele sphaerica* also grow there. There is mixed forest of pine, oak and maple.'

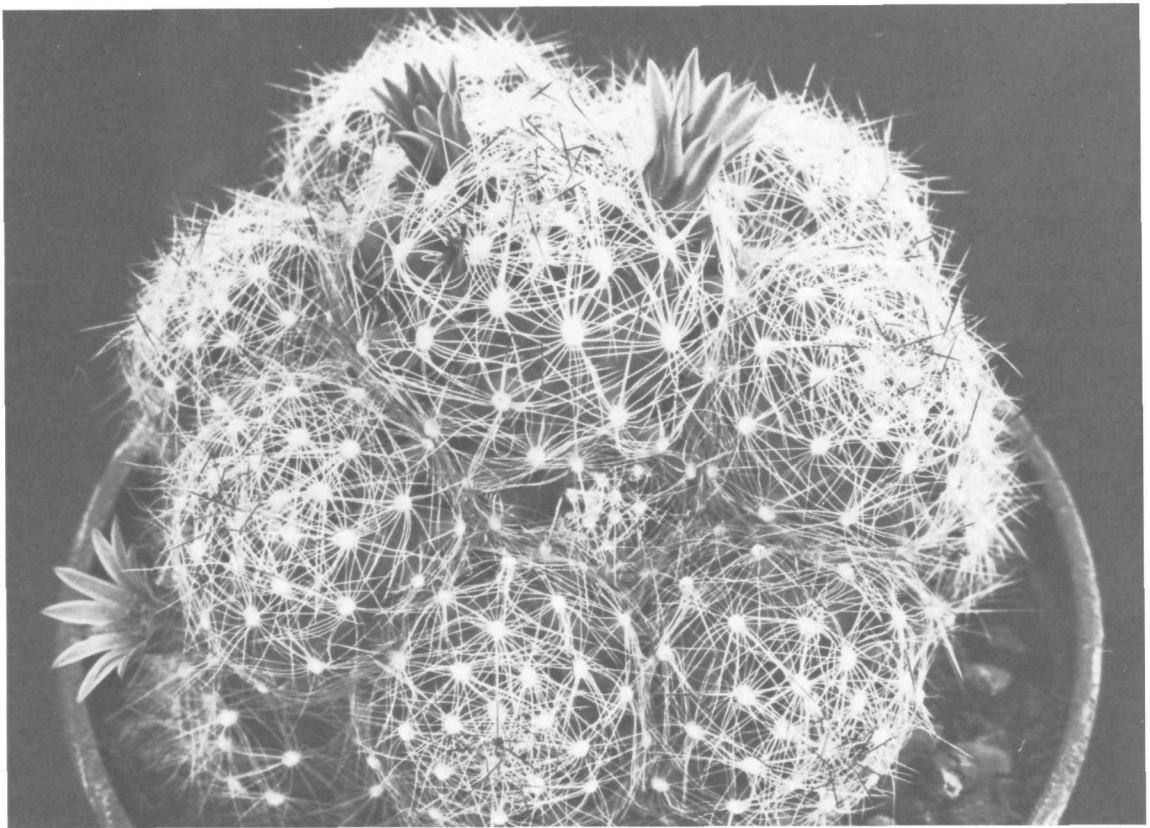
The essential difference between the series *Lasiacanthae* and *Proliferae*, corresponding to subgenera *Acentracantha* and *Rectochilita* of the Buxbaum system, has been regarded as the absence of central spines in *Lasiacanthae*, though this rule was broken from the start by *M. dumentorum*. *M. laui* which I provisionally place in the *Lasiacanthae*, violates the rule more flagrantly, however, and for practical purposes I must fall back on the secondary character of the *very numerous spines* to enable the two series to be distinguished. Nevertheless, I am very conscious that the series *Lasiacanthae* is a mixed bag; the several groups it contains probably merit series status individually: the larger-flowered *M. lenta* group (*M. lenta*, *M. herrerae*, *M. aureilanata*); the *Solisia* group (*M. pectinifera*, *M. solisioides*); and the red-flowered species (*M. humboldtii* and *M. laui*). Further proposals on these lines are, however, outside the scope of the present paper.



Seed of *M. laui* (Lau 1171). SEM photo by courtesy of Dr. W. Barthlott



Map of type localities of taxa enumerated in this paper. Numbers correspond with those in the text.



*M. kraehenbuehlii*

(photo: Weightman)

*M. carmenae* (Lau 1192)

(photo: Weightman)



Series SPHACELATAE

17. *M. kraehenbuehlii* (Krainz) Krainz, Die Kakteen Lfg. 46-7, sine pag. (1 June 1971), also in KuaS 22(5): 93-5 (1971), without basionym ref. *Pseudomammillaria kraehenbuehlii* Krainz in KuaS 22 (1): Beil. (23 December 1970). Type: Mexico, Oaxaca, near Tamazulapan, on stony hillsides mostly amongst grass or in the shade of low shrubs, often also on top of rocks in indirect sun, 15 March 1968, *Kraehenbuehl* FK 153.68 (ZSS).

The series Sphacelatae, which I have recently segregated from Schumann's Leptocladodae, contrasts with the latter group in its stem morphology, spines, flowers, fruits and seeds, and in its occurrence south rather than north of the Volcanic Belt. The two recent additions to the series are both remarkable, *M. kraehenbuehlii* for its habit, the young stems reminiscent of *M. vetula* or even a *Dolichothele*, but later tough and mound-forming like *M. sphacelata* itself; and *M. tonalensis* (see below) for its hooked spines, suggesting distant connections between this group and other series. In my studies of other plant groups, notably the *Commelinaceae*, I have been impressed with the way that, time and again, 'missing links' or 'living fossils' turn up in the States of Puebla and, more especially, Oaxaca, and this seems true of the *Mammillaria* groups too. I have already mentioned *M.*

*zephyranthoides*, *M. heidiaea* and *M. oteroi*; here in series *Sphacelatae* I am sure we have more species of phyto-geographical and phylogenetic significance. And what should we make of *Ortegocactus macdougallii*, another endemic from Oaxaca, which can flower at ungrooved tubercles and so bridge the gap between *Escobaria* and *Mammillaria*?

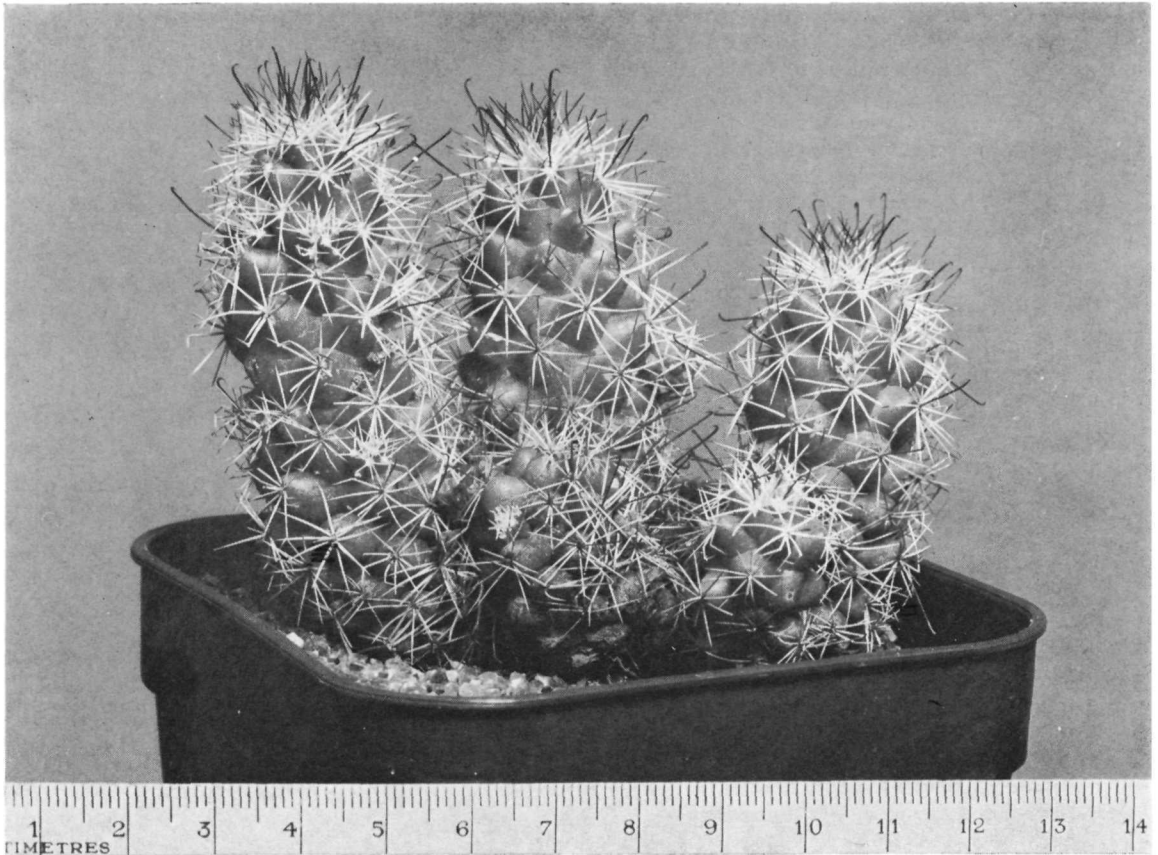
18. *Mammillaria tonalensis* D. R. Hunt, **species nova**; *M. sphacelatae* manifeste affinis, sed spina centrali unica hamata praesertim differt. Typus: Mexico, Oaxaca, Puente de Tonalá, steep limestone rocks lightly covered with bushes and with *M. carnea* and *M. dixanthocentron* var. (?), 17 October 1974, *Reppenhagen* 522, flowered in cultivation in Austria, 14 May 1977 (flowers, K); the same locality, *Lau* 1114 (holotype, K).

DESCRIPTION. Freely clustering and offsetting from fibrous roots, the stems erect or decumbent, slender cylindrical to 12 cm or more long and 2-2.5(-3.5) cm in diameter; tubercles shortly and obtusely terete-conic, about 5(-8) mm long and 8(-12) mm broad at base, light green, in three and five spirals, sap watery; axils naked or with slight wool; areoles sparsely woolly. Central spine 1, porrect, up to 18 mm long, acicular (0.3 mm diam.) hooked (hook 1.3 mm diam.), chestnut brown at first, becoming almost black, smooth to the naked eye;

*M. laui* f. *laui* (*Lau* 1171)

(photo: Weightman)





Above, *M. tonalensis* (Lau 1114) (photo: Zabeau); below left, flowers of *M. tonalensis* (Reppenhagen 522) (photo: Reppenhagen)

radial spines 9–12, up to 1 cm long, acicular, straight, chalky white, the upper tipped chestnut brown. Flowers funnel-shaped, about 1.5 cm long, 10–12 mm broad when fully open, outer segments brownish pink, inner narrowly oblong-linear c. 1.5 mm broad, carmine with whitish margins; stigmas short, c. 1 mm long. Fruit and seed not yet known.

*M. tonalensis* is at present known from the type locality only, to the south-west of the known range of *M. sphaclata*, its most obvious ally, and about 40 km from *M. kraehenbuehlii*. Several of its characters hint at a more distant relationship with the series *Ancistracanthae*.

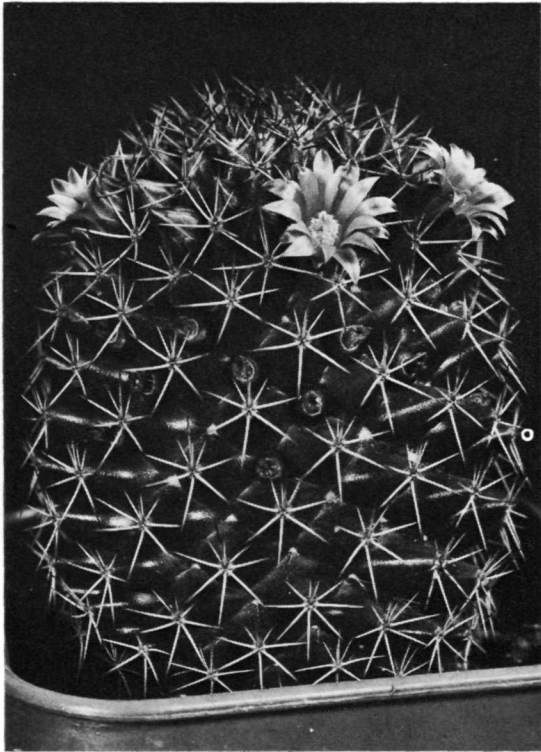
#### Section **Subhydrochylus**

Series HETEROCHLORAE

19. *M. sp.* (Toluca)

Mexico (State), Nevado de Toluca, Otero.

This plant is apparently distinct from *M. fera-rubra*, which occurs between Toluca and Querétaro. It may be the little known *M. mundtii* K. Schum. but its status is uncertain. I shall mention it again later.



*M. ernestii*

(photo: Weightman)

Series POLYACANTHAE

20. *M. centraliplumosa* Fittkau in Cact. Suc. Mex. 16: 39 (1971). Type: Mexico, state of Mexico, Calderon, Fittkau (MEXU 141524).
21. *M. ernestii* Fittkau, l.c. 36. Type: Mexico, state of Mexico, La Puerta, Fittkau (MEXU 141523).
22. *M. virginis* Fittkau & Kladiwa in Krainz, Die Kakt., Lfg. 46-7, with figs. (1971). Type: Mexico, Guerrero, Ancon, Fittkau 1512.70 (ZSS).

I take these three together as they seem to me to be little more than dots on the map of the *M. spinosissima* complex, *M. ernestii* being doubtfully distinguishable from *M. backebergiana* and *M. centraliplumosa* and *M. virginis* no more than phases of *M. spinosissima* with slender stems. The slightly pubescent central spines are not constant in *M. centraliplumosa* even in its type locality.

23. *M. xaltianguis* Sanchez-Mejorada in An. Inst. Biol. Mex. 44 (1973) Bot. Ser. (1): 30, with figs. (1975). Type: Mexico, Guerrero, mun. Acapulco, 1 km N. of Xaltianguis, Sanchez-Mejorada 70-0802 (MEXU).

*M. xaltianguis* is much more interesting, being a Pacific counterpart of *M. eriacantha* which occurs in the Atlantic State of Veracruz. These two are the only yellowish-flowered members of the Polyacanthae series. In addition to the type locality, I believe *M. xaltianguis* occurs in the adjacent state of Michoacan, where, if my

identification is correct, it has been collected at Aguililla by Lau (Lau 1155). This Michoacan form differs from the typical one in the absence of axillary bristles.

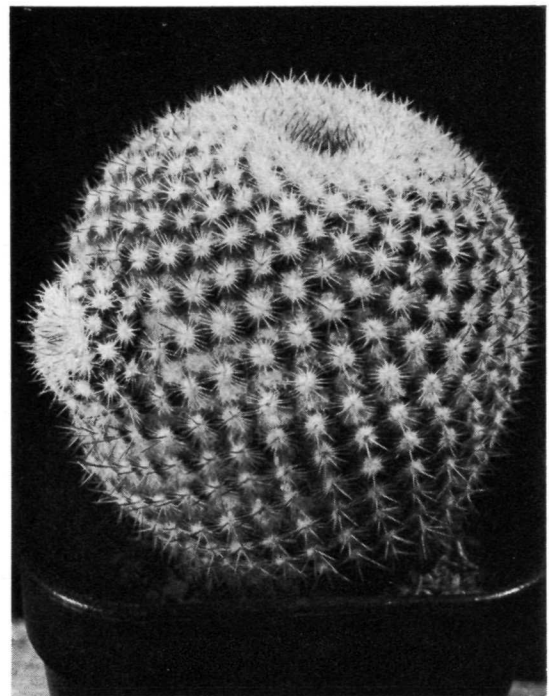
24. *M. sp.* (Yolox). Collected in Mexico, Oaxaca, near Yolox and Quiotepec, Lau 1055 (living plants). Illustrated by Schreier in KuaS 30(1): 3 (1979) as Lau 1155.

Lau 1055 from Yolox, Oaxaca, is a distinctive member of the *M. rekoii-pullihanata* group, but I feel that ideally this group should be the subject of a careful taxonomic study before more new species are proposed, and I recommend that this particular collection should be known by its Lau number, or with the locality 'Yolox' as a cultivar name for the time being.

Series SUPERTEXTAE

25. *M. reppenhagenii* D. R. Hunt in KuaS 28(6): 129-130, with figs. (1977); and in CSJGB 40(2): 38 (1978). Type: Mexico, Colima, Rancho Tecuan, Cerro Barrigon, alt. 2000 m, 24 September 1972, Reppenhagen 382 (ZSS).

The series Supertextae (formerly Elegantes) is one of the most difficult as well as one of the most attractive Mammillaria groups, as I am sure many would agree. *M. reppenhagenii* is a very pretty plant which extends the distribution of the *M. albilanata* complex right across the broad basin of the Rio Balsas drainage system into Colima, the small State from which only the unrelated *M. occidentalis* had previously been described.

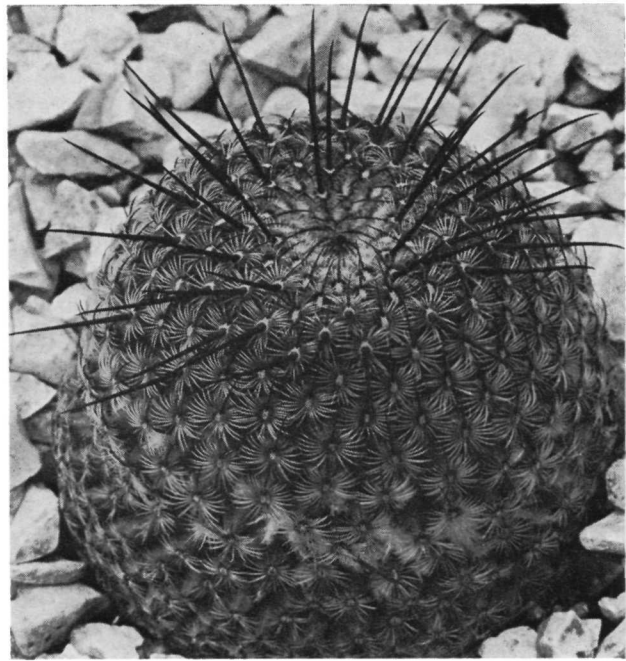


*M. reppenhagenii*

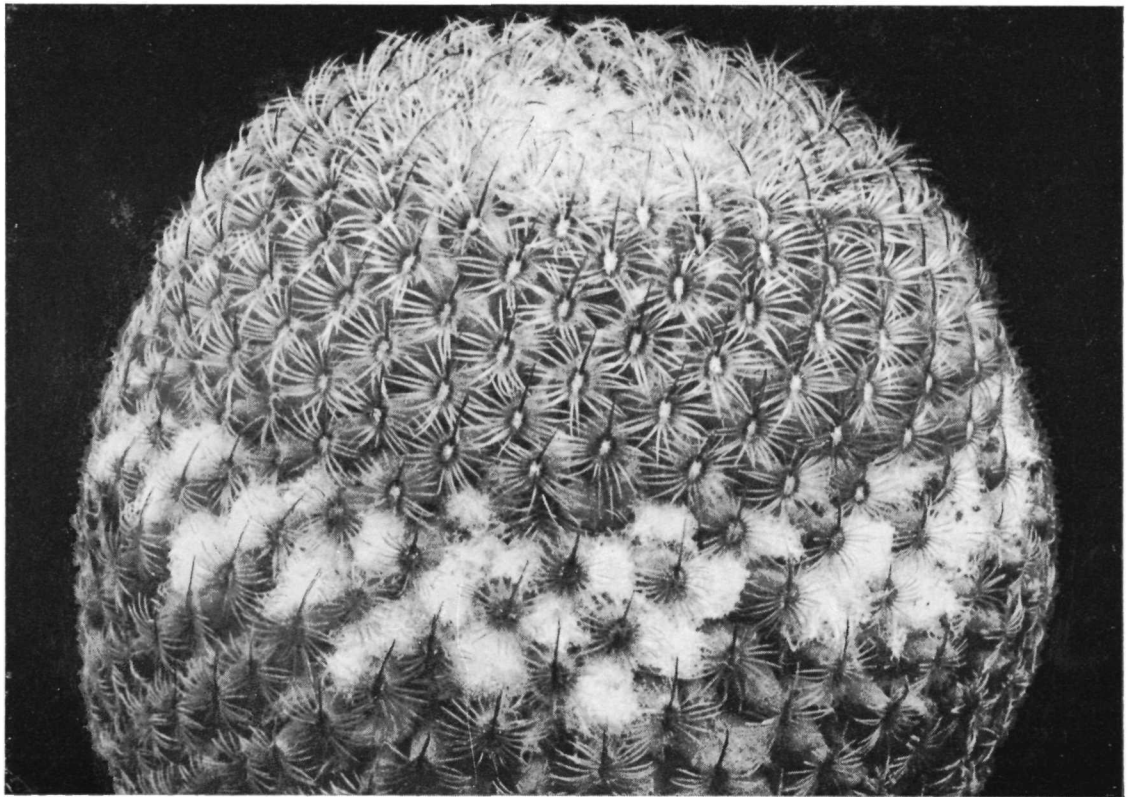
(photo: Zabeau)

26. ***M. huitzilopochtli*** D. R. Hunt **species nova**; *M. crucigerae salutans*, habitu columnari spinis centralibus formam crucis nihil referentibus autem aliena; spina principali ubi adest immitte feroci, gladiata, nigra, porrecta, 1.5-3(-5) cm longa, aliis (0-2) brevibus, erectis; *M. dixanthocentro* etiam vicina sed spinis centralibus non semper auctis, seminibus perpusillis. Typus: Mexico, Oaxaca, Tomellin valley, gorge near confluence of Rio Salado and Rio Quiotepec, on red conglomerate rocks, Lau 066 (K).

DESCRIPTION. Solitary at first, eventually branching dichotomously, at first globose, later clavate-cylindric, 13 cm or more tall, 8-9 cm diameter; tubercles small, obtusely terete-conic, somewhat compressed laterally, in 13:21 spirals, 6 mm long, 5 mm broad at base, dark green, sap watery; non-flowering axils naked, flowering axils with dense whitish wool; areoles elliptic, c. 2 mm long, 1.5 mm broad, minutely woolly at first, later naked. Central spine 0-1 (rarely 2) in juvenile plants, erect from top edge of areole, 4 mm long, fine acicular, very dark brown at first, in mature specimens an additional porrect, subulate, dark brown to black central spine 1.5-2 cm also often developed (up to 5 cm long, fide Lau); radial spines c. 15-30, 2.5-3.5 mm long,

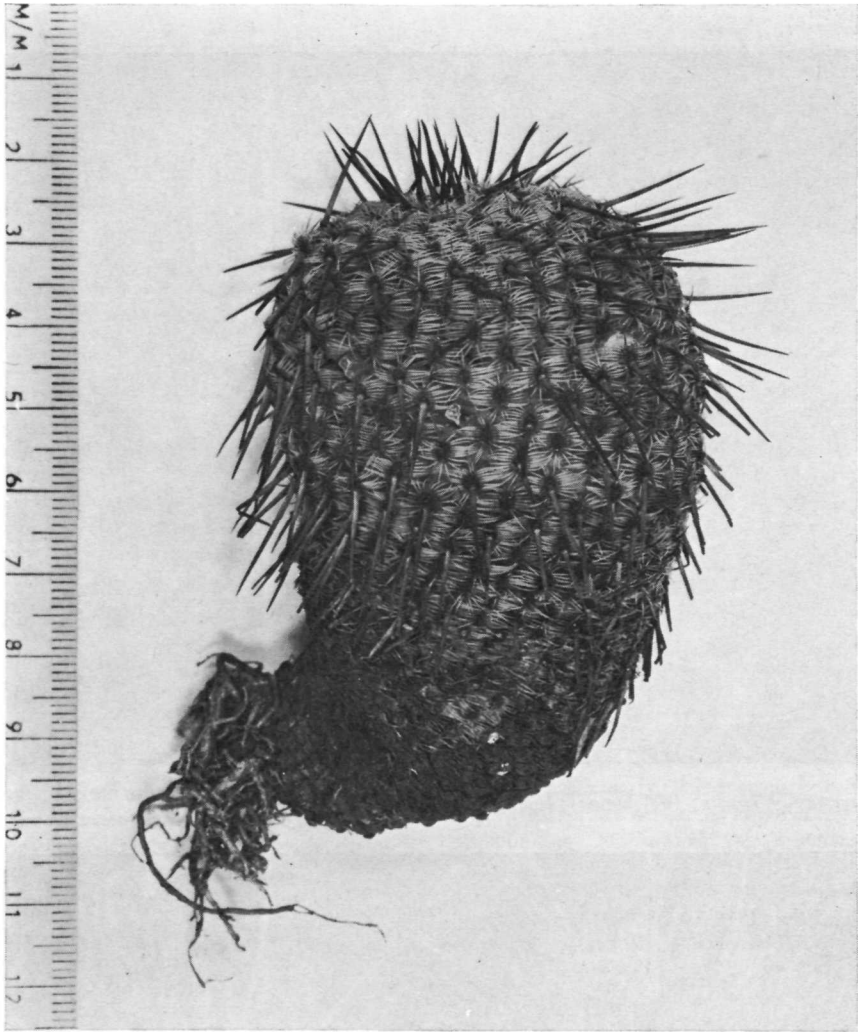


*M. huitzilopochtli*. Heavily-armed plant of Lau 066 at Holly Gate Nurseries (photo: Weightman)



Another plant of *M. huitzilopochtli* (Lau 066) in the possession of Helmut Broogh. The spear-like lower central spine is not (yet) developed. About twice natural size (photo: Broogh)





*M. huitzilopochtli* (Lau 066). Type plant prior to preservation.

(photo: Zabeau)

glassy white. Flowers tubular-funnel shaped, 12–15 mm long, 7 mm diam. (not widely expanded), mid to deep carmine. Fruit clavate-cylindric, c. 15 mm long, red, with dried perianth persistent; seeds very small, pyriform with short hilum,  $1.4 \times 0.75$  mm.

Huitzilopochtli, in the Aztec religion, was the god of the sun and of war; the name is here used as a substantive, i.e., a noun in apposition, and as such is indeclinable.

The description given is restricted to the type number (Lau 066), but other collections from conglomerate formations may merit inclusion, such as Lau 681, which has only 14–17 radial spines and (so far) only one short central spine, and two collections from above Cuicatlan, Lau 066a and Hunt 8841. According to Dr. Lau, his 066a can produce a long central spine like 066 but not so dark. In plants I have seen, however, there are two or four centrals barely distinguishable from the radials. My own collection, made with Felipe Otero in 1974, has 7–9 very

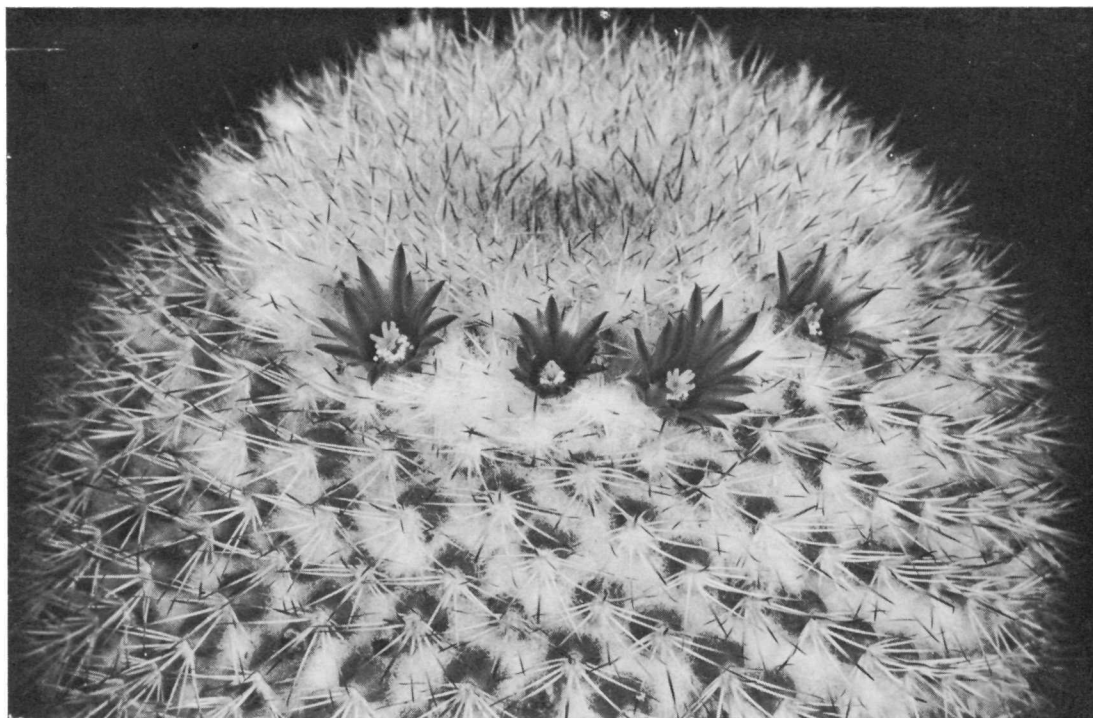
fine central spines, appressed and barely discernible from the radials.

I have not overlooked the possibility that natural hybridization between the neighbouring and contrasting species *M. crucigera* and *M. dixanthocentron* could account for *M. huitzilopochtli*, but field-collected seed appears to be true-breeding.

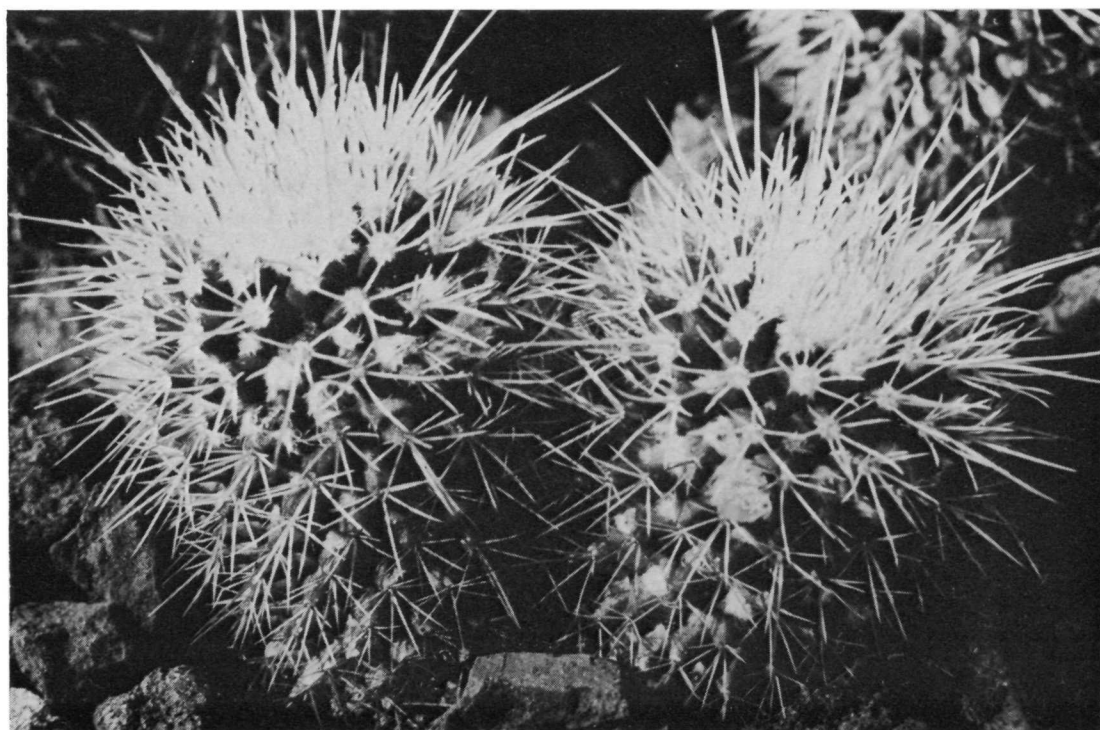
#### Section **Mammillaria**

##### Series MACROTHELAE

27. *M. miegiana* Earle in Sagaroland Bull. 26: 77–9, with fig. (1972). Type: Mexico, Sonora, 14 km W. of Moctezuma, various collectors (DES 6500).
28. *M. tayloriorum* Glass & Foster in CSJA 47: 173–6, figs. 1, 2, 4 (caption transposed with fig. 3) (1975). Type: Mexico, Sonora, Is. San Pedro Nolasco, Nov. 1970, G. & F. 2686 (POM).



*Above, M. tayloriorum (photo: Weightman); below, M. beiselii (photo: Beisel)*



For reasons I shall suggest later, species in the series *Macrothelae* are hard to define and group, and this is particularly true of those in the north-west of Mexico, where they are very varied. *M. miegiana* is the most northerly element so far described in the *M. sonorensis-standleyi* complex, and *M. tayloriorum* apparently represents an endemic race from the island of San Pedro Nolasco, off the coast of Sonora. The status of both may have to be reconsidered in the light of critical appraisal of the Sonoran *Macrothelae* as a whole.

29. ***M. rubrograndis*** Reppenhagen & Lau ex Reppenhagen in KuaS 30(4): 82-3 with fig. (1979). Type: Mexico, Tamaulipas, between Jaumave and Ciudad Victoria, Asbestos mine, 1976, Lau 1220; 12 January 1977, Lau & Reppenhagen (ZSS 18-17).

*M. rubrograndis*, from the eastern side of Mexico, seems to me more interesting and, as the name indicates, has a remarkably large red flower. Its closest allies are not immediately apparent, but are probably amongst the *M. petterssonii* complex rather than that of *M. compressa* or *M. magnimamma*.

#### Series POLYEDRAE

30. ***M. beiselii*** Diers in KuaS 30(3): (57-60), with figs. (1979). Type: Mexico, Colima/Michoacan borderland, near the coast, 25 April 1978, Beisel BK 100 (PH Rheinl., Abt. Köln).

This plant appears to present a parallel case to that of *M. reppenhagenii*, being a close ally of a well-known complex, in this case the *M. voburnensis* group, and extending its distribution very considerably north, across the drainage catchment of the Rio Balsas. The resemblance to forms of *M. collinsii* is inescapable.

#### Discussion

From the remarks about each of the taxa enumerated, it will be clear that in my opinion they differ widely in taxonomic status. In other words, some are much more distinct than others. The less distinct are not necessarily less intrinsically interesting; it is more a matter of how far speciation has progressed in individual cases and, moreover, how long the process of evolution has been going on in the various groups to which they belong.

In the present state of knowledge, the most clearly marked species are perhaps these:

<i>heidiae</i>	<i>lauri</i>
<i>mathildae</i>	<i>kraehenbuehlii</i>
<i>oteroi</i>	<i>tonalensis</i>
<i>fittkauii</i>	<i>xaltiangyuensis</i>
<i>carmenae</i>	<i>rubrograndis</i>

It may be only coincidence that eight of these ten species belong to black-seeded groups, regarded as older or more conservative in my hypothetical evolutionary

scheme. The observation is nevertheless consistent with the hypothesis that speciation has been going on for longer in these groups and that the products are more clearly defined, if not in some cases approaching the end of the evolutionary road. In some examples, like *M. tonalensis*, their recent discovery could be indicative of very narrow distribution and/or ecological tolerance. It is noticeable, however, that in general the black-seeded *Mammillarias* are characteristic of more highly xeric habitats than those with brown seeds, often on rocks and limited to small pockets of rapidly drying humic soil, and this could be a factor in their generally narrower distribution and endemism.

Contrasting with the very distinct species just mentioned, some of the novelties have clear allies amongst species already well-known but substantially extend their overall range and variation, notably the following:

<i>reppenhagenii</i>	} <i>albilanata</i> complex
<i>miegiana</i>	
<i>tayloriorum</i>	
<i>beiselii</i>	} <i>standleyi</i> complex
	} <i>voburnensis</i> complex (cf. <i>collinsii</i> , <i>nejapensis</i> )

These are all members of relatively advanced series within the genus, where the evidence points to the conclusion that speciation is still in active progress. In the *Macrothelae* and *Polyedrae* of eastern and southern Mexico, particularly, it is extremely difficult to define individual species within the major complexes, like those surrounding *M. heyderi*, *M. magnimamma* and *M. karwinskiana*. It is also to be noted that many of the *Macrothelae* with their sunken stem bases and deep root system enjoy more mesic conditions than their black-seeded congeners and tend to be widely distributed over flatter country, with less tendency to narrow endemism.

Of the remaining novelties on my list, several invite interpretation as local forms or 'topotypes' of previously described species:

<i>saboeae</i> f. <i>haudeana</i>	( <i>saboeae</i> )
<i>longiflora</i> f. <i>stampferi</i>	( <i>longiflora</i> )
<i>wrightii</i> f. <i>wolfii</i>	( <i>wrightii</i> )
<i>ascensionis</i>	( <i>glassii</i> )
Lau 1063 (Aramberri)	( <i>viereckii</i> Hort.)
<i>centraliolumosa</i>	( <i>spinosissima</i> )
<i>ernestii</i>	( <i>backebergiana</i> )
<i>virginis</i>	( <i>spinosissima</i> )
Lau 1055 (Yolox)	( <i>rekoi/pulliamata</i> )

These local forms are often of interest to collectors, as in the case of the first three listed, being attractive and distinctive on the greenhouse bench, if not actually superior in some way to the forms already known. From a botanical point of view, their interest may be just as great if it extends our picture of the variability, genetic resources, or distribution of the species or species complexes to which they belong. It is doubtful, how-

ever, whether any of them merit recognition as species, and in most cases a lower rank or even cultivar status is more appropriate.

In the case of the series Polyacanthae, to which *M. centraliplumosa* etc. belong, I have argued elsewhere that this group has been particularly prone to the development of local races or micro-species because the highly dissected terrain which is their habitat must tend to isolate populations relatively swiftly.

With the remainder of the novelties I have enumerated there are individual problems to be solved demanding detailed work in the field, greenhouse and laboratory:

*meridiorosei*  
*pennispinosa* var. *nazasensis*  
sp. (Lau 1186: Cerro Viejo)  
sp. (Otero s.n.: Toluca)  
*huitzilopochtli*

*M. meridiorosei* as I have already said, is effectively a new name for *M. wrightii* var. *wilcoxii*. This hinges on the typification and neotypification of *M. wilcoxii*, which is a controversial point on which Benson and the authors of *M. meridiorosei* are at variance. Casterter, Pierce & Schwerin's argument appears to be based on false premises (that Toumey, not Schumann, drew up the description of *M. wilcoxii*, etc.), but in any case, the taxon in question has its centre of distribution in Mexico, where it has yet to be studied in detail, and the naming of *M. meridiorosei* throws very little light on the problem.

The attractive plant from the Rio Nazas valley described by Glass & Foster as a variety of *M. pennispinosa* lacks both the well-developed corky appendage of the seed and the high degree of plumosity in the spines of that species. It also seems different in habit and its status vis à vis *M. pennispinosa* and the *M. mercadensis* complex merits critical study.

Lau's white-spined plant from Cerro Viejo is said to be a member of the *M. glassii* complex, like *M. ascensionis*. I have not yet had the opportunity to study fertile material or seeds and am unable to comment constructively. The larger flower of Lau 1186 is noteworthy, and puts me strongly in mind of a photograph I have which is alleged to depict the true *M. schwarzii* Shurly (not to be confused with *Porfiria schwarzii*, which is *M. coahuilensis*). *M. schwarzii* was supposed to have been found in Guanajuato but has never been rediscovered there to my knowledge. Its characters are divergent from the characteristic Stylothelae of that State and I am tempted to think that the information concerning the source was false. In common with *M. glassii* and *M. ascensionis*, *M. schwarzii* is variable in its central spines, which were described as unhooked, but are sometimes hooked in cultivated specimens. If, in reality, *M. schwarzii* came from Nuevo Leon or Tamaulipas, this would make the distribution pattern more coherent, and place the whole group geographically as well as morphologically between the Stylothelae and the *M. albicom-*

*prolifera* group (series Proliferae).

The Mammillaria found on the Nevado de Toluca by Felipe Otero is one of a group which links the *M. rhodantha* and *M. discolor* complexes. It resembles the plant illustrated by Schumann as *M. mundtii*, but this was apparently a more cylindrical species and its geographical origin is uncertain. Schmoll reported it from the state of Querétaro. Where the typification of old names is in doubt it may be better to coin new ones for the plants we grow.

*M. huitzilopochtli*, newly described above and typified by Lau 066, is superficially similar in habit to *M. matudae* but has the capacity when grown in full exposure to produce strong black central spines, and it displays equivocal affinities with *M. dixanthocentron*, *M. crucigera* and other members of the series Supertextae, all occurring in the Tomellin valley. Unlike *M. crucigera* which is apparently confined to gypsum cliffs and screes, *M. huitzilopochtli* occurs on conglomerate formations and further knowledge of ecological preferences such as these is needed to help clarify the interrelationships of the numerous Supertextae now known from the area.

In conclusion, I must stress that almost all the novelties we have been considering are known at present from single collections or populations and that studies have yet to be made of variation within each new species or variety. Significant variability has really only been observed in one or two of the new species, especially *M. laui*, of which Dr. Lau has collected a number of forms representing populations at different altitudes which vary markedly in the strength and coloration of their spines. This range of variation in a single new species is not perhaps what collectors of cacti are used to, but the spectrum of variation is continuous and clearly correlated with the altitudinal zonation of the forms, so that there can be little doubt that the forms are no more than altitudinal ecotypes.

This interesting species, *M. laui*, is only one of many remarkable plant discoveries in many cactus genera and several other families which have made Alfred Lau's name a legend in his own time. Nearly half the Mammillaria novelties I have discussed bear his collecting number and there are many more in cultivation which I have not mentioned. I began by recording the debt of Mammillaria enthusiasts to Schumann and Buxbaum, and I should like to end by acknowledging our indebtedness to Dr. Lau for revealing to us so much more of the riches of this fascinating genus. I am also personally indebted to Professor Dr. Kurt Schreier, Dr. W. Beisel, Mr. R. Hosslinger, Mr. W. Reppenhagen, Messrs. Charles Glass and Robert Foster and Mr. F. Krachenbuehl for illustrations and/or study material of the species discussed, and to Mr. Felipe Otero and Mr. Hernando Sanchez-Mejorada who acted as my guides in the field during short periods of fieldwork in 1973 and 1974. For the majority of the photographs which illustrate this paper I am grateful to Messrs. John Pilbeam and Bill Weightman.

## Connoisseurs' Cacti

chosen by Gordon Rowley, Margaret Martin & Peter Chapman

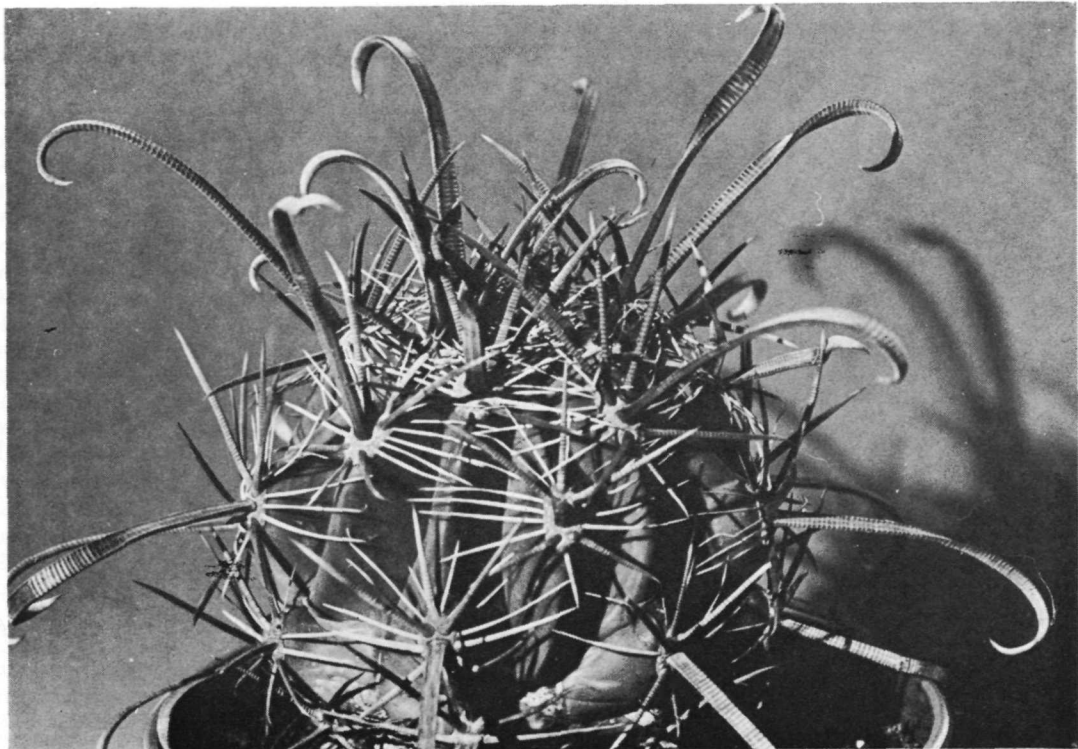
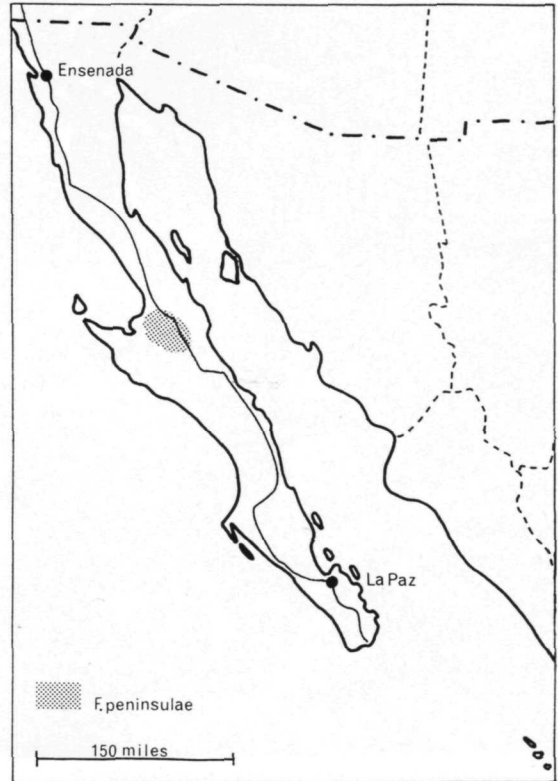
### 7. *Ferocactus peninsulæ*

Baja California is rich in *Ferocacti*, as a trip down the newly completed highway will show. If you stop at any of the garages or motels which are springing up along the route you are likely to see the flower beds bordered with single or double rows of locally dug *Ferocacti*, and start wondering where one species begins and another leaves off. All names must be provisional, I think, until Nigel Taylor's monograph appears (!), but the plants figured below and overleaf closely match *F. peninsulæ* (A. Weber) B. & R. and Gates's description and pictures of *F. viscaïnensis*. (Both are questionably distinct, as species, from *F. wislizeni*—N.P.T.)

I found it en route for San Ignacio with Reid Moran in September 1974, and with some discomfort transported one infant specimen in my rucksack back to captivity where it has flourished and grown new areoles. It seems uncommon in collections. Its great charm is the magnificent long, straight, broad, hooked central which darken to blood red when moistened.

G.D.R.

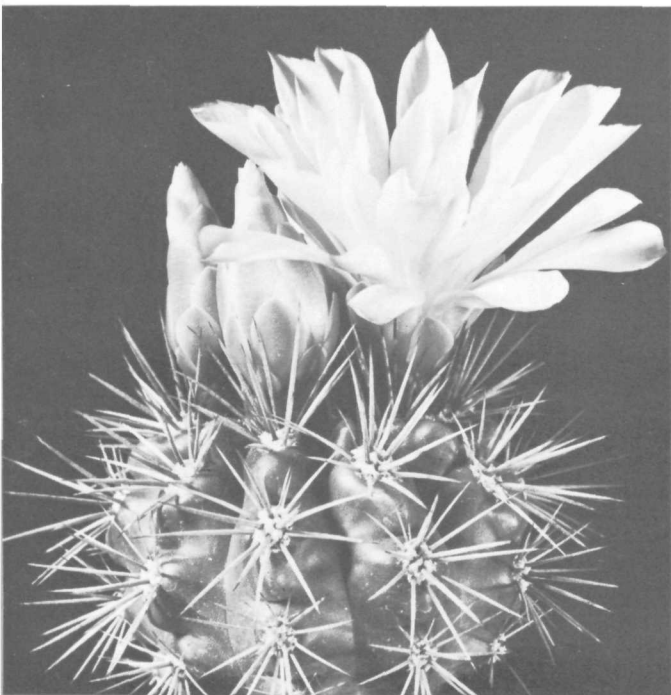
Map, right, show distribution of the Vizcaino Desert form of *F. peninsulæ* only. Below Gordon Rowley's ferocious infant (photo: Rowley)





*Ferocactus peñinsulae* flowering in the Vizcaino Desert

(photo: David Hunt)



*Gymnocalycium horridispinum* (photo: Peter Chapman)

#### 8. *Gymnocalycium horridispinum*

This is a stoutly-spined, handsome plant with a more or less spherical body reaching a diameter of up to 8 cm. (according to Backeberg). Our specimens have almost reached this size and show no signs of forming offsets. The body is of a medium green colour with 10–13 deep, broad ribs and with pronounced 'chins' below the areoles, which are pale grey in colour, with fine wool. The greyish spines are brown towards the tips, stout, strong and sharp. The 10 or 12 radials are spreading and slightly curved, 2–3 cm. long. The 4 outward-pointing centrals are somewhat thicker and longer (up to 4 cm.), very slightly curved. The flowers of our specimens are deep pink but Backeberg says that they can also be white with pink edges. The habitat is given as N. Argentina. The recently described *G. achirasense* is evidently a closely related plant.

Like most gymnocalyciums, *G. horridispinum* is of easy cultivation in any usual compost, such as J.I. No. 2, or a no-soil mixture, preferably with about one-third extra-sharp sand added. We keep our plants at a minimum winter temperature of 4–5°C (around 40°F) and give no water from about November until March.

This is a most attractive plant and well worth growing. In particular the flowers provide a welcome change from the so common whitish blooms of gymnos, beautiful as these may be. M.J.M. & P.R.C.

## Trade in Cacti and other Succulent Plants in the United Kingdom

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### Introduction

Although there have been a number of surveys of the international trade in endangered species of wild fauna, no detailed study has yet been carried out on any endangered group of plants. The UK Endangered Species Act (Anon. 1976b) which contains the legislation representing Britain's ratification of CITES (the Convention on International Trade in Endangered Species) includes in Schedule 2 the family Cactaceae and four genera of other succulents. These plants are the subject of a pilot study sponsored by the TRAFFIC\* Group of the Survival Service Commission, investigating the trade in the United Kingdom.

So far there have been two main objectives. The first was to study the trade outlets in Great Britain in order to assess the importance of imported specimens in trade. The second objective was to monitor the import and export of cacti and succulents to and from Britain by studying the reports on the implementation of CITES published by the British Government (Anon. 1976a, 1977, 1978a).

The retail outlets for cacti and other succulents in Britain come under two main categories. The first is the specialist nurseryman who usually grows succulent plants almost exclusively. He is the main commercial source of supply for thousands of enthusiasts throughout the country. Virtually all the habitat-collected plants purchased in Britain are sold through these nurseries. The second category includes more general retail outlets such as florists and supermarkets. These tend to stock more easily-grown plants for a general public as distinct from enthusiasts. Such shops are supplied either by the specialist nurseries or by other largely wholesale growers, to be found both in Britain and on the Continent.

There are also, in Britain, a number of very active societies run by enthusiasts to promote interest in cacti and other succulents. Shows and exhibitions organised by these societies frequently put plants on sale. A very wide range of species is often offered at these shows but they usually represent surplus seedlings and cuttings

from the collections of members, and imported specimens rarely figure.

The family Cactaceae is almost completely restricted in the wild to the Americas, and Britain imports a large number of plants from these and other areas every year. During 1976, the total number of cacti for which import licences were granted was 29,145 and in 1977 this figure increased to 44,109. A relatively small proportion (15-20 per cent) of these plants was received as direct imports from the country of origin. In 1976 the countries exporting the largest number of cacti to Britain were, in decreasing order, Israel, USA, Malta, West Germany and Belgium. Of these five, only the USA has native cacti, but even so, approximately 40 per cent of USA exports to Britain were said to be re-exports from Mexico and South America. During 1977, about 70 per cent of West Germany's exports to Britain had a similar origin, and over 90 per cent of Belgium's exports to Britain were originally imported from North America and South America. Chile, the home of many species of cacti prized by collectors, exported no cacti direct to Britain in 1976 or in 1977. However, in those years, Britain issued licences for over 2,000 plants from other countries, which were said to have originated in Chile.

There were also considerable numbers of licences granted for the import of other succulents, all of which are native to the Old World. Imports of all four genera increased in 1977 in comparison with the 1976 numbers. 1977 totals were 1003 for *Pachypodium*, 3014 for *Euphorbia*, 505 for *Anacampseros* and 52,336 for *Aloe*.

Although Britain might be thought of as primarily an importing country as far as cacti and succulents are concerned, licences for exporting substantial numbers of plants are granted annually. In 1976, export licences were granted for a total of 24,197 cacti and 2,961 other succulents (i.e., *Euphorbia*, *Pachypodium*, *Aloe*, *Anacampseros*) and in 1977 the corresponding totals were 32,234 and 5. 70 per cent of exports went to Spain and a further 20 per cent was accounted for by Denmark and the USA together.

### Trade outlets within Great Britain

Trade outlets in Britain have been studied in a number of ways. Firstly, lists of species offered for sale by specialist nurseries have been obtained, and a card index

\*TRAFFIC (Trade Records Analysis of Flora and Fauna In Commerce) is a Specialist Group of the Survival Service Commission of the International Union for Conservation of Nature and Natural Resources. Its function is to monitor the international trade in wildlife on behalf of the Survival Service Commission.

compiled of all the species involved in trade. This has also been done for all those other succulent plants which are not at present covered by Schedule 2 of the Endangered Species (Import and Export) Act. Secondly, visits have been made to selected nurseries in order to establish the numbers of habitat-collected plants which are being offered for sale. Such visits have also allowed for some estimation of the proportion of plants on sale which are seed-raised or propagated by other means.

The second section of the trade, made up of florists and supermarkets, was investigated by visiting a sample in one large town in southern England, and noting whether cacti or other succulents were on sale, and if so, which species. Finally a number of flower shows and exhibitions were visited in order to obtain information on the species available through sales stands at such events. These generally included both specialist nurserymen and society stands.

There are more than thirty-five nurseries in Britain which come into the category of specialists in cacti and other succulents. Approximately half of these are very small businesses, run by enthusiasts as an extension of their interest in the plants. In general, these businesses are probably not the main occupation of the owner and they are continued as much out of interest as for financial reasons. Plants sold by these nurseries may reflect the interests of the particular owner, but the range of species offered for sale is often fairly small, consisting mainly of the more easily-grown species. A further third of the nurseries are a little larger than the first group and are run more as small family concerns, but they still rely very heavily on an enthusiastic interest in the plants. The range of species offered may be quite wide, but most plants are either grown from seed or propagated by grafting, or from cuttings. Propagated plants may occasionally be brought in from abroad, usually from Europe. The remaining nurseries, which probably do not exceed six or seven in number, are run as full-time businesses. The range of plants offered for sale is usually wider than that offered by nurseries in the first two categories. These plants may be seed-grown, grafted or otherwise propagated, either at the nursery or bought in from wholesale growers in Britain or Europe. Habitat-collected plants are sometimes on sale. However, relatively few nurseries in Great Britain sell habitat-collected plants and such plants can play a significant part in the trade for no more than three or four British nurseries.

Some degree of pressure discouraging the purchase of habitat-collected plants has been exerted on the trade by the International Organisation for Succulent Plant Study (IOS). The 'Code of Conduct for collectors and growers of succulent plants' (Anon. 1976c) produced by this organisation has been adopted by the British societies and a large number of nurserymen. Both the National Cactus and Succulent Society (NCSS) and the Cactus and Succulent Society of Great Britain (CSSGB) discourage the showing of recently collected plants by

downpointing them in competitive classes. In addition, they refuse to accept advertisements for habitat-collected plants in their journals. However, a demand still exists for imports and one dealer who specialises in this section of the trade still manages to convey through his adverts that he will supply imports. A number of nurserymen have, in recent years, ceased to deal in imports and some nurseries use this as a trading point, stating that they deal only in propagated material.

Visits to nurseries were concentrated mainly upon those dealing in habitat-collected plants but a number of others were also visited. These visits were thought to be necessary because although the names of species offered by a given nursery can be obtained from nursery lists, no idea is given of the number of specimens involved. Obviously this can be very important, especially in the case of habitat-collected plants.

Visits to two nurseries in particular were of interest in relation to habitat-collected plants. The first nursery, visited during August, 1978, had a significant number of listed habitat-collected plants for sale. Over 150 such plants of Cactaceae were seen, including over 150 *Uebelmannia* plants, about 150 *Discoactis*, 80 *Eriosyce* and 20 *Ariocarpus*. In addition, 120 newly-imported *Pachypodium brevicaule* were seen, and a number of *Aloe* and *Euphorbia* plants. A number of habitat-collected plants not at present on the Convention list were also on sale, including 20 *Alluaudia ascendens* plants (Family Didiereaceae), 20 *Caralluma mamillaris* plants and 30 *Caralluma speciosa* plants (Family Asclepiadaceae).

The second nursery, visited during September, 1978, was offering habitat-collected plants from South America. About 250 Cactaceae plants were seen, e.g., *Copiapoa* (48), *Eriosyce* (28), *Oroya* (27), *Submatucana* (55), *Rodentiophila* (11), as well as plants from other genera. Five plants of the CITES Schedule 1 species, *Aloe polyphylla*, were also on sale although it seems likely that these were seed-grown plants.

Where obviously habitat-collected plants were on sale, a request was made to the Principal Management Authority of Great Britain to investigate whether the relevant import licences had been obtained by the importer.

The prices commanded by habitat-collected plants can be quite high. *Ariocarpus* is a popular genus and plants of about 3 cm in diameter of *A. kotschoubeyanus* sell for about £2. For *A. fissuratus* or *A. furfuraceus*, a 7–11 cm diameter plant would cost from £4–£6, while large plants of *A. retusus* sell for about £5–£9 depending on size. Multiheaded clumps are sometimes available and these may sell for up to £25. A *Melocactus* with a cephalium will cost from about £8 upwards, while a 10–15 cm diameter *Eriosyce* or *Rodentiophila* will cost from £6–£12. The plants of *Aloe polyphylla*, mentioned previously, were about 15 cm in diameter and were being offered at £12 each.

The other main section of the trade—florists, supermarkets and other stores—was investigated by the



methods outlined above. Eighteen florists' shops in one town were visited to see if any had cacti or succulents on sale. Of these, only five had, and two of these sold only a single *Kalanchoe* species (Family Crassulaceae), a genus not listed in CITES. One florist stocked a single species of *Agave* (Family Agavaceae) in addition to the *Kalanchoe* plants. Only two florists stocked any cacti as well as other succulents, but the stock did not exceed 30 plants. The cost of plants was usually in the range of 40p–£1.20, and the range of genera included easily-grown species of *Cereus*, *Opuntia*, *Notocactus*, *Lobivia* and *Rebutia*. Succulent genera included *Aloe*, *Euphorbia* and *Crassula*.

Although there were relatively few plants for sale in this sample, florists in other areas have been observed to sell larger numbers of bigger plants. One such shop in the West End of London has, over the past six months, been offering quite large propagated plants for sale. These have included various species of *Cereus*, *Echinopsis*, *Soehrensia*, *Astrophytum*, *Echinocactus*, *Feroactus*, *Mammillaria*, *Parodia*, etc., selling at 50p–60p for 3 cm diameter globular plants and up to about £8 for columnar species up to 50 cm in height. Grafted plants of less common genera were also offered here at £2.50–£3.50 each. Species seen included *Pediocactus simpsonii*, *Gymnocalycium mihanovichii* f. *rubra* and *Neoporteria napina*. Finally an enormous branched specimen (nearly 2 m high) of one of the large-growing species of *Euphorbia* (probably *E. ingens*) was being offered for sale at £175 in the same shop.

Supermarkets and chain stores sometimes stock cacti along with other house plants. *Pachypodium lamerei* has been seen in shops of a supermarket chain along with house plants such as *Cissus*, *Fatshedera*, *Cyperus*, etc. However, the largest range of cacti and succulents seen in shops was found in the gardening section of a well-known nationwide chainstore. Over 150 plants were on sale, the majority being seedlings estimated at about three years old. These sold for 40p and included species of *Cereus*, *Copiapoa*, *Echinopsis*, *Eulychnia*, *Feroactus*, *Gymnocalycium*, *Mammillaria* and *Soehrensia* as well as *Aloe*, *Haworthia* (Family Liliaceae), *Echeveria* (Family Crassulaceae) and *Pleiospilos* (Family Aizoaceae). There were also about 50 plants grafted on *Hylocereus* stocks (cost £1.09), including *Mammillaria plumosa*, *Echinocereus pectinatus*, *Astrophytum myriostigma* and *Chamaecereus silvestrii* f. *lutea*. Slightly more expensive plants included *Notocactus scopia* f. *cristata* and *Gymnocalycium mihanovichii* f. *rubra*. Finally, larger plants on their own roots included various species of *Aloe*, *Stapelia*, *Haworthia* and *Opuntia*.

From a study of the trade outlets in Britain, it would seem that habitat-collected plants do not play a very major part in trade. They are generally sold only through the specialist nurseries but very few sell such plants. Imported plants are of commercial importance to only a few British nurseries. However, there are several nurseries in Europe which depend on habitat-collected imports for a large proportion of their trade, notably in

Holland, Belgium and West Germany. It is likely that a large number of the wild-collected plants which reach Britain do so through these nurseries.

### Trade records

As outlined in the introduction, imports of cacti and succulents have exceeded exports in the two years for which statistics are available for Great Britain. The published statistics (Anon. 1976a, 1977, 1978a) are expressed in terms of specific numbers of licences issued for individual genera. An attempt has been made to identify the routes by which plants reach Britain. Propagated material which may or may not be propagated in its country of origin, and plants collected from their own habitat are included in these statistics but unfortunately there is no way of distinguishing nursery-grown from habitat-collected plants at present. Plants which are exported from Bolivia or Chile, for example, are likely to be habitat-collected because the horticultural industry is poorly developed. However, the same cannot be said of countries such as the USA, Holland or Germany. These three countries, and a great many others have well-developed horticultural industries utilising modern large-scale propagation techniques, but they also deal in habitat-collected plants. Consequently, it is difficult to assess whether plants imported from many countries will be habitat-collected or propagated.

It is important to interpret all these trade figures with some care. The figures deal with licences, not with plants, but in the following commentary, numbers are quoted as if they represent plants to avoid repetition of the distinction.

### Imports

According to the statistics, imports are either from the country of origin of a taxon, or a second country with the country of origin stated, or a second country with no other country of origin stated. In all of these instances plants may be habitat-collected or propagated/cultivated, but this is not stated. The following is not an exhaustive list of all countries exporting plants to Britain but all of the major exporters are dealt with here.

## CACTACEAE

### 1. Argentina

During 1977, Argentina was the fourth largest exporter of cacti to Britain after the USA, Malta and Canada. The total number of plants involved was 2,420 and the number of genera represented was small. However, in both 1976 and 1977, numbers of plants said to originate in Argentina were imported into Britain via other countries, notably Israel, Germany and Belgium.

### 2. Belgium

Belgium exported 809 cacti to Britain in 1976 and 1,558 in 1977. A very large proportion of these plants originated elsewhere, notably Mexico and the USA but plants are also re-exported from most of the South American countries. About 50 different genera are

involved and Belgium deals with many plants of particular interest to enthusiasts.

### 3. *Bolivia*

Bolivia has not apparently exported any cacti to Britain direct in 1976 or 1977. However, large numbers of plants said to originate there have reached Britain via other countries in this period. A total of 357 such plants were imported in 1976 and the figure was 1,374 in 1977. The main countries involved were the USA, Peru, Belgium, Germany and Montserrat. The main genera involved were *Pilosocereus*, *Rebutia*, *Sulcorebutia* and *Weingartia*.

### 4. *Brazil*

Brazil exported 600 cacti to Britain in 1976 and 1,950 in 1977. In addition, 987 plants said to originate in Brazil were imported from other countries in 1976 and the figure was 1,771 in 1977. Genera included *Discocactus*, *Melocactus*, *Pilosocereus*, *Notocactus* and *Uebelmannia* (600 imported direct in 1976, 500 in 1977).

### 5. *Canada*

Canada apparently exported no cacti direct to Britain in 1976, but 2,500 in 1977. These, however, represented only five genera.

### 6. *Chile*

Chile, like Bolivia, is not recorded as having exported any cacti direct to Britain. However, 626 cacti, said to have originated in Chile, were imported into Britain via other countries in 1976. In 1977 this figure increased to 1,424. The intermediate countries include the USA, Israel, Germany and Belgium. Genera involved include *Opuntia*, *Copiapoa* and the *Neoporteria* group of genera.

### 7. *France*

France exported 421 plants to Britain in 1976 and this increased to 1,471 in 1977. The 1976 figure includes 366 plants previously imported from various New World countries but the 1977 figure apparently consists entirely of plants which have been cultivated. The range of genera is quite wide.

### 8. *Holland*

Holland exported 200 plants to Britain in 1976 and 1,366 in 1977. Of this latter figure, about a quarter of the plants had been previously imported from Mexico and various South American countries.

### 9. *Israel*

In 1976, Israel exported more cacti (12,272) to Britain than any other country, but in 1977 this figure fell to 1,667. The 1976 figure was boosted by 3,590 plants which had been previously imported into Israel from Mexico, USA, Chile, Peru and other countries. Genera involved here include *Astrophytum* (1,160 from Mexico), *Gymnocalycium*, *Mammillaria*, *Notocactus* and *Turbincarpus*.

### 10. *Malta*

Malta exported 4,839 cacti to Britain in 1976 (the third major exporter after Israel and the USA) and in 1977 this increased to 12,000. This figure comprised 2,000 specimens each of six commonly cultivated genera.

### 11. *Mexico*

Mexico exported 349 cacti to Britain in 1976 and 126 in 1977. However, a large number of Mexican plants, 4,820 in all, reached Britain in 1976 from other countries. In 1977 this figure was 4,187. Mexico is the home of many species which are highly prized by collectors. Such is the interest in many of these plants that a Continental travel agency organises regular tours for enthusiasts to the areas where these plants grow. These plants are often very slow growing even in cultivation, and when grafted to increase their growth rate, lose their attractive appearance. Consequently, habitat-collected plants are popular with many collectors. Many of these genera have fairly restricted distributions and are very sensitive to selective gathering by collectors. It is to be hoped that such activities do not go completely unchecked or many species will soon be unknown in the wild. Many genera are involved in trade, including *Ariocarpus*, *Aztekium*, *Mammillaria*, *Pelecyphora*, *Strombocactus* and *Turbincarpus*. Plants originating in Mexico reach Britain mainly through the USA, Belgium, Germany and Israel.

### 12. *Paraguay*

In 1976, 200 plants said to originate in Paraguay were imported into Britain, but none of these came directly from Paraguay. The majority came from Israel and included the genera *Gymnocalycium* and *Frailea*. No plants were imported from Paraguay in 1977.

### 13. *Peru*

During 1976, Britain imported 550 cacti direct from Peru and in 1977, 728. A significant proportion had previously been imported from Chile, Bolivia, and a few from Argentina. This makes Peru the only South American country which re-exports cacti from other South American countries. In 1976, Britain also imported 630 cacti said to be of Peruvian origin via other countries, mainly via Israel, and in 1977 the figure was 661, mainly via the USA. There are a wide range of genera involved, including *Borzicactus*, *Copiapoa*, *Eriosyce*, *Gymnocalycium*, *Lobivia*, *Neowerdermannia*, *Oroya*, *Submatucana* and *Sulcorebutia*.

### 14. *South Africa*

In 1976, South Africa exported 480 cacti (five genera) to Britain but there were no exports in 1977.

### 15. *Uruguay*

In 1976, Britain imported 75 cacti from Israel which were said to have originated in Uruguay, and in 1977, 270 plants were imported direct. Genera included *Frailea*, *Gymnocalycium* and *Notocactus*.

### 16. *USA*

The USA is one of the major exporters of cacti to Britain. In 1976, 6,046 plants were exported, 2,293 of which originated in other countries. In 1977 the total was 15,355, with 7,285 originating elsewhere. A relatively small number of plants originating in the USA reached Britain via other countries.

There are many cactus nurseries in the USA, and the country is also the home of many species of cacti, many

of them popular with collectors. Consequently, exports from the USA are likely to be a mixture of habitat-collected plants and propagated plants. In addition, a little under half of the exports to Britain are re-exports from countries such as Bolivia, Brazil (1,512 in 1977), Chile, Peru and especially Mexico (over 2,500 in 1977). A very wide range of genera is involved, including *Ariocarpus*, *Aztekium*, *Echinocereus*, *Mammillaria*, *Neogomesia*, *Pelecypora*, *Thelocactus* and *Turbinicarpus*.

#### 17. West Germany

West Germany, along with Belgium, is the major exporter of cacti to Britain in continental Europe. The total number of plants exported to Britain in 1976 was 1,813 and in 1977 the figure rose to 2,017. Much of the material is probably propagated, but in 1976, 1,331 plants were said to have originated elsewhere, mostly from Mexico. The range of genera is wide and includes *Ariocarpus*, *Aztekium*, *Epithelantha*, *Lophophora*, *Pelecypora* and *Thelocactus*.

### OTHER SUCCULENTS

Trade figures for other succulents cover the four genera *Pachypodium*, *Euphorbia* (succulent species), *Aloe* and *Anacampseros*.

#### 1. *Pachypodium*

Britain imported a total of 296 *Pachypodium* plants in 1976 and 1,003 in 1977. In 1976, most of these came from Germany and Israel, with some plants being re-exports from South Africa. In 1977, the majority of plants were imported direct from South Africa. Large numbers of *Pachypodium* are now raised from seed on the Continent due to the increased availability of seed, presumably from South Africa and Madagascar. Madagascar's 1977 report on the implementation of CITES (Anon. 1978b) records that a staggering 15,500 kg (surely this should be 15.5 kg?) of *Pachypodium* seed was exported to West Germany in that year. This is presumably habitat-collected seed. It is to be hoped that this does not represent a threat to the normal regeneration cycle of these plants. It would indeed be ironic if while trade in plants of *Pachypodium* species was regulated, the unregulated trade in seed were to be responsible for the gradual extinction of these plants in their natural habitats.

#### 2. *Euphorbia*

Britain imported a total of 1,098 plants of *Euphorbia* in 1976 and 3,014 in 1977. In 1976, 863 of the plants were imported from the USA, the majority having originated elsewhere, e.g., Kenya, Madagascar, Yemen, and South Africa, but also Mexico, Brazil and Peru. Similarly, in 1977, over 1,000 plants were imported from the USA, all of which originated in Africa or Madagascar. A further 1,350 were imported from South Africa direct with most of the remaining plants coming from Europe, some of them originating in Madagascar.

#### 3. *Aloe*

Britain imported a total of 827 plants of *Aloe* in 1976 and 52,336 plants in 1977. This last figure represents more imports than for the whole of the Cactaceae for

the same year and emphasises the importance in trade of the 'other succulents'. *Aloe* imports in 1976 came mainly from the USA, 719 in all, most of which originated in countries such as Angola, Madagascar, Yemen and South Africa. In 1977, 51,264 plants were imported from the USA, 250 of which originated in Africa. Over 1,000 plants were imported direct from South Africa.

#### 4. *Anacampseros*

Britain imported only three plants of *Anacampseros* in 1976, but this increased to 505 in 1977, the exporting countries being South Africa and the USA.

### Exports

Britain's exports of cacti and succulents, especially the former, are considerable.

### CACTACEAE

Total exports were 24,197 in 1976, and 32,234 in 1977. The range of species was wide, covering most genera of the family. All except five plants exported during 1976 were said to be either cultivated or imported into Britain prior to 1 January, 1976. The following list includes only the countries importing larger numbers of plants from Britain.

Destination	1976	1977
Spain	20240	22745
USA	2763	842
Denmark	627	6642
Belgium	74	467
Japan	16	465
W. Germany	37	304

### OTHER SUCCULENTS

Exports of other succulent plants were 2,961 in 1976 and five in 1977. As with the exports of Cactaceae, the major importers of other succulents from Britain were Spain, Denmark and the USA, in 1976.

(This table is not intended as a complete list.)

Destination	1976	1977
Spain	2401	0
Denmark	382	5
USA	39	0
W. Germany	28	0
Sweden	20	0

#### Total Exports

Genus	1976	1977
<i>Pachypodium</i>	8	5
<i>Euphorbia</i>	1417	0
<i>Aloe</i>	1535	0
<i>Anacampseros</i>	1	0

Care should be exercised in the interpretation of all these figures. Firstly, the figures deal with licences, not with plants, as mentioned previously. Figures based on returned licences which would reflect actual imports would be much more satisfactory. Secondly, there is no way of distinguishing between habitat-collected and artificially propagated plants in the figures. The former are of major importance from the point of view of conservation, but present attempts to regulate trade in them also tends to affect the trade in artificially-propagated plants. Some method of distinguishing between these two categories at the licensing stage would be extremely useful for monitoring purposes. In addition, many more succulent plant groups should undoubtedly be added to the CITES Schedule to allow monitoring, considering the obvious importance of *Aloe*, *Pachypodium* and *Euphorbia* in trade.

### Acknowledgements

The author would like to thank the TRAFFIC Group of the Survival Service Commission which enabled this survey to be carried out, the staff in their London office for varied assistance, and Messrs. D. R. Hunt and G. D. Rowley for helpful discussions.

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## Annual General Meeting

In accordance with Rule 6, I hereby give notice that the Annual General Meeting of the Cactus and Succulent Society of Great Britain will be held on Saturday, 1 March 1980, at Capel Manor Primary School, Bullsmoor Lane, Enfield, Commencing at 2 p.m.

The attention of members is drawn to Rule 5, sections (d) and (e), which define the procedure to be followed in the election of Officers and Council. The Rule requires that the several Vice-Presidents be elected annually by a show of hands at the Annual General Meeting. The Chairman, Honorary Secretary, Honorary Treasurer and members of Council to fill the vacancies resulting from the retirement of members who have completed their three year term of office will be elected by postal ballot in the event of the number of nominations exceeding the number of vacancies. Following the change in Rule 5 (d) made at the last Annual General Meeting *retiring members of Council are ineligible for re-election for one year.*

Nominations are therefore invited for the offices of Chairman, Honorary Secretary, Honorary Treasurer and three members of Council. These nominations must be in writing and must bear the signature of a proposer and seconder and be accompanied by the written and signed consent of the person nominated. Such nominations must be in the hands of the Honorary Secretary not less than nine weeks prior to the Annual General Meeting, that is, not later than Friday, 28th December, 1979.

The following are due to retire:—

Chairman	Mr. W. F. Maddams	} eligible for re-nomination
Honorary Secretary	Mr. R. H. I. Read	
Honorary Treasurer	Mr. D. R. Hunt	
Members of Council	Mr. D. T. Best, Mrs. H. Hodgson, Dr. R. B. Pearce	

In the event of the number of nominations exceeding the number of vacancies, a ballot paper will be circulated to paid-up members not less than six weeks prior to the Annual General Meeting.

R. H. I. READ  
Honorary Secretary.

## Branch Activities

*Items for inclusion in the next issue must reach the Editor not later than 14th December.*

### North London

**Secretary:** Mrs. B. Massey, 86 Auckland Road, Potters Bar, Herts.

**Meeting Place:** Capel Manor Primary School, Bullsmoor Lane, Enfield.

**Time:** 3rd Friday in month, 7.30 p.m.

Future events:

16 November

Peru Habitat (Paul Sherville)

21 December

Xmas meeting

### North Surrey

**Secretary:** W. F. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG.

**Meeting Place:** Adult School, Benhill Avenue, Sutton.

**Time:** 1st Tuesday in month, 7.45 p.m.

Summer events included a joint meeting with Kingston NCSS to hear Dr. Sarkaria (Indian Succulent Society) and see his excellent slides of Carallumas in habitat. Most classes at the Branch Show on 1 September, judged by Mrs. Stillwell, well-supported, with plants of good standard R. H. I. Read gained highest points in the cactus classes and Mrs. J. Ellis beat Mrs. Nightingale by just one point in the 'other succulent' classes.

The Branch's New Year party will be held on 8th January 1980.

### Warrington & District

**Secretary:** Mrs. D. Pritchard, 81 Birdwell Drive, Great Sankey, Warrington, tel. no. Penketh (092572) 4699.

**Meeting Place:** Meeting Lane Leisure Centre, Penketh, Warrington.

First speaker at the new venue was Keith Grantham (13 September) whose talk on 'Unusual Succulents' was enjoyed by about sixty members and visitors. We are grateful to Mr. Picken, of Cheshire Libraries, for enabling us stage displays in various local libraries, and to the organizers of Antrobux Country Fayre, who gave us space for a display and plant stall.

Future events:

24 November

Christmas Fayre

12 December

Winter care of your plants (Dr. R. Allcock)

9 January 1980

Topic to be announced

13 February

Two slide-talks by Gordon Rowley, presented by Eric Jennison.

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**Cruck Cottage Cacti** (Dorothy & Ronald Wood), Cliff Road, Wrelton, Pickering, North Yorkshire YO18 8PJ. Tel. no. Pickering (0751) 72042. Open daily except Sat. morning. No lists. Nursery in garden setting.

**Whitestone Gardens Ltd.**, The Cactus Houses, Sutton-under-Whitstonecliffe, Thirsk, North Yorkshire YO7 2PZ. Tel. no. Sutton (08456) 467. Open daylight hours every day throughout the year. Send 4 × 7p stamps (UK) or 3 international postal reply coupons for list. Everything for the cactophile; plants, seeds, books, sundries; substantial stocks and extensive collection on view.

**Oak Dene Nurseries**, 10 Back Lane West, Royston, Barnsley, Yorkshire S71 4SB. Tel. no. Royston (022670) 2253. Open every day, April–Sept. 9–6, Oct.–March 10–4 (closed for lunch 12.30–1.30). S.A.E. for list. Seed, plants, books and sundries.

## Merseyside

**Jim Bolton**, Southview, 39 Altcar Road, Formby, Liverpool L37 8DR. Tel. no. Formby (07048) 73187. Open all day Sundays, advisable to telephone for weekday visits. Large selection of seedlings, etc., all at reasonable prices. No list.

## North Wales

**Jolly's** (G. A. & M. A. Coombes), Glanrafon, Talsarnau, Gwynedd LL47 6YD. Tel. Penrhyndeudraeth (076674) 643. Open any time by appointment. No orders by post; no list. Warm welcome to holidaymakers—we are in the Snowdonia National Park.

## Derbyshire

**Abbey Brook Cactus Nursery**, Old Hackney Lane, Matlock, Derbyshire. Tel. no. Matlock (0629) 55360. Open every afternoon 2–6 except Tuesday (closed all day). List free on request, stamp appreciated. Mail order catalogue illustrated in colour lists over 1700 species of nursery-grown cacti and other succulent plants.

## Nottinghamshire

**Carlton Forest Cacti**, Carlton Forest, Blyth Road, Worksop, Notts. S81 0TP. Tel. no. Worksop (0909) 731642. Almost always open but please telephone to avoid disappointment. S.A.E. for list. Mainly cacti, very few succulents.

**Woodside Nurseries** (Stuart Dixon), 173 Main St., Burton Joyce, Notts. Tel. no. Burton Joyce (060231) 2142. Closed Mondays, open 10–4.30 other days. S.A.E. for list. Nursery-grown seedlings, specimen plants.

## South Humberside & Lincolnshire

**Southfield Nurseries** (B. Goodey), Louth Road, Holton-le-Clay, Grimsby, South Humberside DN36 5HL. Tel. no. Grimsby (0472) 822157. Open daily 10–5 (closed for lunch 12.30–1.30). Send stamp for list. Seed-grown cacti, Lithops, succulents.

**Glenhirst Cacti** (N.C. & S.A. Bell), Station Road, Swinehead, near Boston, Lincs. Tel. no. Swinehead (020582) 314. Open most days ('phone call advisable if travelling far to ensure someone available). S.A.E. for list. Lithops, Epiphyllums Asclepiadaceae.

**Jumanery Cacti** (June & Tom Jenkins), St. Catherine's Lodge, Cranesgate Road, Whaplode St. Catherine, Nr. Spalding, Lincs PE12 6SR. Tel. no. Holbeach St. Johns (040634) 373. Open 9–5 Sunday–Friday, closed Saturday. S.A.E. for list

## Norfolk

**Richard & Wendy Edginton**, The Vines, 2 Green Man Lane, Kirstead, Norwich, Norfolk NR15 1EP. Tel. no. Brooke (0508) 58113. Open most mornings and weekends. S.A.E. for list. Seedling cactus plants 35p upwards.

**Barleyfield Succulent Plant Nursery** (Victor & Heather Graham), Southburgh, Thetford, Norfolk. Tel. no. Dereham (0362) 820457. Nearly always open, but telephone call appreciated. S.A.E. for list. 'Other' succulents, handmade plant pots.

## Bedfordshire

**A. & V. Parker**, 31 Southill, Nr. Biggleswade, Beds. SG18 9HU. Tel. no. Hitchin (0462) 814022. Open evenings and weekends ('phone first). No list. Seed-raised plants.

**Southwest seeds** (Doug. Rowland), 200 Spring Road, Kempston, Bedford MK42 8ND. Tel. no. Bedford (0234) 58970. Open Sunday afternoons. S.A.E. for comprehensive seed list.

## Hertfordshire

**R. F. S. & B. R. Dale**, Thurnlea, 14 Buttodene Crescent, Old Nazeing Road, Broxbourne, Herts EN10 6RH. Tel. no. Hoddesdon 63234. Open almost any time but write or 'phone. No list. Full range B.E.F. pots, labels, top dressing, etc.

## Essex

**M. L. Fussell**, 29 The Readings, Harlow, Essex CM18 7BT. Tel. no. Harlow (0279) 23246. S.A.E. for list. Service by return of post.

**The Cactus Place** (David & Barbara Brewerton), 33 Bridge Avenue, Upminster, Essex RM14 2LX. Tel. no. Upminster 29911. No list. Open 9 till dusk, but 'phone first. Large and medium sized specimens.

**H. Guirl**, Glenholme, Nursery Road, Nazeing, Essex. Tel. no. Hoddesdon 62291. Visitors and parties welcome. A prior telephone call would be appreciated. No list.

## London

**The Lithops (Living Stones) Specialist Ltd.**, (Roy & Sheila Young), 79 Pearcroft Road, Leytonstone, London E11 4DP. Tel. no. 01-556 8048. Visitors by appointment. S.A.E. (A4 size) for comprehensive list of Lithops plants and seeds available.

## East & West Sussex

**Mrs. Yvonne Warrick**, 122 Barnhorn Road, Little Common Bexhill, E. Sussex. Tel. no. Cooden (04243) 4726. Not open. S.A.E. for list. Rare succulents and Epiphytics.

**Ernest Hepworth**, Mira Mar, 133 Ambleside Avenue, Telcombe Cliffs, Sussex BN9 7LG. Tel. no. Peacehaven (07914) 3260. Open by appointment; closed Sundays. Send 9p stamp for list. Lithops, Mesems, Sempervivums.

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## Dorset

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