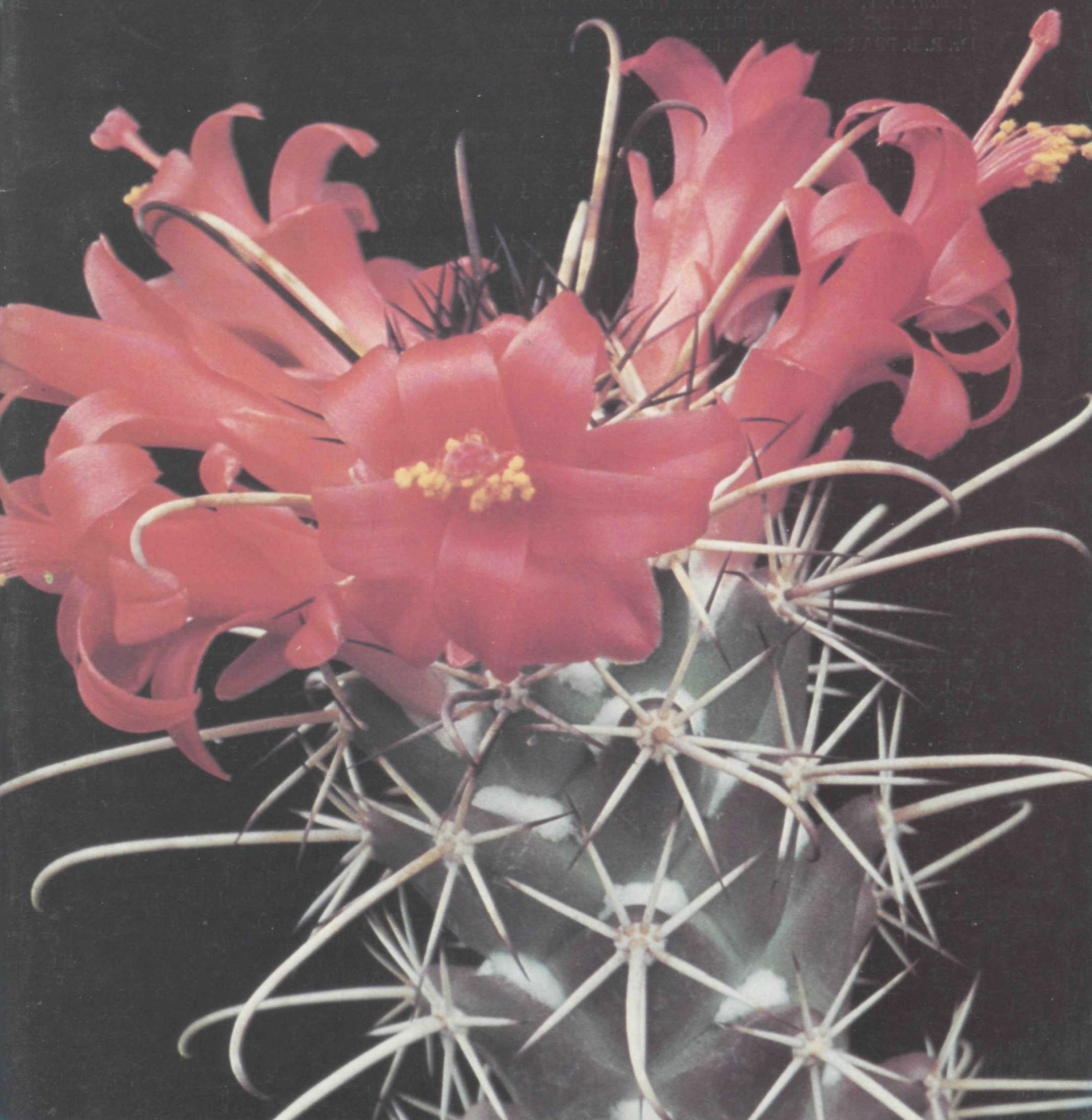


Volume 42/Number 1
February 1980

The Cactus and Succulent Journal of Great Britain



President: A. BOARDER

Vice-Presidents: H. A. AUGER,
Mrs. M. STILLWELL, J. E. TAYLOR

Chairman: W. F. MADDAMS, M.Sc., M.INST.P.

Hon. Secretary: R. H. I. READ, 5 Wilbury Avenue, Cheam,
Surrey, SM2 7DU.

Hon. Treasurer: D. R. HUNT, M.A.

Council: D. T. BEST, Dr. C. W. BIRD, D. BOWDERY,
Mrs. H. HODGSON, L. HURLEY, Mrs. B. MADDAMS,
Dr. R. B. PEARCE, Mrs. D. PRITCHARD, P. SHERVILLE



Editor: D. R. Hunt, M.A., 67 Gloucester Court, Kew Road, Richmond, Surrey, TW9 3EA.

Assistant Editor: N. P. Taylor, B.Sc., c/o Editorial Office.

Show Secretary: D. Bowdery, 14 Callander Road, Catford, London, SE6 2QD.

Publicity Officer: Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey, SM7 2DG.

Librarian: G. G. Leighton-Boyce, 220 Leigham Court Road, London, S.W.16.

Seed Purchasing Officer: Dr. T. C. Smale, 28 St. Leonard's Road, Epsom Downs, Surrey.

SUBSCRIPTION RATES 1980

Full Membership		£5.00
Joint Membership		£6.00
Junior Membership (under 18 years)		£2.50
'Senior Citizens' who joined in 1975 or earlier		£3.00
Joint members (two in family) receive one journal but are entitled to free seeds and voting rights.		

BACK VOLUMES

Vol. 24 (1962)—Vol. 36 (1974), per volume	£2.00
Vol. 37 (1975), nos. 3—4 only	£1.00
Vol. 38 (1976)—Vol. 41 (1979), per volume	£4.00

Prices include postage by surface mail.

INDEXES

Vol. 26-30 (1964-68)		0.90p
Vol. 31-37 (1969-75)		0.90p

Applications for membership, advertising, back volumes and indexes should be made to the following address:

Cactus & Succulent Society of Great Britain
67 Gloucester Court
Kew Road
RICHMOND
Surrey TW9 3EA
England

SOCIETY SALES ITEMS

All items post-paid inland. Overseas extra.

Journal Binders (to hold 4 vols.)		out of stock
Society badge		£1.00
Car sticker		0.30p
Booklet on cultivation		0.30p
Key fobs (mixed colours)		0.25p
Ballpoint pens (black, blue or red)		10 for 0.60p
T-Shirts and Sweatshirts		write for details

Order from: **Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG, England.**

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: *Mammillaria posejgeri* (see p.4).
Photo by Gordon Rowley.

The Journal is published quarterly by the Society, price £1.25 (ISSN 0007-9375).

The Cactus and Succulent Journal of Great Britain

Volume 42 Number 1 February 1980

In this issue

Floral behaviour in <i>Aloe</i>	3
Connoisseurs' Cacti	4
Literature Notes	6
Pollen as an aid to the classification of <i>Conophytum</i>	7
Historical Notes on <i>Echeveria</i> (2)	13
Pests apart from the two-legged sort	21
Forum	22
Notes from Members	22
Notes on the 1980 Seed Distribution	23
Forthcoming Events	27
Branch Activities	27
Nursery List	27

Exit the 'Seventies

Twelve speakers and a responsive audience of over 100, plus efficient hotel organization and good food, were the ingredients of our successful weekend meeting at the Dolphin & Anchor, Chichester, last 20-21 October.

The theme of the meeting, jointly sponsored by CSSGB and IOS British Section, was *Succulents in the 'Seventies* and the speakers took a part serious, part nostalgic and part irreverent backward glance over the decade. One or two proved to have aspirations as clairvoyants, too! A major development in the 'Seventies has been the widening of our horizons by cheaper, swifter and more comfortable travel, and the opportunities for many more of us to get out 'in the field' were reflected in the programme by travel talks from a distinguished band of travellers, including John Lavranos, Keith Mortimer, Len Newton and Tom Jenkins, who brought the landscape and succulents of Africa to life in pictures and commentary, and guest-of-honour Werner Rauh, who took us to both Old World and New. Our speaker from farthest afield, Roberto Kiesling, reviewed cactus research, including his own, in his native Argentina.

The elegant ballroom of the Dolphin & Anchor Hotel was our lecture theatre and also an ideal setting for the CSSGB's 48th Anniversary Dinner, attended by nearly seventy members and guests.

Enter the 'Eighties

Numerous encouraging letters approved of the coloured illustrations in the last issue, for which many thanks. We do take the point, made by some who wrote, that colour inside is often of more value for reference and identification, but hope that a colourful cover will be effective in attracting new members. Also, it is less costly to print a colour illustration on the cover than one inside.

Some of you said you would be happy to pay for more colour with a subscription of £6.50 or even more, but there may be an alternative; that of combining forces with the National Cactus & Succulent Society to produce one high-quality journal. The idea of pooling resources was first mooted about two years ago (see CSJGB 41(2): 30.1978) and although now, as then, there are no plans for a merger of the Societies, the Council of our Society and the Finance Committee of the NCSS have reached agreement on outline proposals which might lead to our collaborating on a joint production as soon as next year. Practical details have yet to be decided, and in any event the scheme will not go ahead without the approval of members.

The suggested title of the combined Journal is 'The British Cactus and Succulent Journal' and the proposals agreed so far are as follows:

1. It is proposed by the Finance Committee of the National Cactus and Succulent Society and the Council of the Cactus and Succulent Society of Great Britain that the existing Journals of the Societies, which are similar in format, be united under the above title for an experimental period, subject to review after one year.
2. The Societies would retain their separate identity and the new Journal would be managed jointly by both Societies and function through appointed editorial staff.
3. It is further proposed that the Newsletter of the National Society should be issued separately with the Journal to members of that Society only.
4. It is envisaged that this arrangement, if approved, will come into effect as from the first issue of 1981.

There will be an opportunity to discuss the scheme at our Annual General Meeting on 1 March, but anyone unable to attend who wishes to comment should contact any officer of the Society as soon as possible. Council is empowered by the Rules to give the scheme the go-ahead, but if significant opposition is registered a ballot of all members will be preferred.

ANNUAL GENERAL MEETING

Saturday 1 March

to be held at Capel Manor Primary School,
Bullsmoor Lane, Enfield, starting at 2.30 p.m.

Directions for reaching the venue are on p. 27.

Comparison of the two Societies' membership lists has shown that about 60% of GB subscribers also subscribe to NCSS, whose Executive Committee will be deciding whether or not to implement the scheme. For those who belong to both Societies, the hoped-for chain of advantages is that it will combine the best features of both Journals on a single subscription basis, have a wider appeal than either of the present journals, increase circulation and attract many more subscribers at home and abroad, make regular colour features feasible, and economize on administrative time and costs, keeping the subscription rate down. For those who do not subscribe to NCSS the advantages will be still greater: a bigger and better journal with no increase (perhaps a decrease) in subscription rate, thanks to larger circulation.

For anyone who might be prompted to ask 'Why not go the whole hog and merge the Societies?', the answer is that whilst the current climate of goodwill is such that a reunion could well come about in due course, combining forces on journal production is a comparatively simple step, procedurally and administratively, and also one that is not irreversible.

Society will hold an Autumn Show

Following a petition by interested members, Council has reversed its earlier decision not to hold any Shows this year. There will be one show, fixed for Saturday, 4 October at the now usual venue, St Saviours Hall, Pimlico. A new Show Committee with Derek Bowdery as Secretary has prepared a schedule combining the most popular classes from both last year's Shows. Full details in the May issue.

Square Pots

Unfortunately, we have been unable to secure the cooperation of BEF Ltd. in manufacturing larger sizes of square half-pots. We are told they have been tooling-up instead for a cheaper line in popular sizes, which sounds ominous.

Peyote thief

Last October a thief broke into member Cyril Harp's greenhouse at Banstead, Surrey, and took a *Pelecyphora* and two *Lophophoras*, probably for their narcotic value, says Mr. Harp. The police were informed and anyone else losing plants should do the same.

Correction

The seed of *M. huitzilopochtli* measures 0.4×0.75 mm., not 1.4×0.75 mm. as printed on page 107 of the November issue.

Making the point for us

Objecting to our report (CSJGB 41 (3): 55.1979) about the cacti confiscated at Frankfurt last April, Mr. K. D. Ehlers of Ehlers Reisen has admitted, in a letter, that the collecting was illegal, but claims the real culprits were not his party (who apparently only dug up 100-200 plants per person) but three people who happened to travel on the same 'plane, having collected far more, and were also stopped by German customs.

No one suggested that Ehlers Reisen clients were the *only* people digging up plants illegally in America. That's just the point, Mr. Ehlers.

Ehlers Reisen plan further trips to Mexico and Peru this year. They are seeking the necessary permits this time, and dissociate themselves from 'enthusiasts who, it appears, have to finance their expenses by selling wild plants they collect'.

Mystery Echeveria still a mystery

Replying to Nigel Taylor, who claimed (CSJGB 41:11. 1979) that his plant of *Echeveria agavoides* var. *corderoyi* had produced three offsets in five years, compared with Mr. Justus Corderoy's statement that his plant had only produced three young ones in 30 years, J. C. van Keppel opines that Nigel's must be a different clone and perhaps produced its offsets after injury or over-feeding. Although Nigel's feeding habits are well-known, he denies maltreating his plants and points out that the Kew plant of var. *corderoyi* has also produced offsets.

How easily does this variety off-set? Readers' views would be useful. And where did var. *corderoyi* come from? Was it a hybrid or nursery mutant, or does it occur in the wild?

Lithops, Naturally

Professor Desmond Cole, the well-known authority on *Lithops*, has sent us specimen copies of three sets of coloured prints and mimeographed text under the above title depicting and describing the plants in habitat. There are 10 picture cards 6×4 inches (15×10 cm.) in each set. The text has been typed within a somewhat smaller frame so that it can, if desired, be cut out and stuck on further cards and filed with the pictures. Colour reproduction looks very good.

Professor Cole says that the series 'was produced in response to an insistent demand from the USA . . . and the first three sets come in a small, experimental edition of 500. If we get our money back, and if I can find time to set up more series, we shall continue, but please don't ask when. Price is South African R8.00 per set, R24.00 for the three, by registered airmail, post free. Remittances preferably by bank draft payable to D. T. Cole, Nedbank, Braamfontein, Johannesburg, direct with your order. Personal cheques in British sterling *must* include R1.50 extra for bank charges.'

Floral behaviour in the genus *Aloe*

by L. E. Newton

Biology Department
University of Science and Technology
Kumasi, Ghana

In the second edition of the *Flora of West Tropical Africa* the section on the genus *Aloe* (Kcay, 1968) includes one plate of line drawings, as t. 348. One drawing, fig. F, is a longitudinal section of a flower of *A. macrocarpa* var. *major*. This drawing depicts the flower with unopened anthers lying just inside the mouth of the perianth tube, and the stigma slightly exserted from the perianth tube. However, such an arrangement of parts does not occur in *Aloe* flowers.

Aloe flowers are protandrous, i.e. the anthers mature and open to release the pollen before the stigma becomes receptive. In species which I have observed, including all those indigenous in West Africa, each flower is open for two days. On the first day the anthers are exerted from the perianth tube and they split open to release the pollen. In the West African taxa this occurs between 5 a.m. and 6 a.m. At this stage the stigma is still inside the perianth tube, and so the flower is in the male phase (fig. 1, top). Shortly before dawn on the second day, continued growth of the style pushes the stigma clear of the perianth tube, and the stigmatic surface becomes receptive. By this time the anthers are withdrawn into the perianth tube by contraction of the filaments. Thus in the second day the flower is in the female phase (fig. 1, bottom).

The outline of floral behaviour given above is based on observations of flowering in relatively few species.

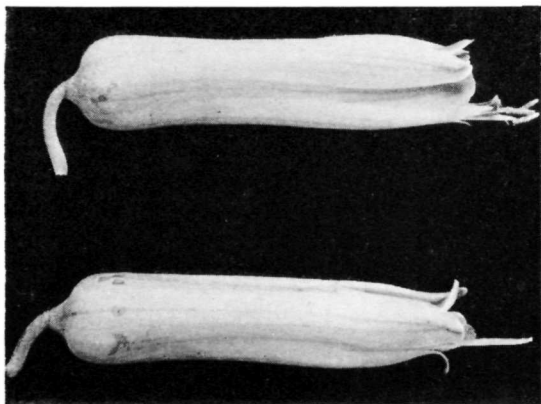


Fig. 1. Flowers of *Aloe schweinfurthii* Baker. Top: male phase, with anthers exerted. Bottom: female phase, with the stigma exerted and the anthers withdrawn into the perianth tube.

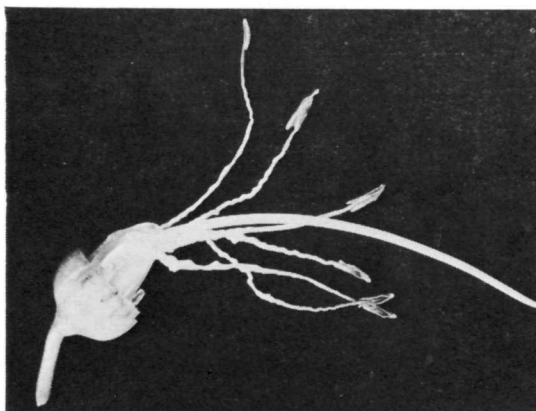


Fig. 2. Flower of *A. schweinfurthii* in the female phase, with the perianth removed. Note the convoluted filaments.

That protandry is the general rule in the genus *Aloe* is seen by examining the two books by Reynolds (1950, 1966). In these works every photograph of a series of flowers from bud to post-pollination stage shows, where details are visible, a male phase followed by a female phase. The degree of exertion of anthers and stigmas varies in different species.

Contraction of the filaments, which has been reported briefly once before (Newton, 1974), is an interesting phenomenon. In the female phase the filaments have a characteristic convoluted shape (fig. 2). Examination with a microscope reveals that the cortical (outer) cells of the filament contract, and the central vascular strand is thrown into folds (fig. 3). In this way the length of the filament is reduced and the anther is drawn into the perianth tube.

The ultimate function of a flower is to produce seeds, and the details of floral structure and behaviour in different species are important aspects of the plants' pollination biology. Protandry is generally regarded as a mechanism to ensure cross-pollination. However, a number of *Aloe* species have been found to be self-incompatible. In this case an elaborate mechanism to prevent self-pollination seems unnecessary since self-pollination will not result in fertilization. Faegri & Van der Pijl (1971) suggest that in such circumstances the mechanism of protandry is a 'phylogenetic relict', since self-incompatibility would be expected to appear later

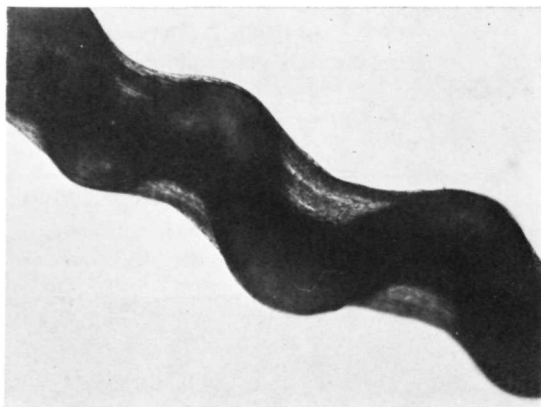


Fig. 3. Detail of filament after contraction.

than protandry in flower evolution. The contribution of these two mechanisms to the pollination biology of *Aloe* species requires further investigation.

References

- FAEGRI, K. & VAN DER PIJL, L. (1971). *The Principles of Pollination Ecology*. Ed. 2. Pergamon Press, Oxford.
- KEAY, R. W. J. (1968). *Aloe* Linn. In J. Hutchinson & J. M. Dalziel, *Flora of West Tropical Africa*, edn. 2, 3: 90-92. Crown Agents, London.
- NEWTON, L. E. (1974). Taxonomic studies on West African Aloes. In *IOS Bull.* 3: 100-102.
- REYNOLDS, G. W. (1950). *The Aloes of South Africa*. Trustees of the Aloes of S. Africa Book Fund, Johannesburg.
- (1966). *The Aloes of Tropical Africa and Madagascar*. Trustees of the Aloes Book Fund, Mbabane.

Connoisseurs' Cacti

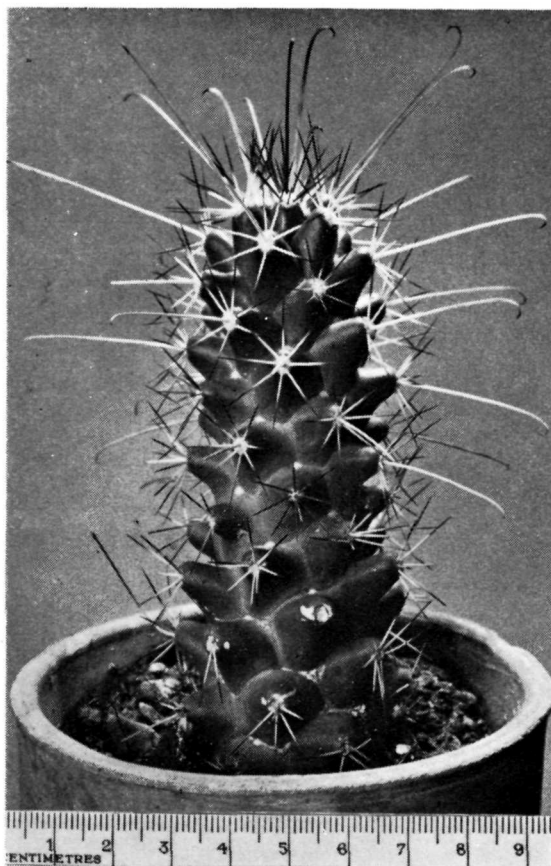
chosen by David Hunt, Nigel Taylor and Jackie Panter

9. *Mammillaria poselgeri* (see also front cover)

The best-known of the Cochemieas, this species was first described by Hildmann in 1885 and said to have been introduced many years earlier by Heinrich Poselger (d. 1883) after whom it was named. According to Thomas Brandegee, who redescribed it a few years later as *M. roseana*, in ignorance of Hildmann's article, it occurs throughout the lower elevations of the Cape Region of Baja California, and the stems 'pendent from rocks at Comondu, are sometimes six feet long'. Gordon Rowley's fine front-cover illustration is of a plant he collected in Baja in 1974 which flowered in England in August 1978 (GR 528). We had travelled together the length of Baja with Reid Moran after the IOS Congress at Santa Barbara, and found a good population of the species some 50 km. north of La Paz. Seeds I collected were subsequently distributed by the Mammillaria Society under the number H.8738, and my own collected plant flowered for the first time in 1979. It had been looking unhappy since the winter and surmising that it was 'off its roots', I decided to re-pot. The fibrous roots were indeed dead, but fortunately the thick root-tuber had not rotted. Re-potted in dry soil, I put the plant under the staging to make its recovery in the shade, and the next time I looked the flower-buds were almost fully formed!

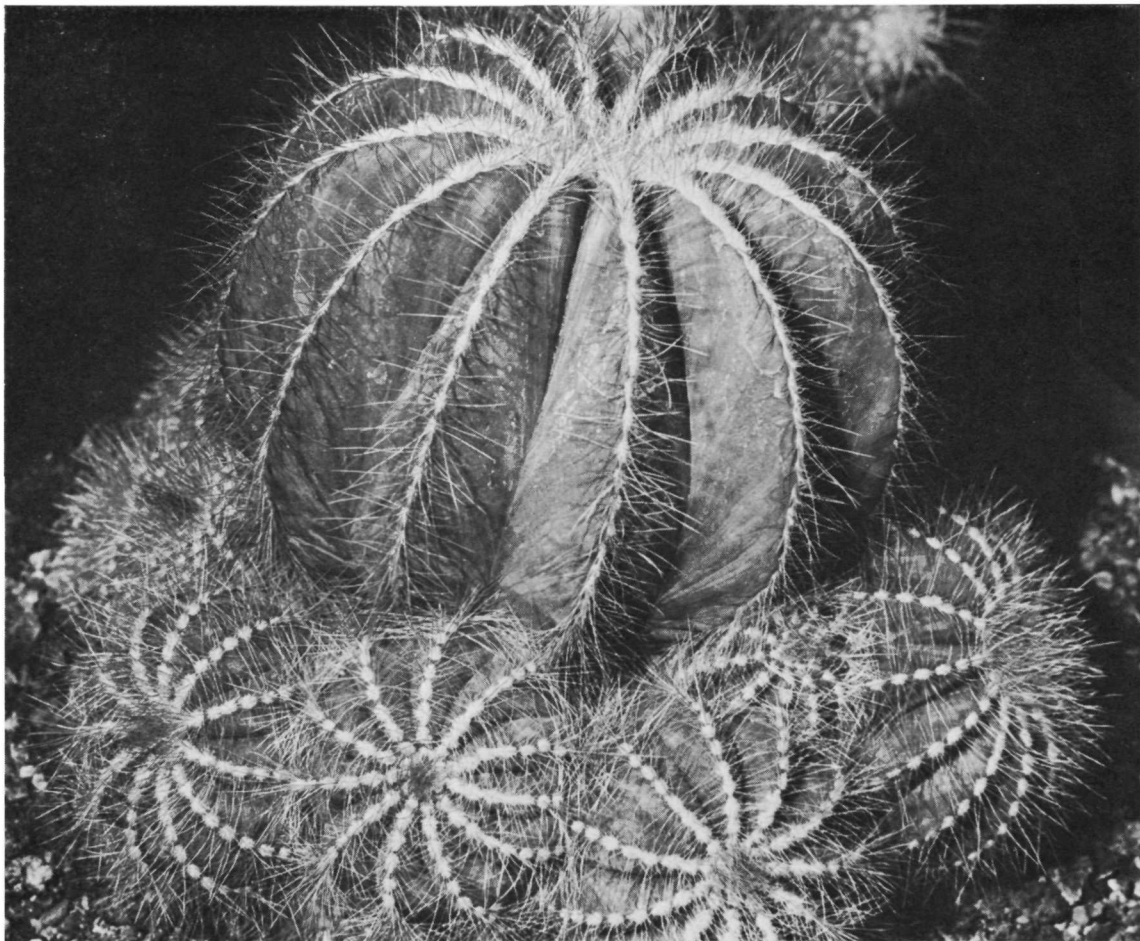
M. poselgeri is quite easy from seed, and plants the size of that shown on this page can be raised in about three years. The species is not so easy to flower, however, and I cannot recommend my own stress/shock treatment, though it appears to have worked once!

D.R.H.



Mammillaria poselgeri

(photo: R. Zabeau)



Notocactus magnificus

(photo: Peter Chapman)

10. *Notocactus magnificus*

The genus *Notocactus* contains many collectors' favourites and this species described in 1966 is no exception. *N. magnificus** belongs to the small *Eriocactus* group comprising *N. schumannianus*, *N. nigrispinus* and *N. leninghausii*, with whom it shares the straight acute ribs, closely set areoles and yellow stigmas. Amongst these species *N. magnificus* is distinguished by having a beautiful blue-glaucous stem with only 11–15 ribs and the tendency to clump while the main head is still globular. With age the main stem gains but little in height, whereas *N. leninghausii* and *N. schumannianus* make stems to a metre or more in length.

* The combination *Notocactus magnificus* (F. Ritter) Krainz in KuaS 17: 195 (1966) was not validly published (exact basionym page not cited—ICBN Art. 33), and apparently has not been validated since; hence: ***Notocactus magnificus*** (F. Ritter) Krainz ex N. P. Taylor, **comb. nov.** Basionym: *Eriocactus magnificus* F. Ritter in *Succulenta* 45(4): 50 (1966).

N. P. TAYLOR

N. magnificus seems easy to grow, and there are now some impressive seed-grown examples to be seen in collections which easily excel the often mis-shapen imports that once represented the plant. Coming from the Serra Geral in the state of Rio Grande do Sul, Brazil, this species is said to enjoy conditions of high temperature and rainfall in habitat. Nevertheless, it appears to withstand a minimum of 5°C (40°F) in winter if kept quite dry, but will benefit from a slightly warmer resting period when a little water can help to prevent desiccation of the roots.

N.P.T.

11. *Astrophytum myriostigma*

'Star plant' is what the generic name *Astrophytum* literally means, and this species from northern Mexico is certainly a popular 'star' in many collections. The *myriostigma* of the name, by the way, does not refer to the stigmas of the flower (as Vera Higgins's book 'Study



Astrophytum myriostigma (photo: Jackie Panter)

of Cacti', p. 45 seems to imply) but the myriad white dots or spots on the stem. Charles Lemaire, who described it back in 1839 from a plant in the Monville collection said so, and who am I to argue? Anyway, there's no doubt about its popular name 'Bishop's Cap', on account of its resemblance to that symbol of episcopal office. It is a highly variable plant with the number of ribs ranging from 4–6 (or even 8–10 according to some authorities); usually it has five and if you find one with more than that these will sometimes revert to the usual number. With only four ribs it is called *A. myriostigma* var. *myriostigma* f. *quadricostatum* but these have been known to suddenly grow a fifth. The density of the white slightly woolly spots or scales varies also and the extreme form without any at all is called *A. myriostigma* var. *potosinum* f. *nudum*; this can also change its number of ribs without warning. I once found one with six and bore it home triumphantly, convinced I had a rare form, only to find that after two years the sixth rib stopped growing and now I have a lopsided five-ribbed specimen instead.

With 4, 5 or 6 ribs, with spots or without, tall or short, this is an easy plant to grow, always attractive although it has a tendency to become misshapen in old age. It is slow-growing, completely lacking spines or glochids and readily produces yellow flowers about one to one-and-a-half inches across, often blooming more than once in the summer months. No special cultural requirements are needed although after several instances of burning I now keep all my *Astrophytums* in a slightly shaded part of the greenhouse.

J.P.

Literature Notes

Ritter vom Steckenpferd

The first volume of Friedrich Ritter's *magnum opus*, 'Kakteen in Südamerika', with over 300 closely-typed pages, several new genera and more than 200 new names (many of them improper, for various reasons), is off the presses.* It deals with Brazil, Uruguay and Paraguay. No one would deny that Ritter has discovered new and exciting cacti in his long career in the field, but equally no one should condone his failure to name, distinguish and document them in an orthodox scientific manner. He admits to not having checked what has been described before, he has a Backebergian disregard for the rules of nomenclature, and his numbering system is practically unintelligible. In short, the jousts who have so long blocked the path of South American cactology with their polemics and pseudo-science are not all gone; one knight, at least, is still astride his hobby-horse.

More Barthlott, more Gibson

Not all the new cactus literature of the latter part of 1979 was so indigestible. Two papers in leading botanical journals should be widely read by those interested in the family's evolution and classification. One, by Wilhelm Barthlott & Gisela Voit of Heidelberg, is an *apéritif* to their extensive SEM and light-microscope survey of seed-coat morphology, covering 900 species, which will be published later. The preliminary paper† outlines the range of seed-coat characters and variation, proposes a terminology for the various microstructures and briefly discusses their taxonomic implications.

The other paper commanding attention is that by Gibson & Horak on the anatomy and phylogeny of the Mexican columnar cacti.§ A paper by Arthur Gibson on wood-skeletons in cacti was published in CSJGB in 1978 (vol. 40(3): 73–80). With Karl Horak, he now reviews the literature on the stem-chemistry of the Pachycereeae (sensu Buxbaum) *et al.*, deals with the shoot-anatomy, provides a growth-form classification and considers the morphology of the reproductive structures along with likely plant-pollinator relationships. Supported by a computer-generated cluster analysis of no less than 69 variable features, the authors produce a new hypothetical phylogeny for the Pachycereeae, more simple and, in our view, much more plausible, than Buxbaum's.

D.R.H.

* Ritter, F. (1979). *Kakteen in Südamerika*. F. Ritter Selbstverlag, D-3509 Spangenberg, W. Germany. Price 36DM (about £10). ('Ritter vom Steckenpferd', by the way, is the title of a piano-piece by Robert Schumann.)

† Barthlott, W. & Voit, G. (1979). *Mikromorphologie der Samenschalen und Taxonomie der Cactaceae: Ein raster-elektronen-mikroskopischer Überblick*. In *Plant Systematics and Evolution* 132: 205–229.

§ Gibson, A. C. & Horak, K. G. (1979). *Systematic Anatomy and Phylogeny of Mexican Columnar Cacti*. In *Annals of the Missouri Botanical Garden* 65(4): 999–1057.

Pollen as an aid to the Classification of Conophytum

by Suzanne Dupont

Laboratory of Ecology and Phytogeography
University of Nantes, France

translated by Lois Glass

General pollen morphology of Conophytum

As in other species of Mesembryanthemaceae which have been studied,* e.g. *Neohenricia sibbettii* (fig. 2), *Ophthalmophyllum praeseptum* (fig. 3) and *Cheiridopsis caroli-schmidtii* (fig. 4), the pollen of *Conophytum* is sub-spherical, the apertures being represented by three parallel equidistant furrows arranged along the equator: *Conophytum obconellum* (fig. 1), *C. pardicolor* (fig. 5). In several *Conophytum* species many of the grains are 4-furrowed: *C. hians* (fig. 7) and *C. pallidum* (fig. 8), a feature I have only rarely observed in the other genera studied; it would be interesting to investigate samples from a different source, in order to check whether this character is constant. The presence in certain grains of *C. gratum* of 6-pericolpate pollen, one side of the grain showing three furrows arranged in a triangle (fig. 9) may perhaps be indicative of hybridity.

The appearance of the furrow varies from one species to another. *C. pardicolor* has a furrow which is closed and scarcely visible (fig. 10), while *C. obconellum* (fig. 11) and *C. lambertense* (fig. 12) have a gaping furrow with the margins clearly differentiated from the rest of the exine, particularly as to the size and density of the perforations. In *C. notabile* (fig. 13) the tectum is more densely granulate in the vicinity of the furrow.

The muri of the tectum are sometimes deeply grooved: *C. hians* (fig. 14); but this feature was also noted in other genera, particularly in some species of *Leipoldtia*. Granules on the nexine layer are visible in the lumina of some species, e.g. *C. scitulum* (fig. 15) and *C. subglobosum* (fig. 20), but the density of these is low compared with that observed in *Octopoma octojuge* (figs. 16, 19).

Unlike other species the pollen of *C. ficiforme* (fig. 17) is irregular in form, with the furrows often slightly curving or not parallel, which gives a very distinctive appearance; it would be interesting to check whether this represents a constant specific character or is an artefact of the preparation technique.

* Nomenclature according to Jacobsen, H. (1970', Das Sukkulantenlexikon. This paper was received in August 1979 and has been edited by D. R. Hunt and I. K. Ferguson. The term 'granules' is used throughout the English version where the French has 'épines' (spinules) or occasionally 'verruces' (verrucae).

Correction to Dr. Dupont's earlier paper, *Notes on the Pollen of the Mesembryanthemaceae*, in CSJGB 39(3): 63 (1977): Line 34 in the second column of print should begin 'morphogenesis of the pollen-grains is always identical . . . '.

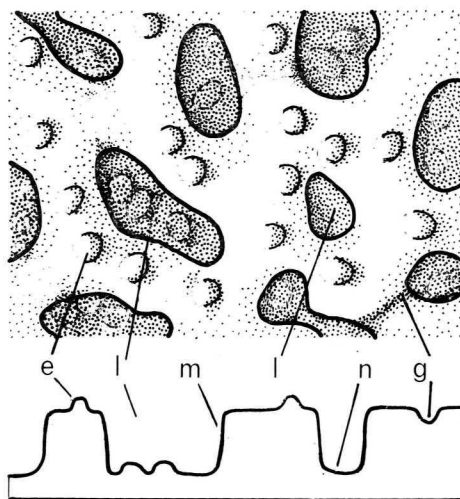
Analysis of variation

Since the exine sculpture is not identical for all species of *Conophytum* (compare, for instance, *C. subglobosum* in figs. 20, 21, and *C. vanheerdei* in figs. 22, 25), I have attempted to use its characters as a basis for groups within this vast genus. We have seen that this ornamentation is not homogeneous throughout the entire surface of the grain; for that reason, and to make the results comparable, I observed throughout a square portion of the surface with sides measuring 5 µm, taken between two furrows and equidistant from their extremities.

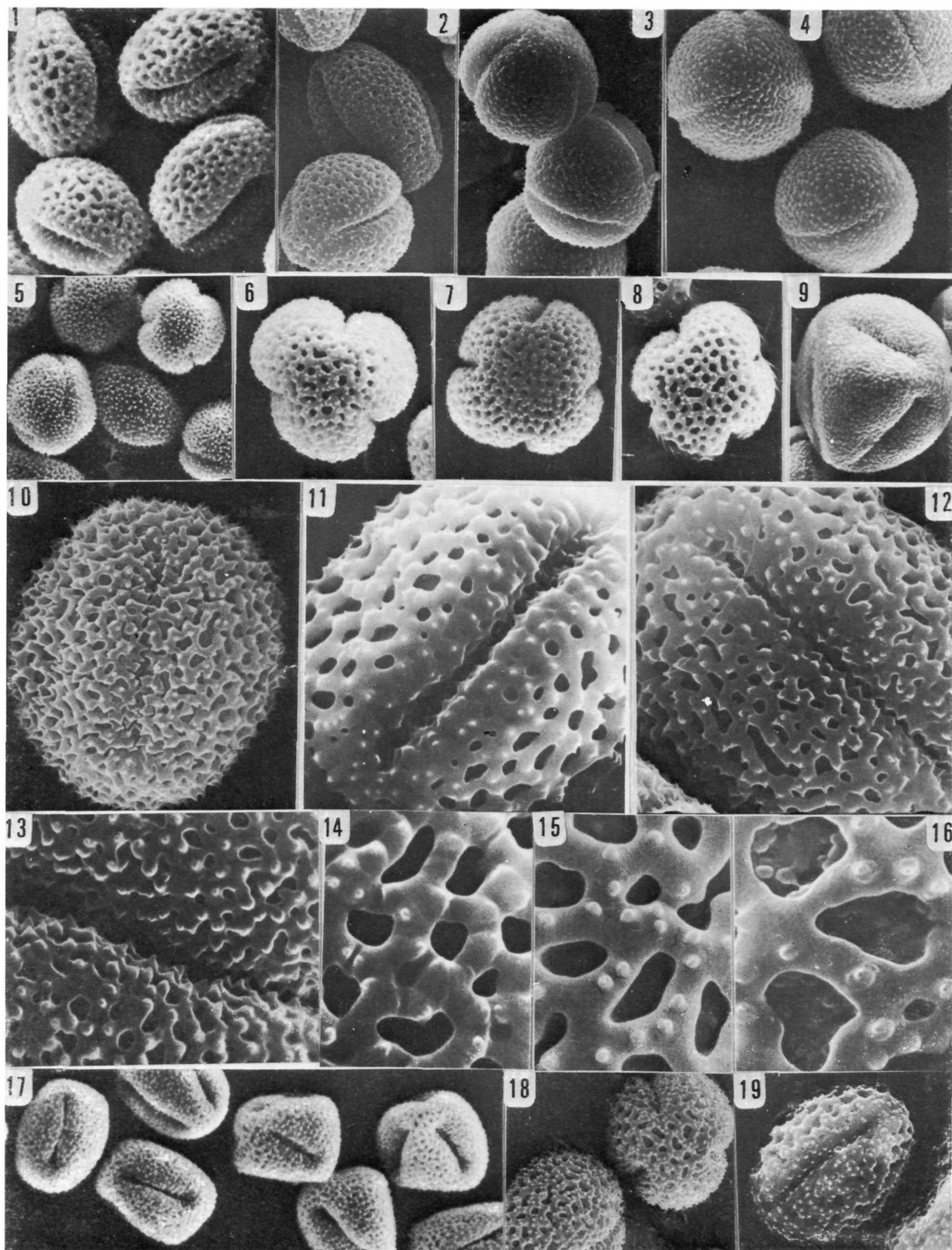
Three particular characters were studied: (a) area occupied by the perforations relative to the total area; (b) the number of perforations; (c) the number of raised elements, irrespective of size. All observations were made at a magnification of $\times 20,000$.

(a) Depending on the surface-area of the perforations, I classified the grains into three groups:

—those where the area of the perforations was less than 10% of the total surface observed (e.g. *C. vanheerdei*, figs. 22, 25);



Features of the tectum: e, raised elements (variously termed granules, spinules, verrucae, etc., according to shape); g, grooves on muri; l, lumina (large perforations in the tectum); m, muri (walls); n, nexine. Compare, for instance, figs. 14-16.



—those where the area of the perforations was between 10–20% (e.g. *C. marnierianum*, fig. 23);

—those where the area of the perforations exceeded 20%, in this case the exine is said to be reticulate (e.g. *C. truncatum* var. *truncatum* f. *renniei*, fig. 24).

(b) Any given area of perforations may be made up either of numerous perforations of small size (e.g. *C. gratum*, figs. 26, 27); or by a small number of large perforations or lumina (e.g. *C. paucillum*, fig. 28). I therefore counted the number of perforations (per $5 \mu\text{m}^2$) and grouped the species as follows: fewer than 21 perforations; between 21 and 50; and over 50. No account was taken of the shape of the perforations (irregular, in general) nor of their size, which was sometimes very variable (e.g. *C. lambertense*, fig. 29).

(c) The number of granules was also noted; this generally exceeds the number of perforations (e.g. *C. notabile*, fig. 30), but there are exceptions (e.g. *C. velutinum*, fig. 31). I was then able to make a further three groups: up to 50 granules; 51–100; and over 100. The number of granules is not correlated with the size of the perforations nor with their total surface-area: *C. pageae*, for instance, where the perforation-area exceeds 20%, has 69 granules whereas *C. ursprungianum* has the surface of the perforations between 10–20% of the surface observed and yet there are only 36 granules. Among the Conophytums I did not observe any with a network of muri of constant thickness and granules with a basal diameter equal to that of the muri such as was noted in *Rabiea albinota* (fig. 35).

Discussion

The combination of the three characters analysed is set out in Table 1. It will be noted that in the majority of species the perforation area is between 10–20%. The number of perforations in these species exceeds 20 and

the number of granules varies enormously—from 170 for *C. notabile* down to 30 for *C. herrei*. In only very few species does the perforation area fall below 10%; the number of these perforations is relatively high which, in turn, implies that they are of very small size.

From the evolutionary point of view, the exine without perforations is usually regarded as the most primitive the area of perforations tending to increase as evolution proceeds, finally producing an intectate exine. Among the Mesembryanthemaceae I have never observed the most primitive type; as for the intectate type, I have only encountered it in the case of certain pollen samples from *Jacobsenia kolbei*, *Jensenobotrya lossowiana* and *Ebracteola montismoltkei* (figs. 36 and 37), so that this hypothetical evolutionary route does exist within the Family. From the viewpoint of their pollen the Conophytums which have been investigated are situated midway between the two extremes noted in other Families.

In Table 1, arrows indicate the evolutionary trend for the three characters under review: increase in the total area occupied by perforations (from bottom to top); reduction in the number of perforations, which is zero in the case of intectate pollen (from left to right); reduction and finally disappearance of granules, since these are no longer present in the case of intectate pollen (from left to right in each of the groups based on perforation-number). Within each of these groups the least evolved species is to be found at the bottom left; and the most highly evolved at the top right. For the table as a whole, the most highly evolved species will be found in the top right-hand corner. (The sign * denotes that the species is near the upper limit of the group for perforation-number; and the sign § signifies that the species is near the upper limit of the group for granule-number.)

Conophytum occultum can have flowers either yellow (fig. 33) or red (fig. 34); with differing pollen. I was given this species by Mr. De Boer in the form of one-year-old plants raised from apparently identical seeds originating from one and the same parent-plant. These seedlings, now mature, have flowered in the two different colours. Hybridity has to be presumed. The testa of all seeds from any one mother-plant will be alike, provided the mother-plant is pure-bred; the same applies to the ovules; but the ovules can be fertilized by pollen either from the same species, or from another species nearby. Thus the embryos which develop from seeds having an identical testa, and originating from the same fruit, may still differ in certain characters which were introduced by the pollen, since this is not necessarily of identical origin.

In Table 2 the species studied are arranged according to Tischer's classification (in Jacobsen, H. (1970), Das Sukkulantenlexikon) and it gives for each such species the number of perforations, the number of granules, and the value for the total surface-area of the perforations. The two classifications coincide only to a limited extent.

PLATE I

1. *Conophytum obconellum* ($\times 1500$). 2. *Neohenricia sibbettii* ($\times 1500$). 3. *Ophthalmophyllum praeseptum* ($\times 1500$). 4. *Cheiridopsis caroli-schmidtii* ($\times 1500$). 5. *Conophytum pardicolor* ($\times 1500$). 6. *Conophytum hians*. Polar view of a normal 3-furrowed grain ($\times 1500$). 7. Same species. Polar view of a 4-furrowed grain ($\times 1500$). 8. *Conophytum pallidum*. Polar view, with 4 furrows ($\times 1500$). 9. *Conophytum gratum*. 3 furrows visible, arranged in a triangle ($\times 1500$). 10. *Conophytum pardicolor*. Closed furrow; exine virtually unmodified in the vicinity of the furrow ($\times 5000$). 11. *Conophytum obconellum*. Gaping furrow giving a view of the granules on its walls and base; exine less perforated in the neighbourhood of the furrow than elsewhere on the grain ($\times 5000$). 12. *Conophytum lambertense*. Size and density of the perforations diminishing in the vicinity of the furrow ($\times 5000$). 13. *Conophytum notabile*. High granule-density near the furrow ($\times 10,000$). 14. *Conophytum hians*. Showing deep grooves in the muri ($\times 10,000$). 15. *Conophytum scitulum*. A few verrucae on the nexine ($\times 10,000$). 16. *Octopoma octojuge*. Numerous verrucae on the nexine ($\times 10,000$). 17. *Conophytum siciforme*. The majority of the grains are irregular ($\times 1500$). 18. *Conophytum scitulum* ($\times 1500$). 19. *Octopoma octojuge*. Exine only slightly perforated in the vicinity of the furrow ($\times 1500$).

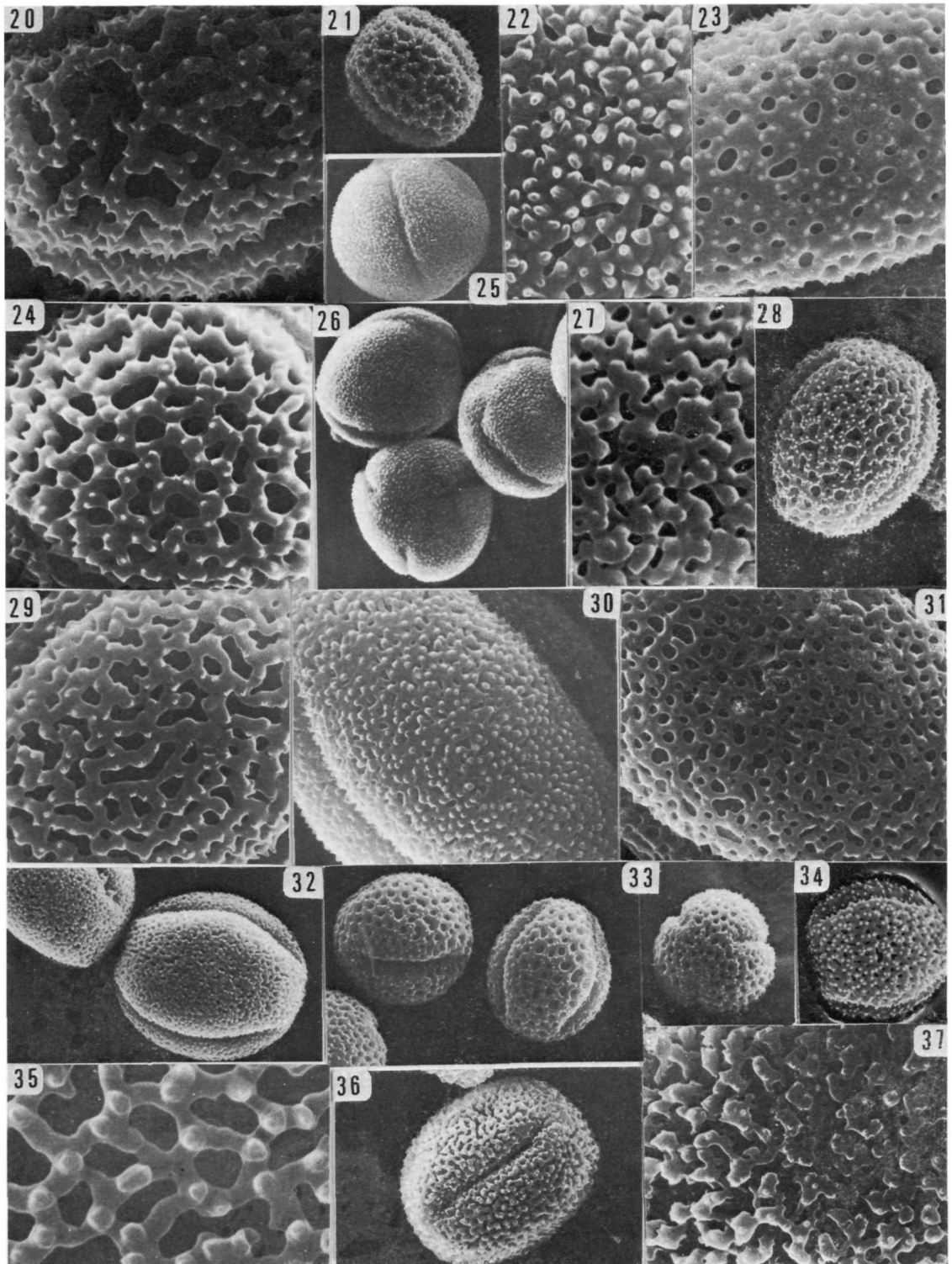


PLATE II

20. *Conophytum subglobosum*. Reticulate tectum with the largest perforations (lamina) observed in *Conophytum*; several verrucae on the nexine ($\times 5000$). **21. *Conophytum subglobosum*.** Meridian view, 2 furrows ($\times 1500$). **22. *Conophytum vanheerdei*.** Perforations occupy less than 10% of the observed surface (see text) ($\times 10,000$). **23. *Conophytum marnieranum*.** Perforations occupy 10–20% of total surface area (see text) ($\times 5000$). **24. *Conophytum truncatum* var. *truncatum* f. *renniei*.** Perforations occupy more than 20% of surface (see text) ($\times 5000$). **25. *Conophytum vanheerdei*.** Equatorial view, 1 furrow ($\times 1500$). **26. *Conophytum gratum*.** ($\times 1500$). **27. *Conophytum gratum*.** Perforations very small; compare their size with those of *C. pauxillum* (fig. 28) ($\times 10,000$). **28. *Conophytum pauxillum*.** ($\times 1500$). **29. *Conophytum lambertense*.** ($\times 5000$). **30. *Conophytum notabile*.** Verrucae very dense ($\times 5000$). **31. *Conophytum velutinum*.** Raised elements less numerous than the perforations ($\times 5000$). **32. *Conophytum praegratum*.** ($\times 1500$). **33. *Conophytum occultum*.** (yellow-flowered form). Meridian and polar views ($\times 1500$). **34. *Conophytum occultum*.** (red-flowered form). Exine less perforated ($\times 1500$). **35. *Rabiea albinota*.** Base of the verrucae as broad as the walls separating the perforations ($\times 10,000$). **36. *Ebracteola montis-moltkei*.** ($\times 1500$). **37. *Ebracteola montis-moltkei*.** Tectum discontinuous in places ($\times 10,000$).

It would be of great interest to complete this work by studying further species of *Conophytum*, and also to investigate other pollen-characters; but it needs to be said that pollen alone cannot provide the key to the genus; and that many morphological and anatomical characters would have to be studied and then perhaps run through a computer; and this, in turn, given the complexity of the data, might provide us with a classification for the species of *Conophytum*.

Acknowledgements

This work has been made possible only by the kind help of Mrs. Hazel Hodgson. It takes a great deal of courage to cut out flower-buds from the rare plants which one has so lovingly tended. Mrs. Hodgson has found the courage to do this, and I take this opportunity of expressing my warmest thanks to her.

I also wish to thank the following: Mrs. Glass, who has prepared the translation of my text; A. Barreau, technician in charge of the SEM (JSM 2); and G. Hauray, technician responsible for processing the films.

Perforations number area									
	51 or more			21 to 50			20 or fewer		
20% or more		membran- aceum	velutinum		hians pictum	ficiforme lambertense		pageae	§occultum (yellow) obconellum §pauxillum §scitulum subglobosum truncatum var. renniei
10–20%	gratum notabile obscurum	cupreiflorum ectypum maximum pardicolor pellucidum §polyandrum praegratum			*cordatum flavum fulleri globuliforme *luisiae marnieranum novellum occultum (red) taylorianum var. ernianum *taylorianum *tischeri wettsteinii	herrei ursprungi- anum			
less than 10%		*ramosum	burgeri	vanheerdei		luckhoffii			
No. of granules	101 or more	51 to 100	50 or fewer	101 or more	51 to 100	50 or fewer	101 or more	51 to 100	50 or fewer

Table 1. For explanation see text (under Discussion). Arrows indicate direction of evolutionary trends in the characters analysed; * denotes species near upper limit of group for perforation-number; § denotes species near upper limit of group for granule number.

Classification according to Tischer (from Jacobsen, 1970)	Species studied	Perforations						Granules per 5µm ²		
		Percentage of surface area 10% or less	10- 20%	20% or more	20 or fewer	21- 50	51 or more	50 or fewer	51- 100	101 or more
subg. I. Fenestrarium sect. 1. Pellucida sect. 2. Subfenestrata	pardicolor pellucidum burgeri	+	+				54 60 63	46	94 95	
subg. II. Conophytum sect. 1. Cordiformia subsect. a) Eubiloba ser. 1	cupreiflorum marnieranum notabile		+			29	78 90		94 53	170
ser. 2	cordatum taylorianum var. ernianum taylorianum		+			50 44 50			95 80 62	
subsect. b) Ovigera	luisiae polyandrum ramosum fischeri velutinum	+	+	+		50 50	76 76 78	43	95 100 100 90	
subsect. c) Saxetana	hians			+		23			60	
sect. 2. Truncatum	ficiforme novellum subglobosum truncatum var. renniei		+	+	6 18	26 27		43 33 44	53	
sect. 3. Wettsteiniana subsect. a) Longistyla	flavum gratum maximum praegratum wettsteinii		+			38 36	59 70 54		53 97 92 67	120
sect. 4. Cataphracta	globuliforme membranaceum pageae		+	+	14	42	60		100 71 69	
sect. 5. Colorata subsect. a) Picta	occultum (yellow) occultum (red) pauxillum pictum scitulum		+	+	18 13 18	26 30		50 50 49	57 61	
subsect. b) Tuberculata	lambertense obconellum ursprungianum		+	+	13	24 30		43 30 36		
sect. 6. Minuscula	herrei luckhoffii	+	+			26 46		30 28		
sect. 7. Costata subsect. b) Verrucosa	ectypum fulleri obscurum vanheerdei	+	+	+		30 41	76 71		71 60	108 200

Table 2. Species studied, and their pollen characters. Classification according to Tischer (from Jacobsen, 1970).

Historical Notes on Echeveria (2)

by J. C. van Keppel*

translated by Susan Roach

Although the American Eric Walther (1892–1959) was already publishing on *Echeveria* before von Poellnitz, I am discussing his work after the latter because von Poellnitz's monograph appeared thirty-five years earlier than Walther's. Walther's book was not published until thirteen years after his death, that is in 1972. From 1931 to 1959 he published numerous articles on *Echeveria* and allied genera in a variety of journals, especially the Cactus and Succulent Journal of America, and has undoubtedly been the most productive researcher in the history of the genus.

Eric Walther was born in Dresden, Germany, and emigrated to California at the age of seventeen. Choosing horticulture as his profession, he began at the Golden Gate Park, San Francisco, as an ordinary worker in 1918 and ended up as Director of the Strybing Arboretum, retiring in 1957. Sadly, his death overtook him only two years later while he was still in the final stages of preparing his *magnum opus*, the *Echeveria* monograph, but he had already arranged for the California Academy of Sciences to publish the work. The manuscript and the photographs and other illustrations were by no means ready and to his friend John Thomas Howell fell the difficult task of welding the notes into an acceptable whole. In editing the book Howell was helped by Dr. Reid Moran, the American *Echeveria* specialist, who also supplied a large number of photographs. One difficulty was that the content of Walther's manuscripts could not be altered or supplemented, and by the time the book eventually appeared in 1972 it was regrettably out of date. This does not alter the fact that Walther's is the best summary of the genus, in which 143 species and twelve varieties are described and for the most part illustrated. It includes no less than forty-four species and nine varieties described by Walther himself since 1935, the highest number of new descriptions of *Echeveria* ever published by one author. As Walther's concept of a species was quite narrowly circumscribed the number of accepted species is somewhat lower, but because of the emergence of new species described between 1959 and 1972 by other authors the total today remains about the same, i.e., around 140. It is no reflection on Walther's undoubted authority in this field—as other specialists

agree—that his monograph must be corrected on a number of points. If one compares Walther's own publications one can see that he too corrected himself as necessary; there is simply a large number of doubtful points where, at a given moment, one must cut the Gordian knot if one wants to get into print. Taxonomy is a science which is always moving: what is accepted as established today is rejected tomorrow when new facts come to light. This can be regretted but not refuted. The critical notes which I have penned in these articles on *Echeveria* must be seen in the same light. This is my personal view of the genus *Echeveria*, based on years of observation of the plants and study of the literature on this subject, but when new facts come to light and it looks as if I have judged certain things wrongly I will never hesitate to revise my position.

I should like to make the following remarks concerning new and other taxa dealt with by Walther in publications prior to 1959, taking them in chronological order.

E. crassicaulis differs so little from Schlechtendal's *E. mucronata* that at the most it can be regarded as a variety of this species.

E. longipes is only a poor-flowering variety of *E. maculata* Rose.

E. gracilis Rose, ms., was published by Walther, on the basis, however, of a cultivated plant (with photograph) which does not match Rose's illustration (see Walther's monograph).

Walther described *E. harmsii* var. *multiflora* from herbarium material but corrected himself in 1938 with the description of *E. longissima*. This remarkable *Echeveria* with its flowers more than 3 cm. long is now in my collection, obtained from Mexico, but it has not yet flowered.

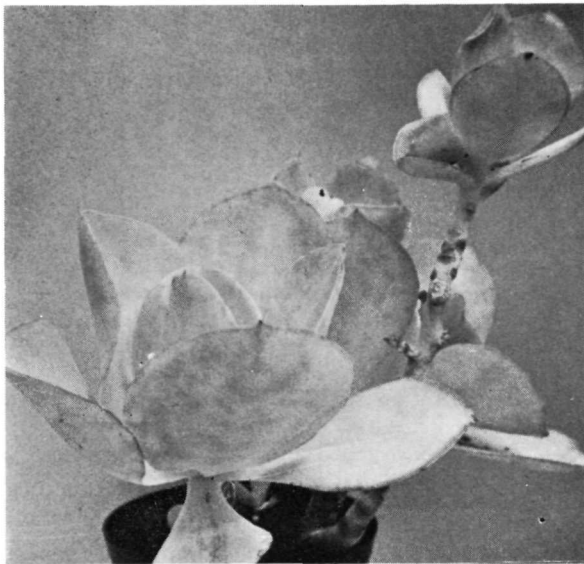
E. potosina is still a mysterious plant in Europe. Several plants appear here wrongly under this name. Sometime I hope to receive original material from Mexico.

E. gilva, described by Walther from a cultivated plant, is not a species but a hybrid of *E. agavoides* with *E. elegans*, as I have been able to establish by means of cross-breeding tests. (See Keppel in NCSJ 23: 12–13, 1968).

E. runyonii Rose ex Walther has only been found in Mexico as a cultivated plant. The variety *macabeana* was previously regarded as a cultivated hybrid. As far as I know *E. runyonii* has not been found in the wild.

E. heterosepala, re-described by Walther in 1931 as *Pachyphytum chloranthum*, then *Pachyphytum heterosepalum*, is now back in *Echeveria* again.

*Continued from CSJGB 41(3): 73–78 (1979). The author reports that he is compiling an identification key for *Echeveria* species in general cultivation in collaboration with Dr. B. K. Boom (Wageningen). Mr. van Keppel would like to hear from anyone with constructive criticisms, opinions or new data. His address is: Jonkerlaan 14, Wassenaar, Netherlands.



Above, *E. pallida* (photo: Buining)
 Right, *E. macdougallii* (photo: Noltee)



E. schaffneri (described by Watson under *Cotyledon*) and *E. bifurcata* Rose were combined by Walther as varieties of the dubious *E. teretifolia* DC. In his monograph he took them up again as independent species. Neither is in cultivation here.

The two new species *E. alpina* and *E. elatior* we can properly regard as habitat forms of *E. secunda*.

E. grisea is not in cultivation here.

E. pallida is the well-known light-green *Echeveria*, related to *E. gibbiflora*.

E. craigiana is an aberrant species with oblong semi-spherical leaves, which is rather susceptible to mealybugs in cultivation.

Walther described *E. violescens* in 1958 on the basis of a cultivated plant from the 'Metallica' complex. He referred however to an illustration made for Dr. Rose by F. A. Walpole in Smithsonian Scientific Series 'Old and New Plantlore' 11, plate 21. This illustration was made from a not very well-grown cultivated plant in Washington (where the art of growing *Echeverias* was not understood, as is apparent from most of Dr. Rose's illustrations!). But the name *E. gibbiflora* var. *metallica* which was given with the plant was correct. *E. violescens* is in my opinion a hybrid of *E. gibbiflora* var. *metallica*.

E. hyalina is a plant which back in 1936 Walther thought to be *E. cuspidata*, but later described as distinct. It seems to be more closely related to *E. simulans* Rose and is possibly a variety of this species.

E. ballsii and *E. johnsonii* come from Colombia and Ecuador respectively and are not known to me. I once received plants from England under the name *johnsonii*, but in my opinion this material belongs to *E. quitensis*,

also from Ecuador.

E. macdougallii is an interesting species which when it is not flowering is strikingly similar to a *Sedum*. Walther did indeed describe another form as *E. sedoides*, but according to the discoverer, Thomas MacDougall, it is one widespread species which in the natural habitat is very variable.

E. halbingeri is a strongly sprouting, blue-pruinose *Echeveria* which remains very small and is easily distinguished.

E. affinis is the beautiful *Echeveria* with almost corymbose inflorescences with red flowers. In full sun its leaves are almost black. The species name *affinis*, given by Walther because he thought the plant resembled the Bolivian *E. chilonensis*, is misleading because the plant does not show any similarity with that plant at all.

E. elegans var. *kesselringiana* Poelln. was rightly upgraded by Walther to a species under the name *E. albicans*.

E. amphoralis is a finely hairy, bush-shaped species with very large, reddish-yellow flowers.

E. penduliflora has hanging flowers in long racemes.

E. semivestita Moran var. *floresiana* differs from the typical variety in that the plant is completely without hairs.

E. viridissima, a shrubby plant, is still scarce in cultivation.

E. globuliflora is not in cultivation.

E. megacalyx is a species which is difficult to grow and which I was not able to keep alive for very long.

E. juarezensis is a species related to *E. fulgens* and still not in general cultivation.

With the description of *E. parrasensis* Walther gave us a complicated puzzle by distinguishing it from *E. cuspidata* Rose and even placing it in another group of related plants. He even went so far as to 'correct' the identification of a plant illustrated as *E. cuspidata* by Purpus (who kept up very close contact with Dr. Rose) to *E. parrasensis*. That *E. parrasensis* is close to *E. agavoides* var. *corde-royi*, as Walther states, I consider to be incorrect.

E. longiflora, related to *E. gibbiflora* and described from a plant of unknown origin, is not in cultivation.

Walther described as *E. goldiana* a greener form of *E. sanchez-mejoradae*.

E. meyranaiana, (like *E. goldiana*, published in the Mexican journal), resembles *E. subalpina* which is found in the same habitat. Possibly it is a natural hybrid between the latter and *E. amoena*.

In 1959 (in 'Leaflets of Western Botany' 9: 1-4), Walther published a new division of the genus *Echeveria* into fourteen groups. With one small modification this classification formed the basis for his monograph. Like every other classification this attempt to bring order to the Echeverias is far from perfect. Moreover, we are already something like twenty years further on and not only has the discovery of new species made alterations necessary, but also different insights from experts have given rise to a number of question-marks. Dr. Reid Moran has already drawn up several new groups which I hope to come back to in another article and I myself have a number of ideas which I hope to publish later, but the time is not yet ripe. At any rate, Walther made an important contribution which forms a good basis for further perfecting. I shall not go into his systematic division further here, in order not to make this historical survey unduly long.

There follows now a summary of the newly described species and varieties in Walther's monograph, supplemented where possible with some comments.

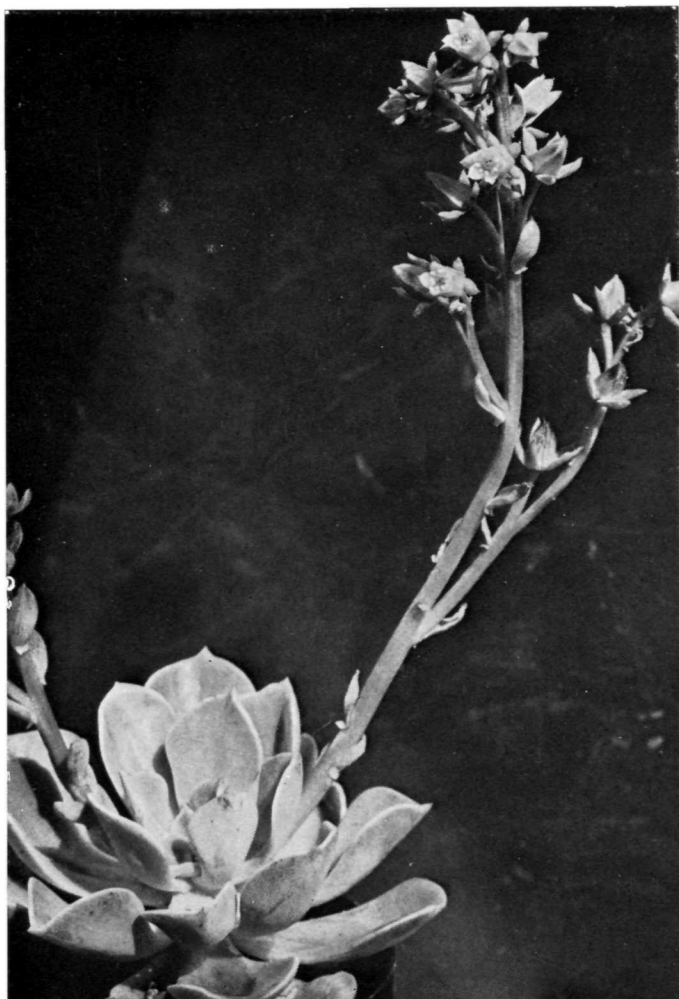
E. agavoides var. *prolifera* is a cultivated plant found in Mexico, which as far as I know has not been rediscovered in the wild.

E. agavoides var. *multifida*. This variety was described by Walther from plants which came from the same habitat in Mexico as the cv. 'Red Edge' mentioned earlier (see CSJGB 40:110. 1978). 'Red Edge' is possibly a selected clone of the var. *multifida*, but I cannot say that with certainty as I have not yet seen the var. *multifida*.

E. lindsayana is a pretty plant with thickish leaves which are coloured blue and at the edges distinctly pink. It is related to *E. chihuahuensis* Poelln., which has smaller and less strongly coloured leaves. *E. colorata* is also from this group but not in cultivation here yet.

E. elegans var. *hernandonis* and var. *tuxpanensis*. The variety *hernandonis* falls within the variation of the species, but what *tuxpanensis* represents Walther did not know himself. He described this var. from herbarium material of Dr. Rose's from 1904!

E. sanchez-mejoradae is a synonym of *E. goldiana* described in 1959 in the Mexican Journal. It is remark-



E. juarezensis (photo: Noltee)

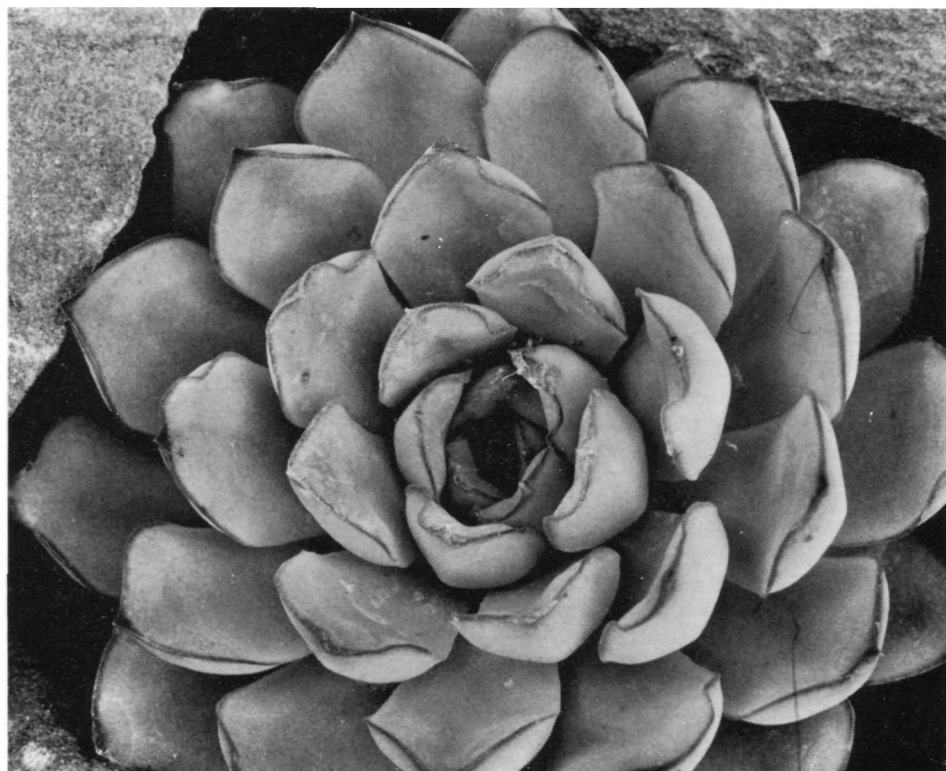
able that although both descriptions speak of green, not bluish leaves, there are now plants brought into cultivation by Abbey Garden (California), which are bluishly pruinose.

E. pulidonis is a very small stemless species with bluish, sharply red-edged leaves and yellow flowers. This species which is easy to grow from seed is a good acquisition for the commercial grower's assortment.

Walther's series *Secundae* gives rise to quite a few question-marks. *E. cuspidata*, which is closely related to *E. parrasensis* or perhaps even a synonym of this species, does not belong to this group. Clearly distinguishable from the type species *E. secunda* are only *E. subalpina*, *E. turgida* and *E. meyranaiana*, the last-named described by Walther. The other 'species', including Walther's *E. cornuta* and *E. reglensis* are in my opinion only habitat varieties of the very variable *E. secunda*. Why Walther regarded the var. *glauca* (*E. glauca* Baker) as a var. of *E. pumila* (= *E. secunda* var. *pumila*) is a complete mystery to me. For that matter, *E. pumila* was not described by Van Houtte, but by Schlechtendal. Van Houtte in his catalogue of 1845-46 only gave the name



Above, *E. sanchez-mejoradae* (photo: Noltee); below, *E. pulidonis* (photo: Buining)

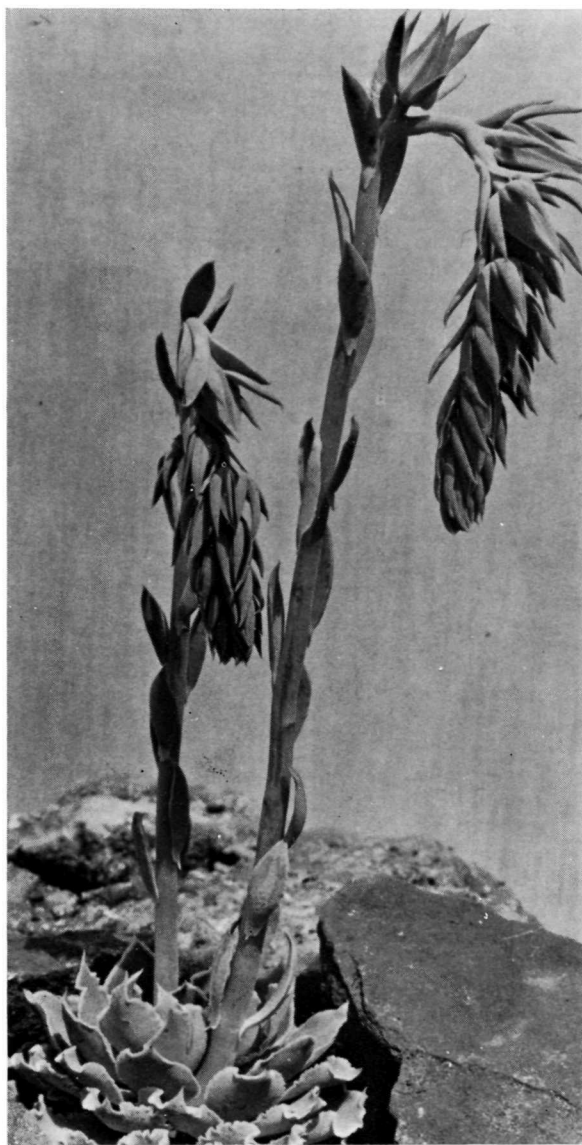


but no description. Walther gave a respectable list of places where *E. secunda* var. *glauca* has been found. In spite of this I am of the opinion that the old descriptions of *E. glauca* and *E. pumila* are only based on plants selected in the last century from the enormous number of cultivated plants of *E. secunda*. In the same year as Baker described *E. glauca* as a species one finds this referred to in horticultural publications as the var. *glauca*, for example by Carrière (in *Revue Horticole* 41: 299 1869). That the var. *pumila* has narrower leaves than *E. secunda* is no reason to make an independent species of it. Walther described *E. sayulensis* from cultivated specimens from Mexico. Whether this is really a species is doubtful. Provisionally I regard it as a hybrid of *E. secunda*, in view of the similarity of this plant to the cv. 'Zahnii', which is none other than the green (normal) form of the variegated cv. 'Hoveyi'.

E. dactylifera is a genuine species from the group *Gibbiflorae*. It is a short-stemmed plant which is quite difficult to grow.

Although I shall devote a future article to the 'genuine' *E. acutifolia* Lindl. as soon as I have identified it with certainty, I can establish now that Walther did not solve this mystery. As synonyms for this species he gives: *Cotyledon devensis* (= *E. devensis* (N.E.Br.) Greene) and *E. holwayi* Rose. By regarding these two plants, which differ so completely, not only from each other, but also from the clear drawing accompanying the original description of *E. acutifolia* by Lindley (in *Bot. Reg.* 28: t. 29. 1842) as synonyms of this species, Walther showed that he did not know this species sufficiently well. *E. devensis* had been received in 1902 by Kew Gardens as a hybrid. Now it often happens that cultivated hybrids are described as species. That a plant which is said to be a hybrid turns out later to be a genuine species is unparalleled. The side axes in the inflorescence of *E. devensis* are very long and many-flowered. The flowers have clearly recurved sepals. *E. acutifolia* has short side axes, each with only a few flowers with ascending sepals. Hybrid or not, *E. devensis* is not synonymous with *E. acutifolia*. Walther did not base his description of *E. acutifolia* on Lindley's *E. acutifolia* but on a plant which was probably a clonotype of *E. holwayi*. Because of this, his description differs from the original description on an important point, viz. the inflorescence. He may have done this because he regarded Lindley's type plant and drawing as a poor specimen. All Lindley's illustrations however show well-grown plants and there is no reason at all to think that *E. acutifolia* was an exception. Although Dr. Rose's original illustration of *E. holwayi* is from a badly grown specimen, it is clearly a completely different plant from Lindley's original illustration (illustr. 113). The most peculiar thing is that since 1962 a plant has appeared in cultivation and has been distributed by the I.S.I. (no. 172) as *E. acutifolia*? which corresponds almost exactly with Lindley's description. The collection data read as follows: 'This species is apparently allied to *E. acutifolia*, is unnamed

and will not be described as new in Walther's monograph on the Genus, though shortly before his death he (Walther) told us, he considered it to be a new species. UCBG 56-797, coll. T. MacDougall at about 3,000 ft altitude on Mount Guicngola, Isthmus of Tehuantepec, Oaxaca, Mexico'. This plant is flowering at the moment in my collection with upright red flowers on short side axes in the same way as Lindley's illustration shows us. That Walther did not regard this plant as *E. acutifolia* but as an undescribed species is probably a result of the fact that the manuscript of *E. acutifolia* for this book was already finished. If he had regarded the above-mentioned



E. shaviana (photo: Buining)

plant as *E. acutifolia* on the basis of Lindley's description then his whole theory about *E. acutifolia*, *E. holwayi* and *E. devensis* would have collapsed like a house of cards.

In his group *Angulatae* Walther described three new species, *E. angustifolia*, *E. erubescens* and *E. tenuifolia*, and a new variety *E. lutea* var. *fusca*, which are unknown or insufficiently known to me. *E. shaviana* is a pretty species. It remains small, has wavy blue to pink leaves and forms a good acquisition for our collections. *E. skinneri* is a stem-forming plant with a small rosette at the top and is unknown to me. *E. nodulosa* var. *minor* and *E. bella* var. *major* are two new varieties which differ on account of their dimensions. *E. moranii*, together with its synonym *E. proxima* also described as new, is a species which remains small. It has strongly red-coloured leaf-edges and keel. The last new species is *E. westii* from Peru. This plant has only been in my collection for a short while and is one of the plants which are difficult to grow.

I shall now conclude these notes with remarks about species which have been described since 1940 by various authors other than Walther. The list begins with five new species described by Dr. E. J. Alexander, botanist of the New York Botanical Garden, in *Cact. Succ. J. Amer.* 13:134-139 (1940):

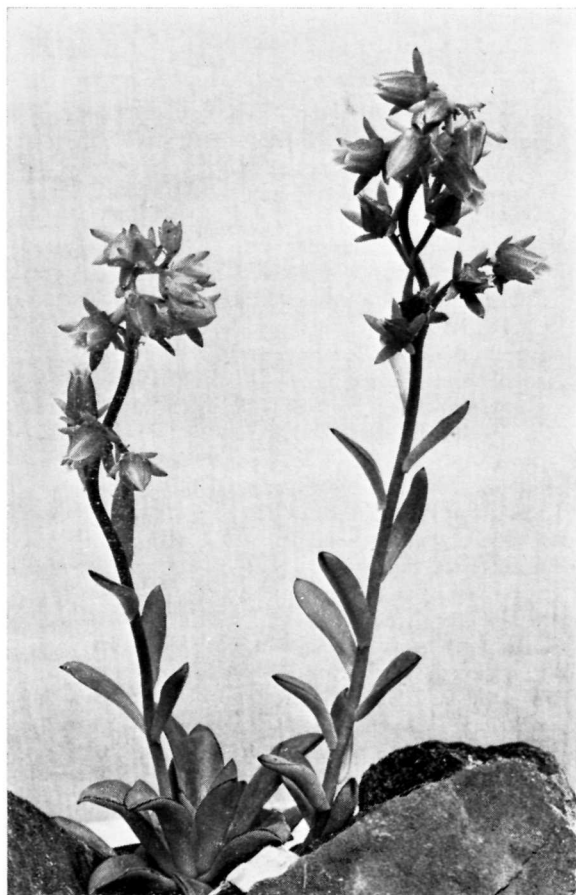
E. bella is the smallest species known to date, which according to the author flowers very profusely. Unfortunately this is not the case here in cultivation in Europe. None of the collectors here have ever seen it in flower. It is also a plant which is very difficult to grow and is often reluctant to start into growth again after the winter resting-period. The rosettes, with very narrow linear leaves, only grow to 2-4 cm in diameter.

E. corallina is related to *E. mucronata*, according to Alexander; according to Walther it is synonymous with *E. sessiliflora*. Thomas MacDougall, a plant-collector who explored southern Mexico for more than thirty years, and in so doing discovered many new *Echeverias*, was of the opinion that it is a distinct species. *E. corallina* is not in cultivation in Europe, so far as I know.

E. spectabilis and *E. carminea* are two related species, more or less shrublike and up to 60 cm tall. The glandular hirsute leaves stand in a short rosette at the top of the stem. The flowers are in both species very large and coloured red with yellow tips.

The botanists J. A. Steyermark (1909-) and P. C. Standley (1884-1963), both attached to the Field Museum of Natural History, Chicago, discovered three new species in Guatemala during their journeys through Central America. Described in *Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser.* 23:159-161 (1944) are: *E. macrantha*, *E. huehueteca* and *E. steyermarkii*. These three are not in cultivation here, so that nothing meaningful can be said about them.

The species which follow now are for the most part not mentioned by Walther. Prof. E. Matuda (1894-1978) who emigrated to Mexico from Japan in 1922 was an eminent botanist, who, in 1976, in spite of his age, took



E. spectabilis (photo: Buining)

part in the IOS Congress in Barcelona. He discovered and described two new *Echeverias* in the Mexican journal *Cactaceas y Suculentas Mexicanas*.

E. tolimanensis (l.c.3:31. 1958) is a species which externally resembles a *Pachyphytum* more than an *Echeveria*. It is a beautifully, white, pruinose species with spherical, black tipped leaves and I do not think it is in cultivation in Europe yet, except in my collection.

E. omitemiana (l.c.8:96. 1963) is not in cultivation but clearly belongs to Walther's group *Spicatae*.

Now we come to the discussion of seven species described by the foremost living *Crassulaceae*-expert, Dr. Reid V. Moran, who is attached to the San Diego Museum of Natural History, California.

E. semivestita (in *Cact. Succ. J. Amer.* 26:60. 1954) is a caulescent species with a paniculate inflorescence. The leaves are finely hairy or glabrous. Walther described a variety, *floresiana*. *E. semivestita* is rare in cultivation in Europe.

E. waltheri was described by Moran together with Dr. Jorge Meyran (in *Cact. Suc. Mex.* 6:79-85. 1961). It is a caulescent species with a short rosette at the top of the stem and with red and white sessile flowers on a red peduncle. It is not easy to grow, but has flowered with me twice.

E. ciliata (in *Cact. Succ. J. Amer.* 33 (5):130-140. 1961) is related to *E. setosa*, but has shorter, broader leaves and

is sparingly hairy, mostly only ciliate along the leaf edges. Moran placed this species and *E. pilosa*, in a new group *Ciliatae*. Recently, however, plants have been found in Mexico by Felipe Otero which are nearly completely glabrous but fall within the range of *E. ciliata*.

E. valvata (l.c.35 (5):152-56. 1963) is a species which is close to *Pachyphytum* in some of its characters, but which must be included in *Echeveria*. This species derives its name from the unusual aestivation of the flowers. The

petals have the edges touching each other, instead of partly overlapping, which is the normal position in *Echeveria*. Moran also drew up a new group for this species, the series *Valvatae*. Later another new species, *E. calycosa* (l.c. 39 (1):13-16. 1967), was found which also belongs to this group. Both are quite difficult to grow and like *E. bella*, must not be kept completely dry in winter. Higher temperatures are required than for the species which can be kept dry.



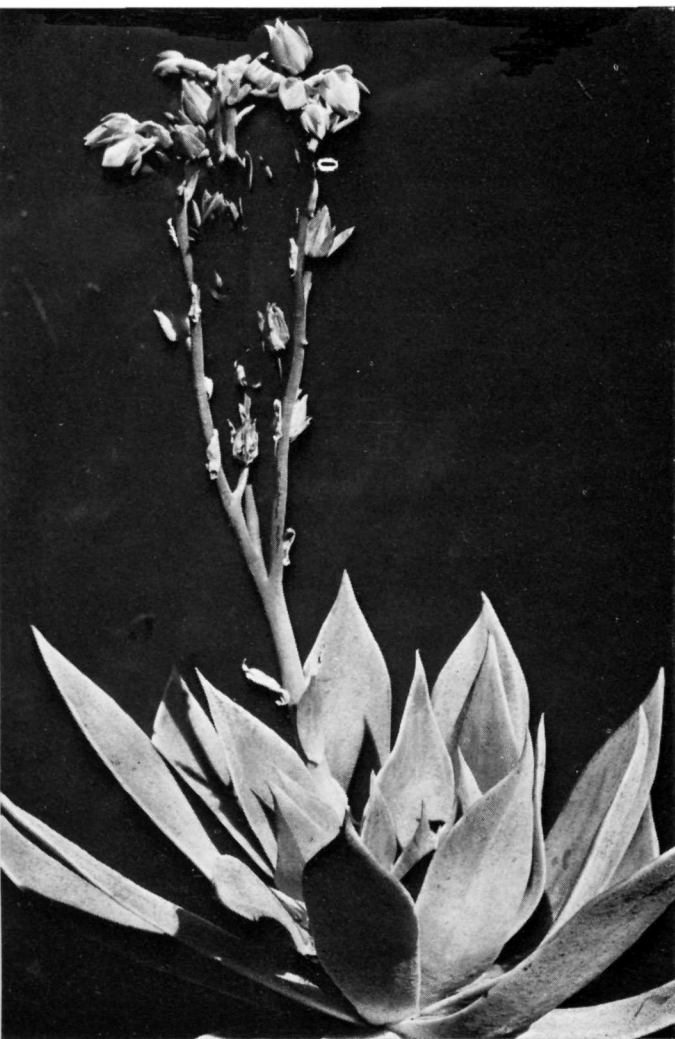
E. minima (photo: Noltee)

E. globulosa (l.c. 38 (1):12-14. 1966), is an acaulescent plant which remains small, with a close, almost spherical rosette. According to Moran it belongs to the series *Secundae*. In habit and inflorescence this species shows a great similarity to *E. derenbergii*, which belongs to the *Pruinosae*.

E. procera (l.c. 39 (5):182-185. 1967) is one of the tall shrublike *Echeverias*. This species is placed in series *Nudae*, but is not yet in cultivation here.

Dr. J. Meyran described *E. minima* in Cact. Suc. Mex. 13(3):47-50 (1968). It is a beautiful and profusely flowering dwarf species, related to *E. secunda* and discovered by the Mexican *Echeveria* enthusiast Felipe Otero. Being only 3-4 cm in diameter, the plant is a good addition to the selection of *Echeverias* available.

E. vanvlietii and *E. rauschii*, discovered by van Vliet in Bolivia were described by me in Cact. Succ. J. Amer. 24



E. recurvata (photo: Noltee)



E. rauschii (photo: Buining)

(4):90-91 (1969). *E. rauschii* has nice orange flowers and those of *E. vanvlietii* vary from nearly white to reddish. So far as I know it is the only *Echeveria* described with such variable flower-colour.

E. recurvata (in Bull. Afr. Pl. Soc. 9 (2): 50-56. 1974) was discovered in Venezuela and was described by the English *Echeveria*-expert Les Carruthers. It is a short-stemmed, rosette forming species with blue-white leaves which are somewhat recurved. Because of its long pointed leaves this plant resembles in habit a *Dudleya*. Carruthers discovered another new *Echeveria* in Venezuela (*E. meridaensis* nom. prov.) and also plants belonging to the *E. bicolor* complex.

So ends this history of *Echeveria* to date,* but it will be clear to the reader that the last word has by no means been said on this genus. In my collection alone there are numerous unidentified plants amongst which there are certainly more new species hiding, and new unknown species are regularly being found in America. Also in the field of cultivars a revolution has been set in motion by the production of many new hybrids, and with new species appearing which are suitable for hybridization, the general range of *Echeverias* will increase dramatically in the years to come. With this historical survey I hope to have given a picture of the present-day *Echeveria* species whether in cultivation or not.

*The original text of this article was completed in 1976 and does not include species described subsequently.

Pests apart from the two-legged sort

by John Pilbeam

Mealy bug

There has been a lot of tosh written about this pest, particularly with regard to the efficacy of methylated spirits. I remember well seeing Jack Brown of Uxbridge with a large mealy bug in a watch glass, which he had for three days dosed with meths. It was distinctly drunk, but definitely not dead. And there is a danger of burning the tender centre growth of plants by liberal application of meths I have found, and this is of course where the mealy bugs congregate in force.

So, what to do. Regular dosing every other month or so, with systemic insecticides should nip any infestation in the bud, although it is advisable to vary the chemicals to avoid the development of resistant strains of mealy bug. If they have appeared in any numbers then rigorous, regular dosing is necessary over a period of months, at intervals of about every 2 or 3 weeks, to make sure the newly hatching bugs are caught as well. Any plants really badly infested should be removed from their fellows, and if it happens in the summer months a good hard blasting from a hose used to wash off the bugs outside the greenhouse, preferably a week or so after dosing with systemic. Leave them in isolation and dose them regularly until you are sure there is no repeat. In the winter the same treatment may be administered and the plants brought into the dwelling house to dry off in higher temperatures.

If you are free from this pest at present adopt a rule with new acquisitions of a period of isolation until you are sure they are free from pests—a dosing with systemic will in any case ensure that any hidden away should be disposed of.

Just one last point: systemics are only of use if watered in and not sprayed if the roots are actively taking in moisture, so water a few days before applying doses of the systemics, and use them as overhead sprays as well.

Another last point: the above applies mainly to cacti, not succulents, as Crassulaceae in particular do not relish these insecticides, although they may be used cautiously watered into the soil; it is mainly contact with the leaves which does the damage. Other succulent families can take them quite well.

And a final last point: odd mealy bugs found on new acquisitions, or indeed in your collection, can be stabbed with a cocktail stick and so destroyed, a method to be used in conjunction with insecticides of course, but one which I have found gives me greater satisfaction.

Note: Do not stay in the glasshouse after using these poisons—they are not particular which they damage, the mealy bugs or you! After a general treatment, keep out of the greenhouse for several hours, if not till the next day, to allow the fumes to disperse, and always observe the maker's safety instructions very strictly.

Root mealy bug

There is some doubt in my mind whether systemic insecticides are effective in dealing with this pest, particularly since by the time they have got a foothold (roothold?) there is little root activity to enable the poison to be taken into the plant, but I have not really experimented to see if this view is valid. What I have done is to combat this pest successfully with really good soakings (up to their earholes) in Malathion and other contact insecticides, leaving the pots or trays affected in the bath for half an hour or more.

But the best really effective method is to first perfect your rooting technique. Then you can just nip off the infected root system and reroot in fresh compost.

Red spider

When you find out you've got this insidious pest it's too late, since they are so small as to be almost invisible except to those with very good eyesight in bright light. The signs of their presence is a spreading rusty marking on the skin of the plant, a barely discernible spiderlike webbing over the surface and spines, seen if held up to the sunlight, and the pests themselves, minute reddish-brown mites. The much more visible red spider sometimes seen, especially in hot summers, is *not* this pest. Regular spraying with an insecticide which specifies in its list of affected pests the red spider mite, should stop this pest ever bothering you. Plants badly affected and marked may grow through all right, but are best discarded or started again from cuttings.

Sciara fly

There are a number of different sorts of these little pests to be found in our collections nowadays, particularly when soil-less composts are used. They are like tiny gnats, or skinny fruit-flies, and the damage is done by the grubs which will demolish seedlings and even large plants if they are allowed to proceed unchecked. Regular overhead spraying will keep down the flies, and systemics or soaking in Malathion should deal with the grubs, although since the grubs attack the root system first, systemics will not get to them once they have a good start.

Spiders

These seem to be my problem only, or does anyone else have the same trouble with webs woven (almost overnight it seems) all over the spination of cactus plants? This does nothing to encourage a judge to place them at all, and sends me berserk lifting pot after pot only to see the hairy legged beggars (careful proof-reading needed here) disappear under the next one. Since they lurk down among the pots sprayed insecticides do not affect them at all. Has anyone solved this one? I seem to have two sorts: the dark brown, long legged barn spider, and a long-bodied, reddish one which seems to make a sort of funnel web. Any authorities on arachnids in our members' ranks?

Forum

Ray Pearce needs more letters on *Copiapoa* for the Forum feature he is preparing on that genus. Please send your comments on any aspect of the plants or their cultivation to him: Dr. R. B. Pearce, Department of Forestry, University of Oxford, South Parks Road, Oxford OX1 3RB, England.

Meanwhile, one of our members in Malta, RENE ZAHRA, has written about his collection and has raised a number of questions concerning the identity of plants he has got from Ritter and Knize's seed. Can anyone comment from their own experience, please? Replies to the Editor (not to Ray Pearce), please.

René writes as follows: 'I have moved to a new house where I have a better garden (3300 sq. ft.). I have planted many cacti outside. In Malta we get nearly all our rain between September and April (250–750 mm., but the normal is in the region of 500 mm.). During the rainy season the temperatures can go down to 3°C in the night and only 6°C during the day. These temperatures only last a few weeks but it is normally damp as well. This is the limiting factor and because of it there are many cacti which could not last very long outside, so I have built a 12 ft. × 34 ft. greenhouse and intend to build another 6 ft. × 50 ft. The plants which do best outside are species of *Echinocactus*, *Cleistocactus*, *Trichocereus*, *Lemaireocereus*, *Weberbauerocereus*, *Espostoa*, *Echeveria*, and *Alluaudia*. I have found that our climate is too wet for *Mammillarias*. *Espostoas* do very well and all the time I am trying new things outside. Another problem is the soil. Our soil is all *terra rossa* and this is normally too alkaline for many cacti. There is nothing we can do about this but I do add peat to it.

'For the last ten years I have been buying seeds from Karel Knize. I am very grateful to him, because thanks to him many rare things are reaching those who would like to cultivate them. On the other hand, I feel he doesn't always know what has been collected before in the same area. I have been growing cacti from seed since 1961 and started by growing many of Ritter's new finds. Because of this I am in a position to compare and contrast the plants collected by these two gentlemen.

'I believe that Knize's *Espostoa baumannii* KK300 is the same as Ritter's *E. mirabilis* FR670 and that Knize's *E. mirabilis* KK295 is the same as Ritter's *E. mirabilis* var. *primigena* FR1061. In my collection I also have a very old plant of Ritter's *E. hylaea* FR668. This is a thin *Espostoa*, very yellow with little hair. The plants I grew from Knize's *E. hylaea* KK296 are very different from Ritter's plants. None of Knize's *Espostoas* are similar to this one, and I have grown them all. The plants I grew from Ritter's seeds are exactly like Backeberg's description in his Lexicon.

'I feel that there is also some confusion in some of Knize's *Oreocereus*. I am of the opinion that Knize's *O. urmirensis* KK888 and *O. luribayensis* KK1336 are

identical with Ritter's *O. fossulatus* var. *rubrispinus* FR100a and *O. fossulatus* var. *flavispinus* (number lost). Knize's *O. fossulatus*, on the other hand, is similar to Ritter's *O. neocelsianus*.

'There seems to be confusion in the *Eulychnias* too. I have in my collection 10 inch plants of most of Ritter's *Eulychnias*. Two of the most beautiful are *E. ritteri* FR276 and *E. saint-pieana* FR479a. Once again, I tried to grow *E. ritteri* KK623 and *E. saint-pieana* KK622, but the plants that came up from these seeds were not half as beautiful as Ritter's plants, and very different indeed.'

Notes from Members

Conservation of Energy

by Arthur Boarder, President of the Society

Owing to the present high price of heating fuels and the need for conserving energy, the following enforced experiment may be of interest to members.

Through failing eyesight I was forced to part with my large collection of *Mammillarias* and *Lithops* and move to near the South Coast. I took with me about 30 *Lithops* and 20 *Mammillarias*, all small seedlings. They were housed in a conservatory facing north which received no sunlight during the winter months. There was no heating and during the winters of 1974–77 the temperature in the conservatory dropped to –4°C (24°F) on several nights. None of the Mamms or *Lithops* suffered in any way, and the only casualty was that all the stems on a small *Schlumbergera* dropped off. However, these were not killed and rooted quite well.

Fortunately, in the spring of 1978 I handed over my young plants to my daughter, as during the winter of 1978–9, the temperature in the conservatory dropped to –8°C (18°F) on at least one occasion. My large and very old *Epiphyllum* was killed outright, and no doubt all the smaller plants would have perished under such low temperatures.

I feel certain that any greenhouse housing cacti and other succulents could have a thermostat set at 2°C (35.6°F), and as long as the plants were all dry they would come to no harm. Any seedlings could be housed in a small frame. One is easily made for the greenhouse, with sheets of cardboard as from packing boxes. Two or three sheets can be pasted together to make the frame and a sheet of glass laid on top. A 25 watt lamp could be inserted controlled by a thermostat. A good type is the one as used by aquarists to regulate the warmth in a fish tank. These work as well out of the water as in it. It is surprising how much warmth a 25 watt bulb can give off in an enclosed space. Providing the plants are completely dry they will come to no harm. After all, many of them have to withstand severe cold in their native habitats.

A. Boarder
30 Sunstar Lane
Polegate
E. Sussex BN26 5HS

Bill Maddams replies:

There is little doubt that Mr. Boarder's suggestion, that many cacti and other succulents when dry will tolerate minimum temperatures around 2°C (36°F), is correct. Nevertheless, there is a real need for careful observations on the subject of minimum winter temperatures. It is to be hoped that those members who, by accident or design, have plants at this sort of temperature will make observations and let us know their results.

I support Mr Boarder's idea of a small heated frame within the greenhouse for seedlings or tender plants such as Melocacti and Discocacti; it is a valuable piece of equipment. Domestic electric light bulbs, particularly when controlled by a thermostat, are an economic form of heating. However, they have one disadvantage, namely a limited life. They usually fail at a time of maximum inconvenience, such as the early hours of a particularly cold morning. This problem can be avoided by wiring two bulbs in series, which means that one terminal of the first is connected to one terminal of the second and the mains leads are wired one each to the remaining terminals. The voltage across each is then one half of the mains voltage, about 115 volts, if the two bulbs are of equal rating. Each bulb operates at a dull yellow heat and their lifetime is indefinite. When two such bulbs are wired in series the overall wattage is about one half of that of either bulb. For example, two 150 watt bulbs will give an output of about 75 watts. It is merely necessary to ascertain by trial and error the combination which will maintain the required temperature, with something in hand, so that the thermostat can switch them on and off as necessary.

W.F.M.

The Genus *Abromeitiella*

by Dale Speirs

From time to time one sees in the pages of various cactus and succulent journals a mention of bromeliads. Authors usually introduce them apologetically and well they might, for the majority of bromeliads are not succulent by any exercise of imagination, nor are they really as xerophytic as made out to be. I do not mean to

put down these charming plants but to point out that most should be rigidly excluded from the domain of succulents.

In the subfamily Pitcairnioideae there are a few terrestrial genera which do qualify as succulents and xerophytes, namely *Hechtia*, *Dyckia*, and *Abromeitiella*. The last is the subject of this note.

In terms of nomenclatural history, this genus is fairly young, having first been described in 1927 by the German botanist Carl Mez (1866–1944). Depending on who one talks with, there are one to half-a-dozen species or so. The taxonomic lumpers seem to be prevailing as variability in habitat becomes known and appreciated (Smith & Downs, 1974). Currently two variable species are recognized, *A. brevifolia* and *A. lorentziana*. A dwarf form known as *A. chlorantha* is considered to be part of *A. brevifolia*.

Plants of *Abromeitiella* will eventually clump up into cushions. The leaves are triangular in cross-section and up to 0.5 cm. thick and 3.0 cm. long in *A. brevifolia*, two or three times larger for *A. lorentziana*.

Reference

SMITH, L. B. & DOWNS, R. J. (1974). Bromeliaceae subfamily Pitcairnioideae. In *Flora Neotropica* 14:241–245.

Notes on the 1980 Seed Distribution

by Nigel Taylor

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 suppliers and given on the packets. Species offered under unpublished or incorrect names are indicated by *italics* after the order number. *Key to habitat collectors.* KK Karel Knize, HU Horst-Uebelmann.

192. *Acanthocalycium variiflorum*. This attractive member of a small N. Argentinian genus (of disputed affinity) has flowers which, in different specimens, may range from pale yellow to orange or red. It is a relative of *A. thionanthum*, according to John Donald, who has illustrated our plant as a variety of this species; see *Ashingtonia* 1(10): 114 (1975).

193. *Ariocarpus furfuraceus*. A form of *A. retusus* with short wrinkled tubercles and white or pink flowers borne late in the season. The patience required to grow *Ariocarpus* spp. from seed is repaid by the unmarked beauty of the eventual result; they are not as slow as you might think. See CSJA 46: 172–4 (1974) for many good illustrations.

194. *Astrophytum capricorne* var. *minor*. Perhaps the choicest species of this popular N. American genus, whose seeds germinate in as little as 48 hours. The small-growing form offered here has long, flexible, dark, curled spines and the white epidermal hair-flecks that are characteristic of *Astrophytums*.

195. *Astrophytum ornatum* var. *mirbelii*. Said to differ from the typical var. in its attractive golden-yellow spines and denser hair-fleck development. The largest species of the genus (to 1 m high) which does not usually flower until it is about 10 cm. in diameter.



Abromeitiella brevifolia

(photo: D. C. Speirs)

- 196. *Astrophytum senile*.** A variety of *A. capricorne*, differing in its larger stems, which generally lack hair-flecks, and with denser spination. The beautiful red-centred yellow flowers are freely produced in mid-summer from seedlings 5 years of age.
- 197. *Buiningia brevicylindrica* HU 167.** The type species of a new genus (1971) of short spiny cerei, which bear lateral cephalia of dense wool with bristles. Flowers are tubular and light yellowish-green. Little is known about the cultivation of these new Brazilian plants, so please report your successes (or failures) to the Journal.
- 198. *Copiapoa aurata* KK 1397.** An undescribed novelty from Chile, the home of all members of the genus. Be sure to keep the collector's number on the label, in case this plant is eventually described under a different name.
- 199. *Copiapoa cupreata* KK 1382.** As suggested above, make a note of the collector's number, especially since the name *C. cupreata*, based on a poorly described plant of Poselger, is a somewhat 'unknown quantity'.
- 200. *Copiapoa dealbata* var. *deminuta* KK 1383.** According to Backeberg this species is merely a variety of the breath-taking powdery-white *C. cinerea*, but Ritter's original illustration depicts a fairly distinctive-looking plant. It will probably be slow-growing but nevertheless attractive as a seedling. The remarks made under nos. 198–9 apply once again.
- 201. *Copiapoa longispina* KK 1135.** Perhaps a close relative of *C. humilis*, in which case we may assume that it will be easy to grow and free-flowering. Flowers pale yellow. This offering and the next are more of Knize's re-collections of taxa named by Ritter.
- 202. *Copiapoa pendulina* KK 1391.** In age this is a sprawling plant with stems up to 2 m long in nature. Flowers reddish-yellow.
- 203. *Coryphantha bergerana*.** One advantage of many *Coryphantha* spp. is that they take a long time to outgrow their welcome. This species attains a diameter of about 6 cm. and is densely spined; the bright yellow flowers can hide the plant. From Nuevo Leon (Mexico).
- 204. *Coryphantha greenwoodii*.** This relatively new species was described in the Mexican Cactus Journal just 10 years ago from SE. Cent. Mexico (SW. Vera Cruz). It resembles *C. commivens* and *C. elephantidens* with large dark green shiny tubercles, and reaches 9 cm. in diam. The flowers are 5 cm. in diameter; petals yellow with purplish-brown midstripes, and red stamen-filaments.
- 205. *Echinocereus adustus*.** A delightful, slow-growing, pectinate-spined species with showy pink flowers, unusual in that they have white stigmas (not green as in other members of this large genus). Imposing central spines may, or may not be produced. An interesting account of the native haunts of the plant can be found in CSJA 46(1): 8–11 (1974).
- 206. *Echinocereus dasyacanthus*.** Benson considers this plant to be a variety of *E. pectinatus*, with which it shares exciting, very large flowers, but differs in the erect, non-pectinate spination, and in the frequently yellow petals. Patience is required to flower this plant, but the event is well worth waiting for.
- 207. *Echinocereus gentryi*.** An attractive species with clustering, sprawling stems and long funnel-shaped, pink flowers, which Backeberg claims open mainly at night. Mexico (Sonora).
- 208. *Echinocereus longisetus*.** A choice species making a fine partner to the equally choice *E. delatetii*. Covered in long, bristly white spines contrasting with the 6 cm. long light purple flowers. Our seed was collected at Rayones, Nuevo Leon, Mexico.
- 209. *Echinocereus subinermis*.** A small-growing species with weak spination and large yellow flowers. Easy to grow and popular with the judges at shows. NW. Mexico (Chihuahua & Sonora).
- 210. *Echinofossulocactus multicostatus*.** The plant with an exterior like a crumpled car radiator! Illustrated on page 93 of 1978's November issue. The most extreme member of a small but fascinating group that is very closely related to *Ferocactus*. Cent. N. Mexico.
- 211. *Echinofossulocactus* sp.** (from San Luis Potosi). Easily grown from seed, and most spp. are free-flowering. A cool home for the winter seems to encourage flowering in my experience. An aid to the identification of this mystery offering can be found in last May's issue, pp. 31–38.
- 212. *Echinopsis mamilliosa* (Pseudobolivia Group).** The well-known *E. kermesina* is a closely related variety. Flowers long-tubed, white, pink or red; plant body usually remains depressed and seldom exceeds 10 cm. in diameter. S. Bolivia & N. Argentina.
- 213. *Escobaria dasyacantha*.** A member of a choice genus closely allied to *Mammillaria*, but with grooved flowering tubercles. Usually single stemmed, these hidden by the attractive, dense white spination. Flowers whitish, striped pink, greenish or brownish, with green stigmas. Cent. N. Mexico, S. New Mexico & W. Texas.
- 214. *Espostoa nana* KK 301.** Said to be a dwarf relative of the beautiful *E. melanostele*, in which case the stem will be clothed in a dense 'candy-floss-like' mass of soft white hair, hiding sharp yellow spines, to surprise the unwary admirer. From N. Peru. Easy from seed.
- 215. *Eriosyce auseliana* KK 1327.** As yet undescribed but Backeberg says it differs from the long known *E. ceratistes* in its finer brown spines. *Eriosyces* are globular or short columnar, densely spined cacti which can attain a large size (1 m high) in the wild. A beautiful habitat picture of a member of the genus was recently published on the cover of KuaS 30(11)(1979). Central Chile.
- 216. *Eriosyce* sp.** KK 1322. (from Los Loros, Chile). Knize recommends the treatment of seeds of this genus at -10°C for 24 hours in the seed pan to aid germination.
- 217. *Eulychnia ritleri* KK 95.** A great favourite of the writer. This slow growing cereus has stout slender stems clothed in delicate short areolar wool through which fearsome, needle-like spines protrude. Everyone should grow at least one species of this characteristic S. American genus.
- 218. *Ferocactus glaucescens*.** Another firm favourite of the writer. Young plants are tuberculate, but then develop straight glaucous ribs bearing woolly areoles and golden-yellow spines. Plants 15 cm. or more in diameter will produce their yellow flowers in cultivation, but this takes about 10–12 years from seed. However, young plants are just as attractive and take up less space. N. Cent. Mexico.
- 219. *Gymnocactus beguinii* var.** (from Paila, Coahuila). This plant belongs to a group of dwarf Mexican species whose closest allies are to be found in *Turbinicarpus*. The plants have small tuberculate stems and many upward pointing, straight spines from densely woolly areoles. Flowers normally violet-pink, freely produced in summer.
- 220. *Gymnocalycium castellanosi*** (from La Rioja). This Argentinian has a matt bluish-green stem to 10 cm. in diameter. Spines 5–8, robust; flower white suffused pink.
- 221. *Gymnocalycium friedrichii*.** A quaint variety of *G. mihanovichii* with transverse striations on the ribs which suggest the name 'Zebra-cactus'. The pink flowers have a slender green tube; freely produced even on tiny specimens.
- 222. *Gymnocalycium pugionacanthum*.** One of many newer species in this seemingly vast genus that now requires a sound botanical treatment if the true species are not to be hidden by a plethora of dubious names. Petals creamy-white, brownish-pink at base. N. Argentina.
- 223. *Gymnocalycium schickendantzii* var. *Lau* 473** (from Salinas Grandes, Argentina). Exactly what the original *G. schickendantzii* looked like we will never know, since its author, a Dr Weber failed to illustrate his plant. Anyway this seed is supplied with a collector's number so make note of it for future reference in case our plant is mentioned in the literature under another name some day.
- 224. *Gymnocalycium spegazzinii*.** A large growing species to 18 cm. in diameter, with a bluish or greyish-green to brownish

stem, and only 5-7 spines per areole. Flowers to 7 cm. long, whitish with a purple throat. Makes impressive specimens. Argentina (Salta).

225. *Haageocereus horrens* KK 325. Haageocereus are perhaps related to *Trichocereus*, but have smaller flowers. Most species are densely clothed in brightly coloured spines and tend to offset freely from the base. A large genus in which many species have been described, but only a few of these are in general cultivation. There is room for someone to specialize here. From Peru.

226. *Lobivia charazanensis*. Related to *L. caespitosa* according to Rausch who illustrates a plant said to be the same as ours in his 'Lobivia' vol. 1. With long golden-yellow spines and sulphur-coloured flowers; this plant is certainly worthy of cultivation. Bolivia (Charazani).

227. *Lobivia chilensis*. Rausch says this is an undescribed variety of the attractive *L. wrightiana*, with red rather than white stigmas. It comes from the Peru-Chilean border, whereas *L. wrightiana* is from Cent. Peru.

228. *Lobivia corbula* KK 1539 (from Cuzco, Peru). Closely allied to *L. maximiliana* with which it shares a caespitose habit and narrow, acute, red or yellow petals. Members of this complex are illustrated by Rausch, 'Lobivia' vol. 1.

229. *Lobivia haageana*. This plant is a member of a N. Argentinian segment of *Lobivia* which shows bewildering variation in the wild, particularly in flower colour. The flowers are eye-catching, the throat being differently coloured to the petals.

230. *Lobivia laeae*. This species coming from Bolivia is allied to *L. pentlandii*. The stems are depressed-spherical, to 12 cm. in diameter. Rausch illustrates plants with beautiful 'shocking pink' flowers.

231. *Lobivia zecheri* var. *fungiflora*. This belongs to the *L. backebergii* complex according to Rausch, who illustrates an attractive form with rich crimson petals and a white throat. Flower colour, as elsewhere in the genus is quite variable. Peru.

232. *Loxanthocereus eulaliensis* KK 452. As suggested earlier the collector's number here is more useful than the name under which this seed is offered: *L. eulaliensis* is a poorly known plant, its flowers undescribed. The generic name implies relationship with *Borzicactus* in the broad sense. Cent. Peru.

233. *Mammillaria barbata* (Ser. Ancistracanthae). This species comes from Chihuahua and may belong to the much debated *M. wrightii* complex. Not one of the easiest species for the beginner.

234. *Mammillaria baxterana* (Ser. Macrothelae). A member of the Baja California *M. petrophila* Group, with a flattened stem and yellow flowers.

235. *Mammillaria centraliolumosa* (Ser. Polyacanthae). A phase of *M. spinosissima* according to David Hunt: see last issue, p. 105. It differs from the latter in its more slender habit and sometimes plumose central spines. Described in 1971 from the State of Mexico.

236. *Mammillaria cowperae* (Ser. Stylothelae). A beautiful plant regarded as conspecific with *M. moellerana*. Small growing with stout hooked central spines and white flowers; see KuaS 28(2)(1977) for a good illustration. N. Mexico (Zacatecas).

237. *Mammillaria ericacantha* Lau 1104. (Ser. Polyacanthae). Coming from near the coast in Vera Cruz (E. Mexico) this species can be confused with no other. The slender stems are covered with bright yellow spines each of which is minutely hairy; the flower is yellow also. Extra warmth is advisable in winter.

238. *Mammillaria guelzowiana* (Ser. Longiflorae). This outstanding species is a deserved favourite for its large 'shocking pink' flowers; see last February's issue, p. 12. From Durango.

239. *Mammillaria mundtii* (Ser. Heterochlorae). A member of the well known *M. rhodantha* complex of Cent. Mexico. Doubtless an easy subject for the beginner.

240. *Mammillaria nivosa* (Ser. Macrothelae). The series to which this plant belongs covers the distribution of the entire genus; this species is from the W. Indies. The squat, dark green

body is contrasted with the yellow spines and flowers.

241. *Mammillaria xaltiangensis* (Ser. Polyacanthae) (from Rio Papagaio). A distinctive new species described in 1975 from the Mexican State of Guerrero. Its yellow flowers suggest that it may be a Pacific counterpart of *M. ericacantha* (see 237 above) according to Mr Hunt.

242. *Matucana intertexta* KK 1216. A popular member of the large S. American genus *Borzicactus*, which includes plants of diverse habit that share zygomorphic (irregular) tubular flowers. Stems in our plant are globular and densely spiny. The form offered here has orange flowers. N. Peru.

243. *Matucana madisoniorum* KK 456. This remarkable species is sometimes quite spineless, and it then resembles the unrelated N. American *Lophophora*. The flowers are red, with long tubes. N. Peru.

244. *Melocactus alpelescens* KK 1047. From N. Peru; undescribed, keep collector's number.

245. *Melocactus longispinus*. One of the 'very new species' described in 1977 and figured on the front cover of Succulenta vol. 56 no. 6. An exciting-looking plant with long, upward-curved reddish spines up to 12 cm. long. Brazil.

246. *Neoporteria aerocarpa* var. *fulva* (Nichelia Group). Some years ago John Donald and Gordon Rowley reduced this species to a form of *N. reichei* var. *reichei*. I'm not sure what has actually been distributed under this name in the past, since I recall that seedlings I raised some 8 years ago turned out to be very different from the expected *N. reichei* fa. It seems that here we must say 'grow it and see'.

247. *Neoporteria calocephala* (Horridocactus Group). The above remark applies to this offering as well, since it is an undescribed collection of Knize.

248. *Neoporteria cephalophora*. Ours is a new variety, according to Knize, of a diminutive species originally described from N. Chile. The spines of the typical variety are hairlike, light yellow to whitish.

249. *Neoporteria deherdtiana* KK 114 (Nichelia Group). This plant has an ashy-grey to greenish, tuberculate stem and areoles with 6 erect black spines. Flowering when only 3.5 cm. in diameter according to Backeberg, when the yellow flowers may hide the plant.

250. *Neoporteria glaucescens* (Nichelia Group). Donald & Rowley have this plant as *N. eriocephala* var. *glaucescens*, but Backeberg compares it with *N. floccosa*. The plant is said to have black spines which contrast with a bluish-green body. N. Chile.

251. *Neoporteria paucispina* KK 348 (Islaya Group). Correctly known as *N. lindleyi*. Islays are not the easiest of cacti to grow but are well worth the challenge. I recently flowered my only surviving seedling from a 1972 sowing, but only then after 7 years of 'trial and error' cultivation, by which time it had lost its roots. Flowers vivid yellow. From S. Peru.

252. *Neoporteria polyrhaphis*. A somewhat uncertain quantity according to Backeberg, but said to have numerous bristly spines. Collected by Knize.

253. *Neowerdermannia chilensis* KK 625. A pretty species which was described from N. Chile by Backeberg in 1936. It has a shiny green globular stem bearing deeply notched ribs, and a tuberous root. Flowers white; see Ashingtonia 1(1): 10(1973) for a good illustration.

254. *Notocactus brevihamatus* HU 43. This very worthwhile species is offered here from seed collected in cultivation. Amongst the Notos this is not a beginners' subject, but can be grown very quickly once the secret is discovered. Backeberg readers will find it listed under *Parodia*; it is in fact somewhat intermediate between the two genera.

255. *Notocactus herteri*. One of the best discoveries to have come from S. America this century. Plants develop rapidly from seed and soon produce their stunning pink flowers. An outstanding member of its genus.

256. *Notocactus warasii*. Apparently an undescribed novelty.

257. *Notocactus werdermannianus*. This Uruguayan plant has about 40 ribs with numerous chin-like tubercles. The areoles bear many stout acicular spines and 7 cm. diameter

glossy yellow flowers with the characteristic purplish stigmas of the genus.

258. *Obegonia denegrii*. A choice Mexican species closely allied to *Ariocarpus*, with similar leaf-like tubercles and white flowers. Though slow growing this plant is easily raised from seed judging by the fine unmarked specimens seen in some collections. From Tamaulipas.

259. *Oreocereus hendriksenianus* var. *densilanus* (= *O. ritteri*) KK 1117. Botanically, species of this genus belong to *Borzacactus*. *Oreocereus* are rather fun short-columnar cacti from the high altitudes of the Andes, covered in stout spines and long tufts of hair. They seldom reach an embarrassing size in cultivation and their unusual appearance provides great amusement for beginners and experts alike.

260. *Oroya acollana* KK 578. This one and the next are new Peruvian collections for which I have been unable to trace valid names and descriptions. Take note of the collector's number.

261. *Oroya citriflora* KK 1463. *Oroyas* are depressed-globular plants allied to the *Borzacactus* Group (but generically distinct) with short-tubed yellow to red flowers.

262. *Parodia hausteiniana*. This recently described novelty from Bolivia is a small growing plant to 5 cm. in diameter, with yellowish spination. The yellow flowers are only 1 cm. broad but appear throughout the summer.

263. *Parodia maxima* KK 691. In contrast with the last as its name suggests, this is one of the largest species, which in time will make an impressive plant for the show bench. Described in 1964 from Bolivia.

264. *Parodia pluricentralis*. This is one of the larger flowered (5 cm.) hooked spined species, with minute seeds. Care and patience is required to raise seeds of this type, since the seedlings after germination are so tiny that they need protection from moss, etc., in the seed pan, which may otherwise swamp them. From N. Argentina.

265. *Parodia tilcarensis*. One of the 'less recent' species with dense straight, dark brown spines and bronzy-red to blood-red 3 cm. diam. flowers. Rather variable; from N. Argentina (nr. Tilcara).

266. *Pfeiffera ianthothele*. A distinctive member of the epiphytic group of genera, that is sometimes classified along with *Rhipsalis*. The small 3-4-angled stems bear short soft spines and 2 cm. long creamy-white flowers. The fruits are like little gooseberries. Bolivia & Argentina.

267. *Philippicereus castaneus* KK 197. Scarcely differing from *Eulychnia*, this genus (and its only species) seems to be rather rare in cultivation. In the wild the plant reaches 1 m high but forms colonies up to 20 m broad. As in other *Eulychnias* this plant has impressive spines up to 10 cm. long. From Cent. Chile.

268. *Pilocopiapoa solaris* var. *luteispina* KK 1239. An unusual species of *Copiapoa* affinity with hairs in the axils of the receptacle scales, and a caespitose habit resulting in large mound-like clumps reminiscent of the Mexican *Ferocactus robustus*. This form has pale yellow spines and presumably the pinkish-yellow to carmine flowers of the species. N. Chile.

269. *Rebutia graciliflora* var. *borealis*. This member of a genus that is 'forever growing species' is distinguished on account of its delicate little flowers which are only 1.8 cm. long and light red. N. Argentina.

270. *Rebutia narvaecensis*. *Aylostera* Group. A recent discovery from Bolivia described in 1971. As with many members of this genus our plant produces myriads of flowers (pink) from the lower half of the $\pm$ globular, softly spined stem.

271. *Tephrocactus chilensis* var. *rubra* KK 1501. Members interested in plants belonging to this subgenus of *Opuntia* should consult Gilbert Leighton-Boyce & James Liff's 2 part work, 'The Subgenus *Tephrocactus*' published in 1973 by the S.P.T. From Cent. Chile.

272. *Thelocactus bicolor*. This species has recently been transferred to *Ferocactus* subg. *Ancistrocactus* along with a number of its closest allies, e.g. *F. setispinus* (*Hamatocactus setispinus*) and *F. scheeri* (*Ancistrocactus scheeri*). Our seed was

collected at Huizache (SLP, Mexico), which is just about the southern limit of the species; it is a more robust form than those commonly seen in cultivation. The flowers of *F. bicolor* are amongst the most beautiful of the N. American globular cacti. Grows quickly from seed.

273. *Thelocactus flavidispinus*. A dwarf variety of the above that is still quite rare in cultivation. It differs in its smaller stems and all yellow spination, but still carries the large flowers of the species. Texas.

274. *Thelocactus wagneranus*. Plants in cultivation under this name usually represent another dwarf form of *F. bicolor* (see above).

275. *Thelocactus* sp. Lau 744 (from Rayones, Nuevo Leon). Like many of Lau's collections this may turn out to be very interesting; take note of the number.

276. *Turbinicarpus klinkeranus*. Glass & Foster rightly consider this to be a pale yellow flowered variety of the variable *T. schmiedickeanus*. Very easy from seed: it will flower in just 3 years and never requires anything larger than a 7 cm. pot. Mexico (San Luis Potosi).

276. *Weberbauerocereus longicomus*. (collected by Knize). *Weberbauerocereus* are close allies of *Trichocereus*. This species is almost tree-like (to 6 m high) branching towards the base, with stems to 8 cm. in diameter. Ribs 15-18, obtuse with brown areoles bearing c. 25 spines which become hairlike in the flowering part of the stem. Flowers 10 cm. long, white to pink, nocturnal. Peru.

278. *Weingartia saintpieana* KK 1573. (from mid E. Bolivia). A new species according to Knize.

972. *Agave parviflora*. *Agavaceae*. A most delightful dwarf member of its genus, forming a neat rosette of light green, linear-lanceolate leaves, flecked white and with loose white strands. Slow growing and easily accommodated even in the smallest collections. Seed from Terry Smale's plant.

973. *Agave ferdinandi-regis*. *Agavaceae*. This species is closely allied to the other 'royal' *Agave*, namely the beautiful *A. victoriae-reginae*. It differs from the latter in its frequently caespitose habit.

974. *Agyroderma subalbum*. *Aizoaceae*. As with a number of Mesem genera, *Agyrodermas* require very careful watering; the specialist literature should be consulted. These plants grow amongst quartz formations in habitat and have evolved smooth semi-spherical, white leaf-pairs which mimic these surroundings and may help to protect against herbivores. S. Africa.

975. *Cheiridopsis derenbergiana*. *Aizoaceae*. A great many species have been described in this genus; our plant is a thick-leaved representative. *Cheiridopsis* spp. frequently have two pairs of leaves per stem for much of the year in cultivation. In contrast to cacti Mesems seem to develop quite rapidly from seed, but require more gentle handling when young.

976. *Cotyledon luteosquamata*. *Crassulaceae*. *Cotyledon* is a somewhat underrated genus with a great diversity of species for the specialist collector. From S. Africa (Bushmanland).

977. *Echeveria laui*. *Crassulaceae*. This will doubtless be a very popular choice, since *E. laui* must rate as one of the most beautiful plants discovered in the last 20 years. The rosettes of mealy, pure white leaves are normally solitary and detached leaves root and sprout only with difficulty, if at all. Here seed propagation may be the answer. From S. Mexico (Oaxaca).

978. *Fouquieria splendens*. *Fouquieriaceae*. This is the Ocotillo of the N. American SW. deserts. It is a xerophyte (i.e., a drought resistant plant), but not really a succulent. The plant has spiny twigs which bear small green leaves in the growing season. The bunches of bright red flowers account for its epithet 'splendens'.

979. *Gibbaeum heathii*. *Aizoaceae*. A highly succulent stemless Mesem with spherical bodies composed of somewhat unequal leaf-pairs. Flowers white. S. Africa.

980. *Haworthia margaritifera*. *Liliaceae*. One of a number of similar species with very attractive rosettes of pointed leaves that are spotted with little raised white pimples. The name means 'pearl-bearing' and is thus very appropriate. S. Africa.

981. *Hechtia minuta*. Bromeliaceae. A succulent member of the Pineapple Family is offered here to add something unusual to your collection.

982. *Maughaniella luckhoffii*. Aizoaceae. A rare dwarf Mesem with a small swollen caudex and a pair of leaves united into a sheath, about 16 mm long, papillose. Flowers 15–20 mm in diameter, white or pink. S. Africa (Cape Province).

983. *Odontophorus primulinus*. Aizoaceae. Plants form a few heads each with 1–2 pairs of 4 cm. long leaves. Flowers c. 40 mm in diameter, yellow. Jacobsen illustrated this species in vol. 3 of his 'Handbook'. From Little Namaqualand.

984. *Phytolacca dioica*. Phytolaccaceae. Of particular interest to those who take part in botanical speculation, since it was this genus that Buxbaum believed to be in some way ancestral to the Cactaceae. I'm not going to praise this plant too highly in case it turns out to be a greenhouse weed, but nevertheless it's out of the ordinary should anyone wish to start a new fashion.

985. *Ruschia pygmaea*. Aizoaceae. *Ruschia* is a genus containing a variety of growth forms; our offering is a small densely congested plant, but other species can become large and shrubby. My textbook says that the dwarf forms require care in watering, so this is probably not a beginners' plant. S. Africa.

986. *Senecio kleinia*. Compositae. Also known as *Kleinia nerifolia*, this member of the Daisy Family forms part of the fascinating succulent flora of the Canary Isles. It has a smooth cylindrical stem which bears a tuft of linear leaves when in growth. Curious rather than beautiful.

987. *Stapelia grandiflora*. Asclepiadaceae. *Stapelia*s need no introduction for those of us who can claim to grow the 'other succulents', and even though I'm a devotee of the Cacti I must say that the succulent members of the Asclepiadaceae seem to represent a complete hobby in themselves. This S. African example is no exception with brown hairy-margined flowers to 15 cm. in diameter. It will please the flies even if it doesn't please you.

Forthcoming Events

ANNUAL GENERAL MEETING

Saturday 1 March.

Venue: Capel Manor Primary School, Bullsmoor Lane, Enfield, starting at 2.30 p.m.

Directions: Bullsmoor Lane intersects the Great Cambridge Road (A 10) about 4½ miles north of the North Circular Road (A406). Eastwards it is signposted A105 to Waltham Cross. Capel Manor Primary School is the *opposite* way (not part of A105), about 250 yds west of the intersection, on the left-hand side. Bus route 310 Enfield-Waltham Cross goes to the intersection.

North London Branch are acting as hosts for the meeting. There will be refreshments after the meeting itself, some musical entertainment and a talk by Paul Sherville on his South American travels.

BRING AND BUY, Tuesday 13 May.

The annual Bring & Buy meeting will be held as usual at the New Hall, Royal Horticultural Society, Westminster, at 6 for 6.30 p.m. on Tuesday 13 May. Members may bring up to 3 plants per species for auction, 10% of takings being charged as commission to the Society.

Branch Activities

Items for inclusion in the next issue must reach the Editor not later than 14th 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.

North London

Secretary: Roger Day, 50 Admiral's Walk, Hoddesdon, Herts. tel. no. Hoddesdon (STD Code from London: 61) 69521.

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

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

Everyone enjoyed Paul Sherville's entertaining and informative November talk on 'Peru Habitat', quite obviously his favourite subject and copiously illustrated with slides.

Future events:

21 March	Seed-raising and grafting (Ron Dale)
18 April	The Belgium Way (John & Mary Raynor)
23 May	Tenerife (Les Hurley)

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:

4 March	Succulent Trailers & Climbers (Betty Maddams)
1 April	Plant Auction
6 May	Echinocactus Group: North America (Bill & Yvonne Tree)

Warrington & District

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

Average attendance at Branch Meetings last year was 32. The Christmas Fayre proved quite successful and plans are already laid for another this year. Anyone who would like a programme of our 1980 activities should contact Mrs. Pritchard; visitors are always welcome at our meetings.

Future events:

12 March	Favourite S. American plants (Mr. G. Charles)
16 April*	Lithops (Mr. & Mrs. Frost)
7 May*	Crassulaceae (Mrs. D. Jenner)
29 June	Annual Show (Judge: Keith Grantham)

* Note dates, as these are not the usual '2nd Wednesday' of the month.

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, Wretton, 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-Whitestonecliffe, 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.

Woodcote 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, 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.

Gloucestershire

W. G. Geissler, 1 Lyefield Road, Charlton Kings, Cheltenham GL53 8BA. Tel. no. Cheltenham (0242) 517846. Open weekends and evenings. No list, no orders by post, but visitors very welcome in Cotswold country.

P. Strong, Green Mead, Green Lane, Chedworth, Cheltenham GL54 4AR. Tel. no. Fossebridge (028572) 581. Surplus seed-raised plants.

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 Pearcecroft 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, 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. Send 25p for current catalogue of plants and seeds. 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. Sargent) Hamptreston Village, Wimborne, Dorset BH21 7LX. Tel. no. Northbourne (02016) 3829. Not open Sundays and Mondays. List 9p. Plants and seeds.

Devon

Phil Goodson, 1 Marsh Lane, Chudleigh, Newton Abbot, Devon. Tel. no. Chudleigh (0626) 852309. Collection open, plants usually for sale. Between the scenic Teign Valley and Haldon Hills, five miles from M5. 'Phone for directions and convenient times.

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 Devonian 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.

Have you seen?

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: \$16.00. 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.

Whitestone

Whitestone Gardens has everything for succulent fanatics and beginners. A large stock of plants, seeds, books and sundries is constantly on view, and the nursery is open to visitors every day.

Our plants are primarily nursery-grown seedlings, but we also stock a range of larger plants. The nursery shop carries almost everything ever likely to be needed by the cactus enthusiast, including a range of books and other publications which is the most comprehensive in the world. We stock every book in print and many that aren't—why be kept waiting by your local bookseller when you can ring or write to us and get your needs by return of post.

Most of the Whitestone Collection is permanently on view to visitors—free of charge. This is constantly expanding, and now represents one of the best displays in the country. It is of special interest to serious students by virtue of the logical arrangement and the high proportion of authenticated reference material.

Anyone who hasn't been before can find us about 3½ miles from Thirsk on the A170 Scarborough road in the heart of North Yorkshire's most attractive tourist countryside.

1980 Whitestone Price List 45 pages of plants, books, seeds, and sundries, illustrated in full colour and monochrome. Free to existing clients (sent automatically). New UK customers please send *four 8p stamps*, and overseas customers *three International Postal Reply Coupons*.

A few popular book titles from our extensive range:

Cactus Lexicon (Backeberg) £25 plus 86p post

Illustrated Encyclopaedia of Succulents (Rowley) £7.95 + 80p post

Cacti: Botanical Aspects, Descriptions & Cultivation (Barthlott)
£7.95 + 50p post

Illustrated Reference on Cacti & Other Succulents (Lamb)

Vols. 1, 2, 3, 4 £7.50 per Vol. + 50p post each

Vol. 5 £8.50 + 50p post

The Cactaceae (Britton & Rose) 2 Vols. £25 + £1.25 post per set

Cacti & Succulents—A Concise Guide in Colour (Subik & Kaplicka)
£1.50 + 40p post

Post indicated above applies to UK and surface mail overseas

STILL WANTED!

Obsolete publications, especially American journals (we pay 50p per issue), NCSS and GB Society journals (we pay 15p per issue) and all kinds of books for our second-hand trade.



Whitestone Gardens Ltd
The Cactus Houses
Sutton-under-Whitstonecliffe
Thirsk
North Yorkshire YO7 2PZ

Telephone: Sutton 467

You will find a warm welcome
and a good selection of
cacti and succulent plants
at

THE CACTUS PLACE

(DAVID & BARBARA
BREWERTON)

33 BRIDGE AVENUE, UPMINSTER,
ESSEX, RM14 2LX

*"The Cactus Place" is almost
always open, but please phone
Upminster 29911*

Collections Bought — No Lists Issued
BRANCH VISITS BY APPOINTMENT

CACTUS and SUCCULENT PLANT SEEDS

from the deserts
of the world

s.a.e. for latest list.

SOUTHWEST SEEDS
200 SPRING ROAD
KEMPSTON
BEDFORD
ENGLAND

*Seeds despatched Air Mail
to all parts of the World.*

The National Cactus & Succulent Society

has over 100 Branches meeting
regularly in all parts of the British
Isles. The quarterly journal re-
plete with scientific and cultural
information, news and views, has
the largest circulation in the
English-speaking world, and is
amply illustrated on art-paper.
Seed-list with December issue.

Annual subscription £3.00 or \$7.50 U.S.

Further details from the Membership
Secretary, Miss W. E. Dunn, 43 Dewar
Drive, Sheffield, England S7 2GR, to
whom applications for membership
should also be sent.

WHELDON & WESLEY LTD.

Buy and Sell

BOOKS

on all branches of

NATURAL HISTORY

especially

Botany & Horticulture

in all languages

LYTTON LODGE,
CODICOTE, Nr. HITCHIN,
HERTS.

Telephone: Stevenage (0438) 820370
Telegrams: Wheldwesly, Codicote, Hitchin

Volume 42/Number 2
May 1980

The Cactus and Succulent Journal of Great Britain



President: A. BOARDER

Vice-Presidents: H. A. AUGER,
Mrs. M. STILLWELL, J. E. TAYLOR

Chairman: W. F. MADDAMS, M.Sc., M.INST.P.

Hon. Secretary: R. H. I. READ, 5 Wilbury Avenue, Cheam,
Surrey, SM2 7DU.

Hon. Treasurer: D. R. HUNT, M.A.

Council: Dr. C. W. BIRD, D. BOWDERY, K. GRANTHAM,
L. HURLEY, Miss M. A. T. JOHNSON, Mrs. B. MADDAMS,
J. W. PILBEAM, Mrs. D. PRITCHARD, P. SHERVILLE



Editor: D. R. Hunt, M.A., 67 Gloucester Court, Kew Road, Richmond, Surrey, TW9 3EA.

Assistant Editor/Librarian: N. P. Taylor, B.Sc., c/o Editorial Office.

Show Secretary: D. Bowdery, 14 Callander Road, Catford, London, SE6 2QD.

Publicity Officer: Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey, SM7 2DG.

Seed Purchasing Officer: Dr. T. C. Smale, 28 St. Leonard's Road, Epsom Downs, Surrey.

SUBSCRIPTION RATES 1980

Full Membership		£5.00
Joint Membership		£6.00
Junior Membership (under 18 years)		£2.50
'Senior Citizens' who joined in 1975 or earlier		£3.00
Joint members (two in family) receive one journal but are entitled to free seeds and voting rights.		

BACK VOLUMES

Vol. 24 (1962)—Vol. 36 (1974), per volume	£2.50
Vol. 37 (1975), nos. 3—4 only	£1.00
Vol. 38 (1976)—Vol. 41 (1979), per volume	£5.00

Prices include postage by surface mail.

INDEXES

Vol. 26-30 (1964-68)		0.90p
Vol. 31-37 (1969-75)		0.90p

Applications for membership, advertising, back volumes and indexes should be made to the following address:

Cactus & Succulent Society of Great Britain
67 Gloucester Court
Kew Road
RICHMOND
Surrey TW9 3EA
England

SOCIETY SALES ITEMS

All items post-paid inland. Overseas extra.

Journal Binders (to hold 4 vols.)		£4.00
Society badge		£1.00
Car sticker		0.30p
Booklet on cultivation		0.30p
Key fobs (mixed colours)		0.25p
Ballpoint pens (black, blue or red)		10 for 0.60p
T-Shirts and Sweatshirts		write for details

Order from: **Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG, England.**

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: The yellow flowers of *Mammillaria sphaerica* in close-up (about three times natural size).
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 42 Number 2 May 1980

edited by David Hunt and Nigel Taylor

In this issue

South American Cacti in the 1970s	31
Bolivian Cactus Holiday	33
A new variety and a new combination in <i>Sulcorebutia verticillacantha</i>	37
<i>Gymnocalycium mesopotamicum</i> sp. nov. Further cytological investigations in <i>Mammillaria prolifera</i> and other species	43
Leafy Cacti	47
Grow the better <i>Mammillarias</i> (2)	49
Notes from members	53
Seed-raising	55
Report and accounts	56
Forthcoming Events and Branch Activities	58

Achalay!

Tony Mace, who distilled two decades of experience as a cactophile and a wealth of commonsense into his talk at our Chichester meeting last October, touched a nerve when he remarked that the English-language cactus journals cover S. American cacti less well than those of N. America. The comment is certainly a valid one, but part of the explanation is the ineptitude of much of the literature in other languages which puts most serious taxonomists off. Beginning with a transcript of Tony's talk and contributions from our Council member Paul Sherville, IOS President John Donald and Argentinian expert Roberto Kiesling, we are hoping to turn over a new leaf with this issue and give the S. Americans better coverage. In the pipeline are a preliminary account of *Melocactus* by Nigel Taylor and more studies by Dr. Kiesling. Ray Pearce tells us he has had just *one* letter on *Copiapoa* ... two or three more needed, please, for a 'Forum' quorum!

Also in this issue, *Mammillaria* (only two, or is it three, species in S. America!) is prominent again with the first clear drawings of their chromosomes by Margaret Johnson and a continuation of John Pilbeam's choice of the better species to grow. These two authors, together with Keith Grantham (who besides his varied work for the NCSS prepares our journal distribution labels), were elected to our governing body, Council, at the Annual General Meeting on 1 March at Enfield. This brings us back to the title of this editorial, *Achalay*,

a 'shout for joy' in the Quechua language of the Andes, adopted as their group name by the musicians who entertained us after the business meeting was over, playing and singing with authentic South American instruments. Arrangements for the AGM were made by Paul Sherville (on holiday in S. America again, at the time of writing) and the North London Branch, to whom our thanks.

Journal merger talks to continue

Apart from the usual AGM business (Council's Annual Report and Accounts are printed on pp. 56-7), discussion at the AGM centred on the merger proposals announced in the last issue. Opinion was fairly evenly divided 'for' and 'against', some accepting the merits of the case, others fearing loss of identity for the GB Society. Similar feelings 'pro' and 'con' have been voiced in letters received, and Council will take these into consideration in deciding the course of action that will best serve the Society and its objects.

Our partners in the projected merger, The National Cactus & Succulent Society, have also held their AGM, and will, we understand, be balloting members. In view of the time needed to organise a ballot, it is clear that a merger will not take place before the end of next year.

Price increases

First we must apologise to new members in the USA who have joined in response to our advertisement in The Cactus & Succulent Journal of America, where we have been remiss in keeping the subscription rate up-to-date. As a result, we have had to apply to them for an additional \$3. Moreover, two postal charge increases in quick succession have meant that we have had to put the airmail surcharge up again. The US rates are now \$12 (surface), \$17 (air).

Rising postal and running costs also explain the increase in our charges for back numbers, now raised to £2.50 per volume (pre-1975) and £5 (post-1975). Stocks of some volumes are nearly exhausted, so if you want them, do not delay your order too long.

New stock of Journal Binders will arrive about the time this issue is published. The binders hold up to four

volumes and are to the same specification as previous stock. They will now cost £4 each, post free, from Mrs. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG.

Australian Agent appointed

Following the appointment of Mr. D. D. Craig as our Hon. Agent for the USA and Canada, we have pleasure in announcing that Mr. N. P. Davis has agreed to act as Hon. Agent for Australia. His address is: 542 Grand Junction Road, Northfield, South Australia 5085, Australia.

Neil Davis is International Secretary of the recently-formed Confederation of Country Cactus Clubs, a group of more than 15 clubs throughout Australia which have banded together for their mutual advantage. The organisation held a two-day convention last year and publishes a bi-monthly journal which is improving with every issue.

Mr. Davis recently published a very valuable paper on 'The Safe Use of Insecticides' in the Cactus & Succulent Journal of New South Wales. He has given permission for this to be reprinted, and it will appear in our next issue.

Cactusvillain honoured

Congratulations to Gordon Rowley, who has been awarded a Veitch Memorial Medal in gold by the Royal Horticultural Society. This award is made to 'those who have helped in the advancement and improvement of the science and practice of horticulture'. At the presentation, on 19 February, the Society's President, Lord Aberconway, remarked that 'even your house, Mr. Rowley, is called "Cactusville" and I would imagine that only the most intrepid burglar would face the discomfort likely to be associated with paying a nocturnal visit to a house so named!'

The tight security at Cactusville, behind the high screens of *Opuntia* and *Agave*, is well-known to local residents, of course. Only the daily deliveries of ice-cream and phonographic literature give any clue to the succulent goings-on there.

All this brings to mind the cover-blurb of a paperback lately received at the editorial office (courtesy of an anonymous donor): 'Here,' it begins, 'is the explosive story of a movie-making genius—a man of limitless appetites and ambitions. . . . The book? "Naked in a Cactus Garden" by Jesse L. Lasky Jr. (Consul Books, 1963).

Repertorium Plantarum Succulentarum

Volumes 28 and 29 of Gordon Rowley's 'Annual index of all new names of Succulent Plants', covering the years 1977 and 1978, have now been published and are available from the International Organization for Succulent Plant Study (IOS), 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA, price £1.90 each part, post free.

Shurly Award

The closing date for entries to this competition has been postponed to 31 July. For details, see last November's issue, page 94, or apply to the Editor. So far, very few entries have been received, and we hope more will be forthcoming by the deadline. There is a silver cup and a cash prize of £20 to be won for an article for the Journal. The judges will be looking for original ideas or observations in the work submitted, not for length or technical content, so why not put pen to paper?

As ye sow, so shall ye reap

Seed-raising is one of the most fascinating ingredients of our hobby. A rather out-of-touch feature about it on British TV earlier in the year had some of our experts hopping about in front of their sets saying 'no, no, no!' and 'phoning the BBC. One better method is John Pilbeam's, which he describes on pp. 55–6. Those who have seen John's seedlings will testify to the efficacy of the techniques he recommends.

If you are a seed-raiser, one idea for a short article for the Shurly Award would be a report on your results from this year's GB seed distribution or other sources. Aspects to cover might include methods used, details of what germinated (when and how many), descriptions of the seedlings, etc.

Whether or not you enter an article for the competition, please send your comments on the Society seeds, as we want to make this service to members as good as possible.

On the face of it, this year's distribution (cacti, at any rate) should be the best ever, with such a wide and interesting selection available. At the height of the initial rush, we ordered two almost complete 'sets' and received the seed almost by return of post—congratulations to our Hon. Distributor, Isobel Boote. Less promptly one set (95 packets) has been sown (in 2 inch pots, as prescribed by John Pilbeam), and one set put aside as 'vouchers' for reference and study. For comparison, we have also sown fresh and not-so-fresh seed from other sources, bringing the total to nearly 200 packets, and will report our results in the next issue. Let us hear about your successes and disappointments too.

There will also be an opportunity to discuss methods and results with this year's seeds at the Editors' Open Day on 15 June. For details, see p. 58.

Incidentally, we must apologize for one or two misprints in the 'Notes on the 1980 Seed Distribution' and for calling *Notocactus warasii* 'an undescribed novelty'. The plant in question was in fact described as *Eriocactus warasii* by F. Ritter in *Bradea* 1(34): 353–5 (1973), but has not, so far as we know, been transferred to *Notocactus*. It is intermediate in character between *N. leninghausii* and *N. magnificus* (see last issue), and readers of the Dutch journal *Succulenta* will have seen the attractive colour plate in Vol. 58(12): 313 (1979).

South American Cacti in the 1970s

by A. W. Mace

My particular leaning towards South American cacti started on 30th May, 1958, at a lecture given to the Sussex branch of the NCSS by John Donald. This lecture was entitled 'Rarer South American Cacti' and was copiously illustrated by well-grown seedling plants—in Oxo tins as I remember!—raised from seed collected by Ritter, obtained through the firm of H. Winter. There were many strange plants which I had not seen before such as *Matucanas*, *Oroyas*, *Pyrrhocacti* and the very rare *Sulcorebutia*. This inspired me to buy some of the seed and grow it for myself. I still have some nice plants from this source, but now wish very much that I had been more ambitious and grown many more different sorts. Unfortunately, within a year or two, this source of seed dried up and the opportunity was lost.

Towards the end of the 1960's and in the early years of the 1970's a new phenomenon occurred. Large numbers of imported plants arrived in Europe from Peru, Chile, Bolivia, Brazil and Argentina, particularly of the popular globular cacti. At worst these died quickly at the nurseries or in the hands of ignorant cultivators. The more fortunate plants which went to experienced cultivators were established and have remained in cultivation for a number of years. Even amongst these the long term survival record is not good. Accidents due to pests and diseases or neglect due to loss of interest by the collector, or breaking up of collections due to illness or death of the collector have taken a heavy toll. Only in a minority of cases has propagation by seed and cuttings made possible a more secure foothold in cultivation. Imported seed has a much better chance of establishing a plant in cultivation, and it is a pity that a little more effort has not been directed here rather than to buying imported plants just to sit on the Show bench. There are welcome signs that seed raising is becoming more important again. At Shows it is not now so common to see barely growing imported plants gaining prizes over well-grown seedlings, although I believe there is still some room for improvement in particular classes. For some reason, imported *Copiapos* are frequently rated over seedlings on grounds of maturity, even though the imports are badly damaged and the 'seedlings' may be 10-15 years old.

There are, of course, very large differences in the way in which various different groups of imported plants adapt to cultivation. For example, imported *Gymnocalyciums* are in general quite easy to establish

and stay in cultivation for a long time. Large plants of other genera have sometimes been completely wasted. How many of the tens of thousands of *Discocacti* imported in the 1970's are still around? I would suggest less than one per cent. Although we have now more knowledge and are somewhat more successful with these plants, I would be surprised if more than a few dozen are still around in ten years' time. How much better it would have been if we had more seed and fewer plants; fortunately more seems to be available now.

During the 1970's there was an enormous increase in awareness of the pressures man is causing on plant and animal populations due to his various activities, particularly as the human population increases. In South America, although population increases are at a high rate, the plants are probably not suffering too badly yet. This is in marked contrast with, for example, some areas of Africa. Changing climatic conditions are another matter, and some areas, for example, northern Chile and Peru, may be becoming drier which could be endangering certain plant populations.

One problem which devotees of South American cacti have to contend with is the comparatively poor nature of the literature in English. The older works which the average collector has access to, such as Borg or Britton & Rose, are still useful for the North American or Mexican cacti but are of very limited value for South American cacti. Backeberg's work, apart from the brief *Lexicon*, is not of easy access to English readers, can be misleading and in any case is now considerably out of date. The journals such as our own or that of the American Society are again much stronger on the North American cacti than those from South America. Many of the 'new' descriptions of South American cacti appear in the journals of the Dutch and German societies which very few English collectors subscribe to. Articles of importance in sundry South American botanical journals are seen by even fewer collectors.

This problem is compounded by the problems of classification and backlog of new material. Many new names have come into cultivation, a large number of which are minor variants of plants already cultivated, others are recollections of older species under new names, and still others are new species which have never been published. Many collectors faced with this mess have one of three reactions: (1) To throw away all their labels, or (2) to insist that the name purchased under must be correct—and 'I get fed up with all these name changes', etc., or (3) to put any name on the plant that seems near enough. The end result is that

Text of a talk given at the CSSGB/IOS British Section Meeting at Chichester, 20 October 1979. Author's address: Dr. A. W. Mace, 12 Mill Rise, Brighton BN1 5CD, Sussex.

much valuable material is in effect lost from cultivation just because its ancestry is not known.

This has been particularly noticeable to me over the last few years when collections containing invaluable material have been sold after their owner's death. Because of the lack of documentation and of the neglect prior to dispersal which is almost inevitable the value of such collections is largely lost.

Keeping records of a collection has always been a time-consuming business, particularly for a large collection, and although vitally important, usually gets neglected. Something is happening at present of which you may be only marginally aware, which is going to alter this as it is going to alter many other things in our lives by the end of the decade. This is the enormous increase in the use of computers at the personal level. There already are several hundreds of thousands of these machines in homes in the United States and Europe. At present the machines appeal mainly to hobbyists but costs are falling, memory size and ease of programming are increasing. By the end of the decade they will be as common as television sets and will be of an incredible power. This will enable us to keep large amounts of data on our plants very easily, and since these machines will be able to communicate with each other via telephone lines it would be feasible to keep track of all important plants in cultivation. At present this is largely done by remembering that we gave old so-and-so a bit of that plant and if we lose it we ask him for a bit back.

In the 1970's a number of useful specialist works appeared on individual groups of plants, such as the Rausch Lobivia books, but we are still in need of more general works of an up-to-date nature. It is to be hoped that the books of Ritter of which the first volume is now to hand will fill some gaps. No doubt his new genera and species will keep the lumpers occupied for some years to come! However we will at least have some information on some plants which we have had in cultivation for some years. To the amateur the taxonomy of the South American cacti is very confusing. While some are being lumped (e.g. *Matucana/Borzicactus* groups) others have been split into a myriad of genera (e.g. the Brazilian *Cephalocereus*). On the whole I prefer the former approach, if only because, for example in the case of the Brazilian *Cephalocereus*, most of the species seem to have moved round to the different genera in turn during the decade.

There have been some changes in the decade in the pattern of collectors. There are, I believe, more members of the various societies although numbers have not increased dramatically. I do not think that there has been an increase in the number of what, for want of a better word, I might call serious members. By those I mean members who actively participate in the hobby, rather than just having a few plants and attending the occasional branch meeting. I suspect the number of such growers is probably about 800, certainly less than

1000. Now take this in context with the vastly increased activities of the main cactus societies—more meetings, more shows—and add to this the proliferation of specialist societies, with their journals and other activities and you get a picture of much more work and organization being done. Because all these activities rely on the same group of people it is becoming noticeably harder to get people to do things—witness the continual appeal of all editors for copy for their journals. There is a very strong tendency for those most deeply involved with running the societies to neglect their plants and in particular the study of their plants. These people are often the most interested and knowledgeable ones and there is a great danger that the societies are therefore working against their own constituted aims. It is also true that for historical reasons and in some cases pure inertia the societies are very inefficiently organized. What I said about the use of personal computers is relevant here. Membership lists, for example, could be easily maintained, envelopes addressed and accounts maintained, for a cost well within the reach of the main societies.

It is in no way possible for me to chronicle all the individual changes which have occurred in the 1970's but to illustrate a few problems I took along to the Chichester meeting all my Brazilian *Melocacti* of which I have some 50 plants plus some duplicate seedlings. This is a group I have become interested in over the decade but of which I claim no expert knowledge. All but one or two were acquired as seedlings or grown from seed and I have therefore no habitat data. The following points emerged:

1. Some labels badly faded in the sun (nursery printed ones—quite bad). Replace while still decipherable!
2. Some plants under field numbers. Important not to lose these.
3. Some plants under provisional names. Bad—these may be altered and identity of the plant lost. Keep field number in addition.
4. Non-existent and wrongly spelt names. Bad—if detective work cannot reveal correct name. Do not discard the name, however, as it may provide a clue for someone else to identify it for you.
5. Field numbers which do not match correct genus. Nurserymen, please note!
6. Same field numbers—different plants. Again, nurserymen, please note!
7. Different field numbers—same plants. Possible—check field number lists, there may be more than one collection of the same species.
8. Published names different from provisional names. Not unusual, examine new publications for the field number.
9. Plants which seem very distinct but never seem to get published. Ritter's work here should answer much of this criticism.
10. Plants which seem identical yet are published under different names. Splitters, please note!

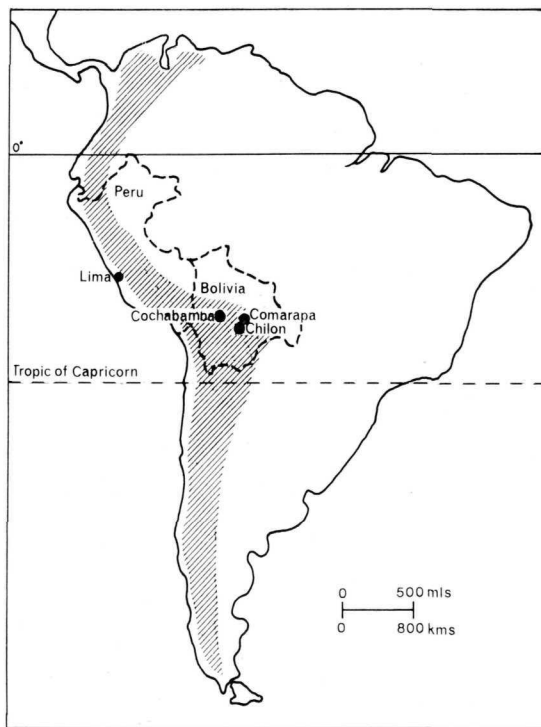
Bolivian Cactus Holiday

by Paul Sherville

The idea of a cactus trip to the Bolivian Andes was first mooted only a few weeks after I returned to England from my first trip to Peru. John Medway, who had also previously made several trips to Peru, suggested that we might make a trip together to Bolivia in late 1978, and I readily agreed, subject to the only possible constraint—finance! Suffice it to say, I saved the required cash, some £750, and so it was that I arrived at Jorge Chavez International Airport, Lima, in the early hours of Saturday, 25 November, to find John waiting there for me. The more astute readers among you will already be wondering why Lima was chosen as a starting point for a Bolivian trip. Well, the reason is two-fold; firstly, Lima is among the easiest (and cheapest) Latin American capitals to reach from Europe, and secondly, Karel Knize, who has provided many of the documented plants of South American cacti in the last decade, lives in Lima, and a visit to his nursery in the Lurin valley is a must for any cactophile visiting Peru. He is also a very valuable source of knowledge and sound advice to potential cactus-hunters.

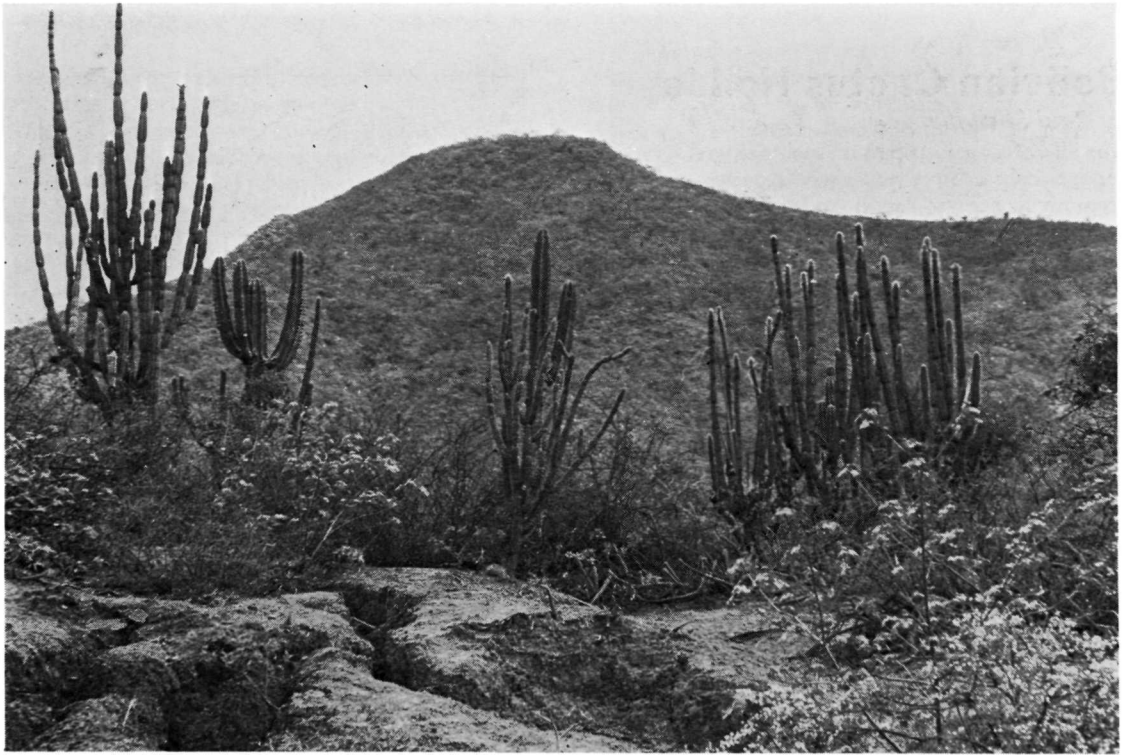
Having spent a couple of days with Karel, we began the trip proper in the Bolivian Andes. Our host for part of the trip was Roberto Vasquez, and such was his hospitality that within a few hours of meeting him we were whisked off to our first cactus habitat in the hills around Cochabamba. As is often the case with Andean towns and cities, and Cochabamba is no exception, they lie in basins, and so on the sunny afternoon of 30 November, Roberto, John and myself drank in the splendid panorama of the basin, with the city only some 100 m below our own 2880 m altitude and the snow-capped Mt. Tunari behind us, all the time being careful not to tread on the very plants we were seeking! The first site on the hill proved to be unproductive for the *Sulcorebutias* we sought, but by moving back down the slope a short way, we soon found clumps ranging from two to fifteen heads of *Sulcorebutia kruegeri* growing in association with an *Opuntia* (possibly *O. soehrensii*); *Cleistocactus parviflorus*; and *Echinopsis huottii* (*E. cochabambensis*). The *S. kruegeri* plants we found were just in bud, but none of the other cacti were showing any signs of floral activity, although some of the other associated flora was in flower. The dominant plant of this particular habitat was a low shrub, growing to approximately 1.5 m in height, which was just starting to unfurl the new season's pale yellowish-green leaves. In addition there were a number of low herbs and grasses to complete the flora, although there would almost certainly emerge some annual species as the season progressed. Our visit coincided with the onset of the rainy season, which lasts usually for some four months, the remainder of the year being dry, or very nearly so.

By way of a weekend 'jaunt', Roberto decided that it would be a good idea to make a trip eastwards from



Cochabamba to look at the plants in the region of the town of Comarapa some 250 kms. away. Needless to say, John and I were in agreement, having never dared to hope of travelling so far! Setting off in the early afternoon, we made good time on good roads, stopping occasionally to stretch our legs, take refreshments, and, of course, make short forays into roadside habitats when Roberto thought it appropriate. Our arrival in Comarapa, well after dark, was amid vivid lightning of a tropical storm, and did not bode well for the rest of the trip. After suitable refreshments we discussed the day's trip and 'finds', including two very distinct forms of *Lobivia caespitosa* growing in association with a few plants of *Sulcorebutia polymorpha* (a name that covers a multitude of sins) near to Kayarani at about 3380 m; and the *Corryocactus melanotrichus* encountered even earlier on the journey near Tiraque at about 2900 m, with practically every stem bearing one or (mostly) two scarlet terminal flowers. We retired to our clean, comfortable beds in the hotel, our minds reeling with the sheer grandeur of the Andean scenery and tense with excitement at Roberto's promise of visiting pastures new even to him, but sound sleep was inevitable as soon as heads touched pillows.

At home, with only the prospect of work before me, I have to be prised out of bed in the mornings, but in Comarapa it just seemed perfectly natural to be up at first light, despite being a little weakened by a stomach upset—almost inevitable for Europeans on first arriving in South America. By 6.30 a.m. we had breakfasted,



Neocardenasia herzogiana (thickest stems) together with outlying specimens of *Castellanosia caeneana* (jointed stems) nearing Chilon on the road from Comarapa. The ubiquitous *Roseocereus tephroacanthus* and other cacti are also in the picture. Note the deep gullies produced by heavy local rainfall.

filled up with petrol, and were on our way deep into the heart of cactus-country, and soon all thoughts of illness were lost in the sheer thrill of seeing the plants in their natural home; even the persistent fine drizzle, a legacy from the overnight storms, could not dampen unbounded enthusiasm as we were transported into wonderland. The countryside is open woodland on sharply undulating hills at around 1700 to 1900 m. altitude; an *Echinopsis* is spotted still bearing fully open flowers from the previous evening, we stop, photographs are taken, it is suggested that this *Echinopsis* is no different to those around Cochabamba 250 km. away to the west, we agree, so it is logged as *Echinopsis huottii* (*E. comarapana* will be preferred by some), and our first find of the day is in the bag.

Just as the cactus vegetation in and around Cochabamba begins almost at the city limits, so it does at Comarapa, and whilst the *Echinopsis* plants were particularly conspicuous with their large white flowers, we were soon amid a virtual sea of cacti, many growing on the woodland floor, especially in the more open glades, but also still to be found under even the densest cover that this particular woodland habitat could muster. Soon after the *Echinopsis*, we encountered in rapid succession the following species, many being large and widespread populations: *Cleistocactus fusiflorus*, many plants mostly in flower (in fact, it was true to say

that this species was so dense and widespread as to be never out of sight for mile-after-mile); *Gymnocalycium pflanzii* ('*G. comarapense*'), less common than the *Echinopsis*, but still numerous, and some plants bearing partially open flowers, with many plants carrying fruits, although the ants had pillaged most of the fruits. It was quite common to harvest a fruit from the *Gymnocalycium* only to have the 'seed' run up one's arm! Nevertheless, despite the ants, a useful quantity of seed was collected.

The next plants to steal our attention were *Weingartia neocumingii** forms. These like the *Echinopsis* and *Gymnocalycium* were locally very abundant, and many of the plants in this particular population were bearing flowers, making a series of pronounced bright yellow patches of colour throughout the woodland floor. On the lower branches of the trees surrounding us were even more cacti. This time they were true epiphytes belonging to the genus *Rhipsalis*, and also *Pseiffiera ianthothele*, the former completely cladding some branches and providing a new niche for further colonization by less xeromorphic plants including an orchid, possibly of the genus *Oncidium*. It was at about this point that we noticed the first specimen of *Neocardenasia herzogiana* in the woodland, just a single, juvenile stem about 3 m high.

* Backeberg's nomenclature is used throughout this article.

Later in the journey this plant was to become one of the dominant members of the flora, its branched stems reaching to about 9 or 10 m in height. The other cereoid cactus common in this locality was *Roseocereus tephraacanthus*, a large shrubby plant, much branched, and again, many of the plants were festooned in flowers still partially open from the previous evening. The *Roseocereus*, the *Echinopsis* from that region, and another short-cereoid plant, *Trichocereus vollianus*, which we were to encounter a few kilometres further on, were all in flower or carrying advanced buds around Comarapa, but devoid of flower, or only just showing buds, in the habitats near Cochabamba. The reason for this difference in the 'season' is simply that at these latitudes (18°S), and in this terrain, the north-south annual solar variation does not govern the seasons; instead, it is the annual advance of the rains from the east. The further west one



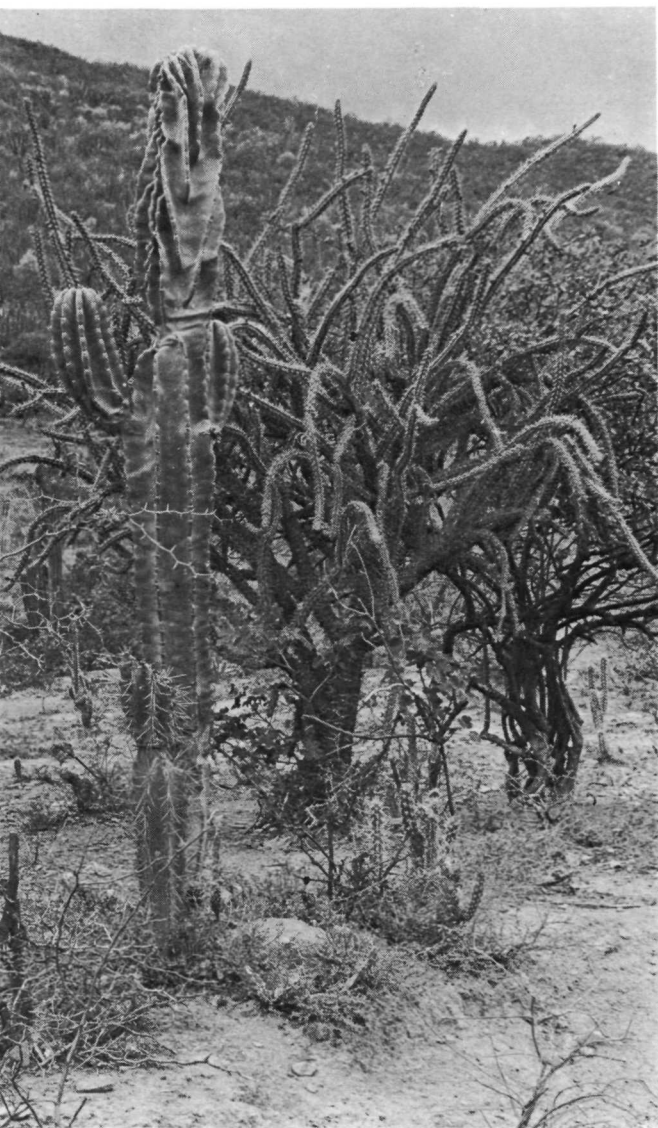
Large stands of *Neocardenasia* between Comarapa and Chilon, with Roberto and John collecting some of the fruit.



A superb tree of *Quibentia pflanzii* reaching about 4 metres in height near Chilon.

travels the later, and shorter, the season becomes, culminating in the almost total desert zone on the Pacific seaboard of the Andean region. This pattern appears to hold generally true from the equatorial Andes down to about 40°S, when the situation reverses, although there are, of course, quite major deviations from this overall trend in certain localities, largely due to topographical effects; the pattern here, however, was beautifully demonstrated by the *Roseocereus*, *Trichocereus* and *Echinopsis*.

Continuing our journey southwards from Comarapa generally in the direction of Chilon and Saipina, the fine rain eased a little temporarily, although the trees still



A monstrose specimen of Neocardenasia together with a large shrubby plant of Roseocereus near Chilon.

continued to drip water, often from epiphytic plants like the Tillandsias which festoon practically everything. We found ourselves at the top of some steep cliffs tumbling away to a glen some 200 metres below. On a ledge not too far down were some cacti which from our vantage point seemed to be different from those seen so far. Descent to the plants proved easier than it looked and very worthwhile, as the ledge was supporting a dense population of *Parodia columnaris*, with a few plants just putting forth pale yellow buds.

Photographs in the camera, the climb back to the

road accomplished safely amid the terrestrial bromeliads (possibly *Dyckia* or *Puya* spp.), and we continued on our way, all the time accompanied by occasional stands of *Roseocereus*, *Trichocereus*, *Neocardenasia* with a ground flora of *Echinopsis*, *Weingartia* and the ubiquitous *Cleistocacti*; now and then a different species would put in an appearance such as the *Parodia* and, of course the *Gymnocalycium*, and occasionally some *Opuntias*. We recorded *Opuntia kiska-loro*; *O. tayapayensis* and *O. salmiana* and even the last-named species, so common in cultivation, was a source of delight on seeing it in habitat almost at the western limit of its range—it occurs eastwards from here to the Atlantic seaboard.

As our journey continued southwards, the *Neocardenasias* became both denser and taller, and whilst contemplating these monsters we spotted another cereoid plant with a very distinctive stem among the trees. A short foray into the woods revealed the plant to be *Castellanosia caneana*, a species which seems to be very rare in cultivation. One's first sighting of any plant in habitat is always exciting. Often the first individuals are widely separated on the fringe of the population, and this was true of the *Castellanosia*, as a few more kilometres of travel revealed. Descending continuously to the floor of the basin we soon found ourselves in a virtual forest of these magnificent plants and still with us were the *Cleistocacti*, *Roseocereus*, *Gymnocalyciums* and *Opuntia tayapayensis*. Near Chilón, the 'Comarapa suite' of cacti was still with us but the *Castellanosias* were also accompanied by *Quiabentia pflanzii* and *Pereskia diaz-romeroana*. Fruits were collected from the *Castellanosias*, as they were from the *Neocardenasias* earlier, but whilst the latter were still also bearing flowers, the flowering season of the former was already finished.

At this point the rains descended in true tropical style, decanting some of the 5 metres (yes—16 FEET) of annual rainfall of this region, and we were not able to proceed further than Chilón on what had been planned as a circular trip through Saipina back to Comarapa. We were effectively stranded in Chilón until the rains abated, but within 10 minutes of sitting in the truck in the village, watching the road turn rapidly into a torrent of red mud, a woman waved to us. Roberto ran across to her house and then beckoned us over too; plates of hot soup were awaiting us! We enjoyed this local hospitality for some two and a half hours until the hot sun emerged for the first time that day, then made our way back to Comarapa via the same route by which we had come, stopping only once to add another species to the day's bag, *Pseudobolivia calorubra*, just before our arrival at dusk in Comarapa.

The next dawn saw us journeying back to Cochabamba via all the cactus habitats en route, but that is another story. Meanwhile, I should like to take the opportunity to thank Roberto Vasquez and his family for their unbounded hospitality and help in making our Bolivian holiday so enjoyable and productive.

A new variety and a new combination in *Sulcorebutia verticillacantha*

by John Donald and Wolfgang Krahn

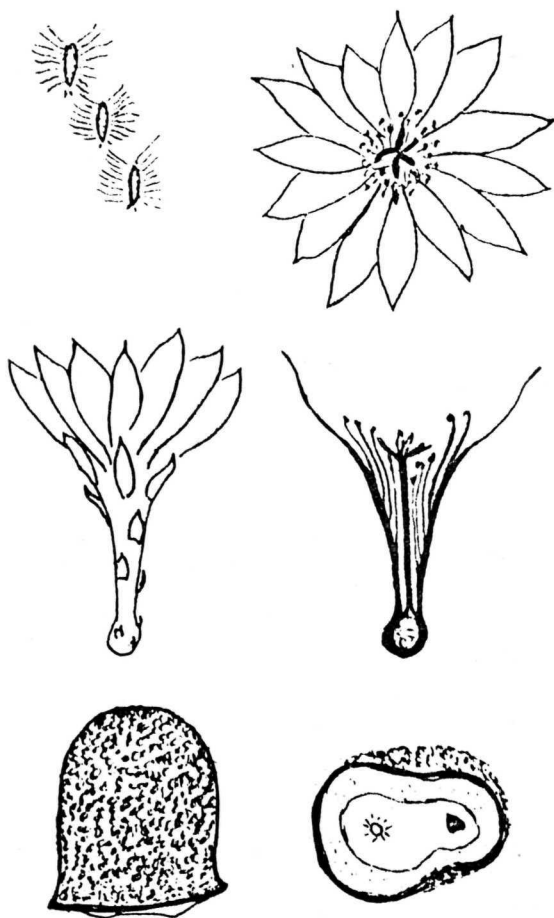
***Sulcorebutia verticillacantha* Ritter var. *applanata* Donald & Krahn, var. nov.**; a typo corpore applanatiore, aculeis vertice non crinitis albis, floribus majoribus omnino purpureo-magenteis differt. Holotypus: Cult. England, Donald, orig. coll. Bolivia, prov. Sucre, dept. Chuquisaca, 2800 m.s.m., 14 July 1964, Krahn WK 217a (K).

DESCRIPTION. Plant forming flat clumps of several to many stems, from a much divided tap-root, the individual heads (25-)30(-50) mm. high and (25-)30(-40) mm. diam. *epidermis* grass green to dark grey green; *ribs* spiralled or occasionally vertical, (12-)15(-17) (in var. *verticillacantha* 13-21), divided into small rounded tubercles 2-2.5 mm. high and 3-4 mm. wide (2-4 mm. x 3-5 mm. in var. *verticillacantha*) separated by a small furrow; *areoles* long and narrow, set in a groove on the upper side of the tubercle and broadest at the apex, 2-4 mm. long, 0.75-1 mm. wide, white-felted. *Spines* lateral only, in

7-9 pectinate pairs 2-4 mm. long with an occasional basal pair 2 mm. long, usually adpressed to the stem, usually white, occasionally yellow or brown, black or brown at base, curled or straight, the young spines not standing erect to form a tuft as in var. *verticillacantha* (in some clones, spines at the youngest areoles may appear chestnut brown, giving a contrasting dark reddish brown appearance to the umbilicus). *Flowers* arising from lower areoles, up to 30 mm. long, 40 mm. diam., larger and deeper coloured than in var. *verticillacantha*; *pericarp* 4 mm. diam., scales rounded, axils naked, reddish olive green; *tube* funnelliform, up to 20 mm. long, with broad blunt reddish olive green to magenta scales merging with the outer perianth segments; *outer perianth segments* spatulate 10-15 mm. long, 3-4 mm. broad, magenta with fresh greenish midstripe; *inner perianth segments* spatulate to spatulate-acuminate, often reflexed when open in full sun with tip upturned, deep shining magenta; *filaments* purple with paler anthers bearing yellow pollen (white to purple or rarely orange in var. *verticillacantha*); *nectary chamber* 2 mm. long, not closed by filaments; *style* free,



20–25 mm. long, white; stigmas 5–6, 5 mm. long. Fruit a flattened 'berry', 5 mm. diam., brownish to deep orange red, floral remains persistent. Seed as in var. *verticillacantha*, 1.3 mm. long, 1 mm. broad; testa black, rugose and papillate, often patchily covered with aril-like skin; hilum broad, basal, white; strophiole not well developed, covering the micropyle and slightly protruding funicular scar.



Type locality: Bolivia, prov. Sucre, dept. Chuquisaca; Sucre City on the road from Rio Chico Valley at 2800 m., on a small sandstone hill, quite isolated from other *Sulcorebutia* populations. The soil was red sandy loam with a predominant moss cover. *Parodia tuberculata* Ritter and *Rebutia fiebrigii* var. *densiseta* (Cullm.) Oeser were present nearby but not very abundant.

The plant was collected by Wolfgang Krahn on 14 July 1964 and does not appear to have been recollected since by Rausch, Lau or other collectors visiting this area. The type locality of *S. verticillacantha* (var. *verticillacantha*) is further north in prov. Arque, dept. Cochabamba, at Sayari.

The plant is close to *Weingartia ritteri* Brandt but differs in its much more flattened habit and its larger and deeper coloured flower. Both taxa belong to the *S. verticillacantha* populations. *Weingartia ritteri* has the typical short cylindric habit of *S. verticillacantha* and not the flattened form of its variety. The choice of the genus *Weingartia* by Brandt needs some comment. It is universally recognized now that *Weingartia* and *Sulcorebutia* are related but not so close as yet to demand that they are united into a single genus. Their evolution is convergent but they stem from different lines. Admittedly there are some *Weingartia* species that are probably best accommodated in *Sulcorebutia* and vice versa. Brandt in his wisdom now chooses to place all *Sulcorebutia* into *Weingartia* under a subgeneric umbrella. In our opinion he has been too hasty in his judgment. The plant he has described, today is still best placed in *Sulcorebutia* but only as a variety. It is certainly not justified as a species.

The new combination required is as follows:

***Sulcorebutia verticillacantha* Ritter var. *ritteri* (Brandt) Donald & Krahn, comb. et stat. nov.**
Basionym: *Weingartia ritteri* Brandt in Kakt. Orch. Rundschau 1978/3: 5–6 (1978) ('*ritterii*').

The relationships of this and other taxa of the *S. verticillacantha* complex will be discussed and developed in a later article.

Senior author's address: J. Donald, 41 Mill Road, North Lancing, West Sussex BN15 0PZ.

A new book

Hirao's colour guide

Many thanks to Gordon Rowley for lending us a copy of Hiroshi Hirao's new 'Colour Encyclopaedia of Cacti'.* This book is crammed full of beautiful colour photographs, mostly of the popular globular cacti, with particularly good coverage of the N. American species, arranged by Backeberg's system. The quality of colour reproduction is very high throughout, and while the text is in Japanese, it is brief and the names that caption the pictures are in roman type. We were particularly interested to find poorly known plants such as *Ferocactus flavovirens*, *F. pottsii* and *F. mathsonii* (*Glandulicactus crassihamatus*) depicted in flower and in full

colour (tt. 47, 46 and III, respectively). Predictably there is a selection of curious Japanese specialities, e.g. hybrid *Ariocarpus* and $\times$ *Thelobergia*, a *Coryphantha* with all its spines turned into glands, and numerous grotesque variegated freaks, not to mention some enviable cristates. Ignoring these eccentricities, Hirao's compilation of, for the most part, accurately named pictures, amounts to a useful reference work, and one wonders whether all Japanese collections house specimens as fine as those he illustrates.

N.P.T.

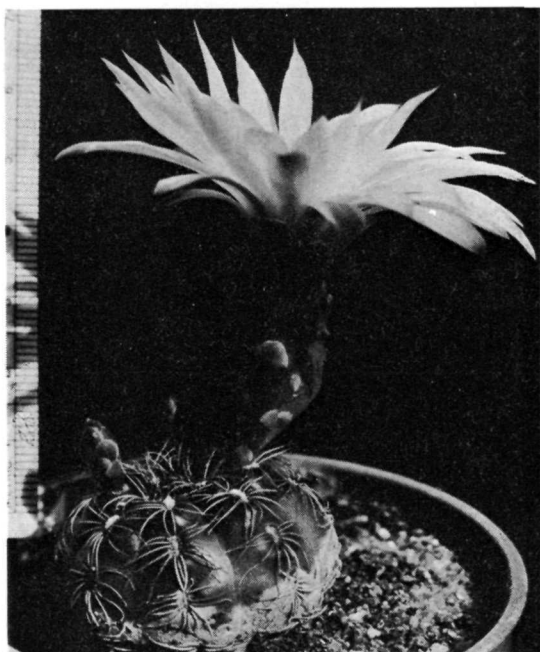
*Hirao, H. (1979). Colour Encyclopaedia of Cacti. Seibundo Shinkosha Pub. Co. Ltd., Japan. 26 $\times$ 18 cm, soft bound, 195 pp. and 800+ colour illustrations, text (excl. latin names) in Japanese characters. Price c. £14.

Gymnocalycium mesopotamicum sp. nov.

by Roberto Kiesling*

Instituto de Botanica Darwinion,
San Isidro, Prov. Buenos Aires, Argentina

During a collecting and study trip made by the Royal Botanic Gardens Kew with the collaboration of the Instituto Darwinion, those taking part found a species of *Gymnocalycium* in the region known as 'Mesopotamia' (prov. Corrientes). It proved to be an unknown species with very interesting features: one is that its seeds and flowers appear to be intermediate between two very distinct series, *Quehliana* F. Buxb. and *Uruguayensis* F. Buxb.† Another is that some specimens seem to be male and others female; studying this problem leads to the conclusion that it is a case of a subdioecious, or polygamous species, i.e. that the separation of the sexes in these plants is partial but not complete.



G. mesopotamicum, Cutler & Lonsdale 126-552, flowering in cultivation, July 1979 (photo: Kiesling)

*Member of the Carrera del Investigador of the Consejo Nacional de Investigaciones Científicas y Técnicas, Republic of Argentina. Work carried out at the Royal Botanic Gardens, Kew, during the tenure of a CONICET scholarship for study abroad. Translated by D. R. Hunt.

†Published as series *Uruguayense* F. Buxb. Corrected in accordance with ICBN Arts 21.2 and 32.4.—D. R. HUNT

Gymnocalycium mesopotamicum Kiesling, **species nova**; *G. denudato* (Link & Otto) Pfeiffer affinis, sed corpore minore, aculeis brevioribus et gracilioribus subpectinatis, tubo florali intus rubro, seminibus cum iis serie Quehlianorum congruentibus.

Simplex, globosa, 4 cm. diametro, 1.2-2.3 cm. alta, obscuro-viridis; costae 7-9, rectae, rotundatae; aculei omnes laterales margine areolae insertae 9-12, 2-9 mm. longae, flexuosae, rufescentes, adpresso-arcuatae, plerumque 2-4 deorsum spectantes. Flores infundibuliformes, 6-7 cm. longi, 6-7 cm. diametro; receptaculum obconicum pallido-viride; squamae spathulatae, olivaceae vel subfuscae; phylla perigonii interioria angusto-lanceolata, nivea, basi rubra vel rosea; filamenta 8-13 mm. longa, alba basi rosea; antherae flavae; stylus cylindricus, 2.2 cm. longus; stigma 0.5-0.6 cm. longum c. 8-lobulatum, cremeum, ovarium obconico-fusiforme. Fructus clavatus 2-3 cm. longus, 7-8 mm. diametro, viridis, parce squamosus. Semina truncato-globosa, c. 1.7 mm. diametro, tuberculata, nigra, hilo magno basali. Typus: Argentina, prov. Corrientes, Mercedes, Nov. 1978, Cutler & Lonsdale 126-552 (K, holo.; SI, iso.).



A, part of rib with one areole and position of two others; B, half-flower of holotype plant (stippled area of receptacle is green); C, fruit with remains of perianth; D, style-apex and stigma of paratype plant (stippled area at base of stigma showed rapid necrosis). All natural size except D (× 2).



G. mesopotanicum, holotype plant prior to removal of apical half for preservation

(photo: Svanderlik)

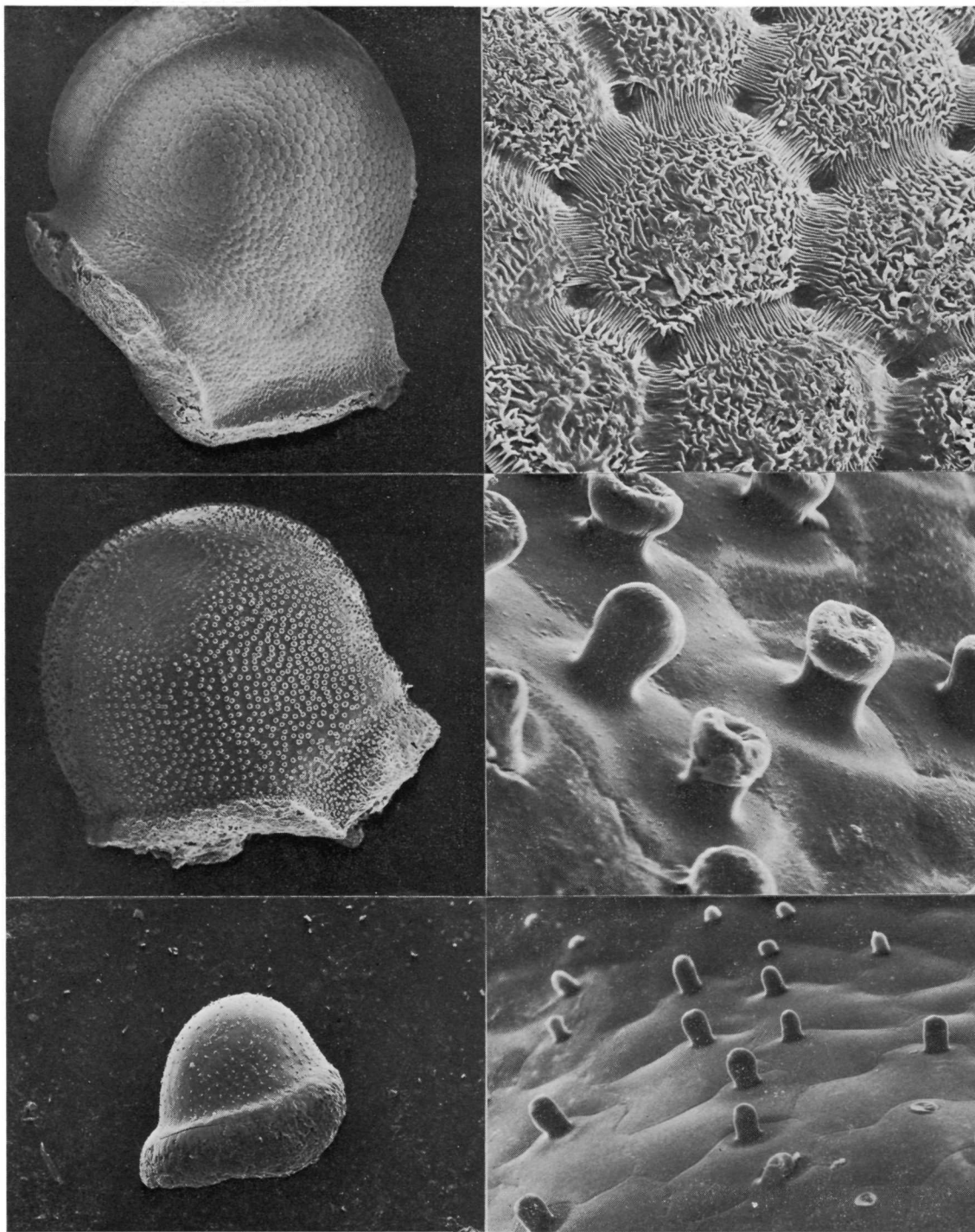
DESCRIPTION. Stem solitary, globose, 1.2–2.3 cm. high and c. 4 cm. diam., epidermis dark green, apex umbilicate, the depression 0.5 cm. deep and 1 cm. diam. with pronounced tubercles. *Ribs* c. 7–9, broad, low, obtuse, 1.5 cm. broad at the base; *tubercles* not very prominent, separated by shallow transverse grooves. *Areoles* c. 5 to each rib, oval, large, 3 mm. long and 1 mm. broad, with abundant yellowish-white wool (grey when adult), somewhat sunken, sited on the upper part of the tubercles. *Spines* 9–12, the smallest only 2–3 mm. long, the longer 9 mm. long, setaceous, flexible, adpressed, arching over the body, subpectinate, arising at the edges of the areoles, reddish brown when young, later greyish white or somewhat pinkish. *Flowers* arising at the adaxial side of areoles bordering the umbilicus, 6–7 cm. long, 2 cm. max. diam. when closed, 5.5 cm. long, 6.5 cm. diam. when open; *receptacle* obconic, 3 cm. long, 0.5 cm. diam. at base and 1 cm. diam. above, light opaque green, fleshy, the wall c. 1 mm. thick; *scales* c. 10, prominent, broad, obtuse, the lower smaller, 2–5 mm. long, 4–5 mm. broad, mucronate, pinkish green; *outer perianth-segments* spatulate 1–3 cm. long, 6–7 mm. broad, mucronate, somewhat fleshy, pinkish green to pinkish white; *inner perianth-segments* lanceolate, 3.1–3.3 cm. long, 6 mm. broad, white, tinged pink near the tip and reddish at the base with pinkish green mid-stripe, *innermost perianth-segments* narrowly lanceolate, very acute, 3 cm. long, 4–5 mm. broad, pure white; *tube* 1.8 cm. long, pale red within *nectar chamber* at base of tube, cylindric, 1 mm. long, 2–3 mm. diam.; *filaments* erect, 8–13 mm. long, white with pinkish base; *anthers* small, 1 mm. long, 0.5 mm. broad, yellow, curving over the style; *pollen* abundant, yellow, globose, tricolpate, with low fertility, tectum perforate-spinulate; *ovary* obconic-fusiform, truncate, 13 mm. long, 3.5–4 mm. diam., with numerous small white ovules;

style cylindric, 1.8 cm. long, 1 mm. diam. creamy white; *stigma* white; papillose, with some 8 radiating sub-cylindric lobes c. 5–6 mm. long and 1 mm. diam. *Fruit* clavate, 2–3 cm. long, 7–8 mm. diam., dull green, with the dried perianth persistent, brown; *scales* few about 6, similar in shape to those of the flower, greenish at the base, pale pink above. *Seeds* globose-truncate, 1.7–1.8 mm. diam., with large convex hilum c. 1.8 mm. long and 1.2 mm. broad, oval, curved; *testa* black with the cells superficially smooth and slightly convex, but each one with an eccentric cylindric or more often capitate projection 0.025 mm. high and 0.015 mm. diam. at the base. *Chromosome* no. $2n=22$ (observed at mitosis in ovary-wall cells, M. A. T. Johnson, unpubl. data).

N.B. All the measurements are taken from living specimens. In drying there would be appreciable shrinking.

I consider this species to be intermediate between series I. *Uruguayensis* F. Buxb. (subg. *Gymnotalycium* in Schütz's scheme) and series VIII *Quchliana* F. Buxb. (subg. *Trichomosemuncum* Schütz), as may be seen from the table.

Sexuality. The holotype plant on which the foregoing description is based produced perfect flowers with both male and female organs well-developed, but with very low pollen-fertility; of 820 grains examined, 54.4% were normal, 40% were empty and 5.4% were of approximately double the normal size and with several



Top, *Gymnocalycium leeanum* (series *Uruguayensia*), seed (left, $\times 32$) and part of testa (right, $\times 480$); centre, *G. mesopotamicum* seed (left, $\times 32$) and part of testa (right, $\times 720$); bottom, *G. ragonessii* (series *Quehliana*), seed (left, $\times 32$) and part of testa (right, $\times 460$) Photographed with a Jeol 535 scanning electron microscope at 18kV at either 30° or 0° tilt.

	Series Uruguayensia	G. mesopotamicum	Series Quehliana
Distribution	S. Brazil, Uruguay, NE. Argentina	NE. Argentina	W. and cent. Argentina
Habitat	Mesophytic	Mesophytic	Xerophytic
Stems	Globose	Globose	Globose-applanate, obconic
Colour	Green	Green	Purplish, glaucous or dull green
Ribs	Rounded, with or without humps	Rounded, without humps	Applanate, with humps
Spines	Flexible to rigid, few to many (3-20)	Flexible (12-14)	Rigid, few (1-7)
Flowers	White to yellow	White, tube red within	White, tube red within
Seeds	Black, 2-3 mm. diam., globose, rugose	Black, 1.7 mm. diam., globose, smooth, with papillae	Brown, 1 mm. diam., campanulate, smooth, with papillae
Polygamous	Yes	Yes	No

Comparison of *G. mesopotamicum* sp. nov., with series *Uruguayensia* and *Quehliana*.

nuclei (3-5). The observations were made by staining the grains with Cotton-blue Lactophenol.

A second specimen, *Cutler & Lonsdale* 126-552A (K, SI, paratypes), showed the following differences: *style* somewhat longer, 2.2 cm., curved in S-shape and showing rapid necrosis at the base of the stigma; *stigma-lobes* connivent at the edges, not separating. *Pollen* with high fertility, about 100%; polar diameter (45-50-56) μ m, equatorial diameter (49-56-60) μ m (mean and extremes from 20 measurements).

All this, I believe, indicates that the species is polygamous, since the specimens studied have flowers with the organs of one or other sex semi-atrophied. This condition is rare but known in the Cactaceae. In *Gymnocalycium* it has been recorded in *G. artigas* Hert. and *G. lecanium* (Hook.) B. & R., both from Uruguay, and in *G. bruchii* (Speg.) Hosseus, from Cordoba.

Phenology. The specimens studied flower in England repeatedly between June (which is when the best flowering occurs) and October. The flowers open for between two and four days from about 12 noon to 3 p.m.

Acknowledgements

I wish to express my thanks to the Director of the Royal Botanic Gardens, Kew, for facilities in the Herbarium, Library and Jodrell Laboratory, to Mr. D. R. Hunt for his help throughout the year and on this paper in particular, to Dr. D. F. Cutler for making the plants studied available to me and for the use of the SEM and other equipment in the Anatomy Section, to Mr. M.

Svanderlik for the colour photograph, and to Miss M. A. T. Johnson for the chromosome data and help with the pollen-study. I am also grateful for the comments of Mr. G. J. Swales and the loan of his unpublished thesis on this genus. My wife Angeles has helped with SEM and light-microscope preparations and with the pollen study.

Bibliography

- BRITTON, N. L. & ROSE, J. N. (1922). The Cactaceae 3: 152-167.
 BUXBAUM, F. (1968). In Krainz, Die Kakteen, Lfg. 38-39.
 SCHÜTZ, B. (1969). In Nat. Cact. Succ. J. 24: 74-76. (Translated from Friciana 46. 1968).
 SWALES, G. J. (1975). Studies in *Gymnocalycium*. Unpublished M.Sc. thesis, University of Durham.

Dr. Kiesling has now returned to Argentina with his wife and son after his year's study visit to England. On the way home he called at the New York Botanical Garden and attended the IOS Congress in Mexico. It was a very great pleasure to have them with us and we hope they will come again.

Further cytological investigations in *Mammillaria prolifera* and other *Mammillaria* species

by Margaret A. T. Johnson

Jodrell Laboratory,
Royal Botanic Gardens, Kew,
Richmond, Surrey

Chromosome morphology in the Cactaceae is still relatively unexplored because the chromosomes are small, making their preparation difficult. Mitotic chromosomes can only be seen in actively dividing tissues (usually the root-tip), so it is essential to encourage the plant to grow rapidly for such studies, and this can present problems where cacti are concerned. *Mammillaria* is of particular chromosomal interest since to date it is one of the few genera in which polyploids have been observed. Detailed analysis of such polyploids can sometimes indicate how individual species have arisen, but work published to date has not produced clear diagrams or drawings showing chromosome morphology. Remski (1954) listed chromosome counts, and gave a few drawings which did not show the chromosomes in any detail, and my own earlier paper (Johnson, 1978) was illustrated with photographs only. Since then improved plant culture and chromosome techniques have enabled better preparations to be made, and these will be reported in this article.

Twenty counts in the genus have been made, some for species not previously examined, and some confirming earlier work by Remski. Several new accessions of *M. prolifera* have been studied and karyotype drawings are shown for the first time. A *karyotype* is the particular chromosome complement of an individual or a related group of individuals as defined both by the number and morphology of the chromosomes, usually at mitotic metaphase.

In my previous paper it was noted that in *M. prolifera*, the size of the pollen mother cells (and the anthers) increases with increasing ploidy level. Mature pollen has now been examined under the scanning electron microscope (SEM) for variation in size and exine structure.

Material and Methods

Material of *M. prolifera* of wild origin was supplied by Mr. D. R. Hunt who also provided material of all the other species originating from various sources (see Table 1).

Mitosis. Best results were obtained by collecting actively growing root-tips early in the growing season in April, the plants having been kept completely dry from September throughout the winter. A few days after liberal watering, suitable roots were collected into 5 ml. of distilled water and two drops of ABN (alpha-bromonaphthalene) added as a pre-treatment. After 24

hours at 5°-6°C, the roots were killed and preserved by transferring to an acetic acid-alcohol solution (1:3) for a minimum of one hour before being hydrolyzed for eight minutes in 1N hydrochloric acid. Feulgen, which specifically stains DNA, was used to stain the chromosomes, and root-tips were squashed under a microscope cover-slip in a drop of 2% aceto-orcein. The use of orcein at this stage instead of 45% acetic acid as previously used (Johnson, 1978) greatly improved staining, making the use of phase contrast optics for observation and photography unnecessary. Karyotype drawings were made from photographic negatives with the aid of a microfiche reader to establish the outline of each chromosome, and finished by reference to the original preparation.

Meiosis. Plants having numerous very young developing buds were selected for study, since several buds usually have to be removed for examination before the right stage of meiosis can be found. Ten to twenty anthers were smeared dry on to a microscope slide and a drop of 2% aceto-orcein added to stain the chromosomes.

All slides of mitosis and meiosis were made permanent using CO₂ under pressure (Bowen, 1956) and are retained in the Jodrell Laboratory; the photographs (A-H) were taken on a Zeiss photomicroscope.

Pollen. Immature and mature pollen of *M. prolifera* was stained in 2% aceto-orcein and examined under the light-microscope (figs. G, H). For the SEM photograph (fig. J), fresh pollen was dusted on to double-sided sellotape covering the stub-surface, then coated with platinum. Specimens were observed in a Jeol 535 SEM at 18 kV with no tilt.

Results

Table I lists diploid ($2n=22$), tetraploid ($2n=44$) and hexaploid ($2n=66$) counts from six populations of *M. prolifera*. They follow the same polyploid distribution pattern as previously described (Johnson, 1978). Hexaploids occur on the islands of Cuba and Haiti and tetraploids and diploids on the lower eastern slopes of the Mexican Sierra Madre Oriental (no field-collected material from the USA having yet been examined). The limited data for Mexico (from eight sites) now suggest that the tetraploid (var. *texana*) occurs at somewhat higher elevations, if not higher latitudes, than the diploid (var. *arachnoidea*). Chromosome complements at different ploidy levels are shown in photographs

Species	Provenance	Source/Donor	Cyt. No.	2n
<i>M. prolifera</i> var. <i>prolifera</i>	Cuba: Pinar del Rio	Z. Meszaros	79.120	66
<i>M. prolifera</i> var. <i>haitiensis</i>	Haiti: Ganthier	Reppenhagen	79.253	66
<i>M. prolifera</i> var. <i>texana</i>	Mexico: Nuevo Leon, Monterrey, Presa Gomez	Repp. 984	79.86	44
<i>M. prolifera</i> var. <i>texana</i>	Mexico: Queretaro(?), between Jalpan and Rio Verde, km. 22	Repp. 787	79.251	44
<i>M. prolifera</i> var. <i>arachnoidea</i>	Mexico: Tamaulipas, Antiguo, Morelos	Repp. 950A, C & D	79.117 79.119 79.205 79.250	22 22 22 22
<i>M. prolifera</i> var. <i>arachnoidea</i>	Mexico: Tamaulipas, Kikos/Hidalgo (? N. of Victoria)	Repp. 236	79.118	22
<i>M. prolifera</i> var. <i>arachnoidea</i>	Mexico: Tamaulipas, Nuevo Guerrero	Repp. 1003	79.252	22
<i>M. armillata</i>	Mexico: Baja California, San Pedrito	Hunt 8743	79.508	22
<i>M. blossfeldiana</i> *	Mexico: Baja California, Boca de Marron	Hunt 8723	79.523	22
<i>M. dioica</i> *	Mexico: Baja California, Arroyo Seco	Hunt 8702S	79.507	44
<i>M. dioica</i>	Mexico: Baja California c. 80 km. W of La Paz	Hunt 8740S	79.531	66
<i>M. fittkaui</i> *	Mexico: Baja California, Boca de Marron [Derived from type collection]	Hunt 8724	79.535	44
<i>M. gracilis</i>	Mexico: Hidalgo, Barranca de Tolantongo	K. Schreier	79.248	22
<i>M. gracilis</i> var. <i>pulchella</i>	Mexico: No further data	Hunt 8624	79.255	22
<i>M. hutchisoniana</i> *	Mexico: Baja California, Llano Magdalena	R. Hosslinger	79.494	22
<i>M. leucantha</i> *	Mexico: Baja California, Llano Magdalena	Hunt 8735	79.501	22
	Mexico: San Luis Potosi, c. 20 km. NE of city	Hunt 8020	79.493	22
<i>M. louisiae</i> *	No data	N. P. Taylor	79.532	22
<i>M. mathildae</i> *	[Derived from type collection]	K. Schreier	79.522	22
<i>M. perbella</i>	Mexico: Queretaro, near Vizarron	Hunt 8634	79.534	22
<i>M. saboae</i> f. <i>haudeana</i> *	Mexico: Sonora, Yecora	Lau 777	79.498	44
<i>M. sheldonii</i>	Mexico: Sonora	Robbins 509/2018	79.537	22
<i>M. aff. subtilis</i> *	Mexico: No further data	K. Schreier	79.492	22
<i>M. vetula</i>	Mexico: Hidalgo, Encarnacion	Hunt 8534	79.504	22
<i>M. virginis</i> *	[Derived from type collection]	K. Schreier	79.533	22
<i>M. aff. zeilmanniana</i>	Mexico: Jalisco, San Andres	Lau 1245	79.734	22

Table I. Chromosome numbers in seventeen species of *Mammillaria*. *Signifies species for which chromosome data have not previously been reported. Under 'Source/Donor', collectors are listed in italics, donors in roman type.

A–C (Plate I). Table I also shows the chromosome numbers for other species, some previously unrecorded, the remainder confirming Remski's counts. In *M. dioica*, plants from two populations were studied, one of which was found to be tetraploid, confirming Remski's count, but the other plant was hexaploid, and is a new chromosome number for this species. The two populations are reported by Hunt (ined.) to differ morphologically, and it is hoped to study more plants of this species from different populations in order to determine whether morphological features and ploidy level are correlated, as in *M. prolifera*. *M. blossfeldiana* was also found to be tetraploid. This species grows with *M. dioica* in part of the range of the latter species but preliminary observations suggest that differences in pollen and stigma microstructure could effectively prevent their hybridization.

The results listed in Table I were derived either from root-tip counts, or from meiotic cells in developing buds. In some cases, all the roots studied from an individual plant were diploid, giving no doubt about its chromosome number. In others, however, more than one level of ploidy was found in different roots from the same individual, e.g. *M. prolifera* R. 1003,

where four roots were diploid and five tetraploid. In such cases it is assumed that the correct chromosome number is always the lower one, and that the variation in chromosome number is due to the local occurrence of polyploid roots produced during callus formation, as reported by Lindstrom & Koos (1931). In individual specimens of *Mammillaria* the proportion of polyploid to normal diploid roots can be high, so wherever possible, and especially where polyploid counts are consistently found in an individual, it is desirable to obtain confirmation of mitotic counts by examination of meiosis. In *M. saboae* f. *haudeana* meiosis has not yet been studied, but the eleven roots examined were all found to be tetraploid and there can be little doubt that the chromosome number of this plant is $2n=44$.

The karyotype drawings of *M. prolifera* at three different ploidy levels show a small overall increase in chromosome size with increasing ploidy level (Plate 1). This contrasts with the overall decrease found in *Chrysanthemum* by Dowrick (1952). A satellite can be seen in the diploid set, with two in the hexaploid, and although no satellites can be seen in the tetraploid, a secondary constriction is visible. The chromosomes are mostly metacentric (i.e. with arms of approximately

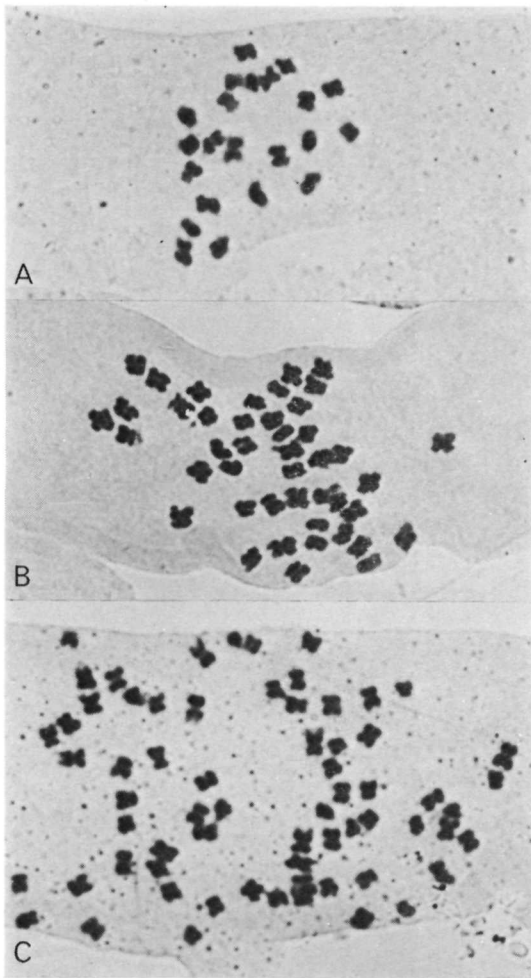


PLATE I. Root-tip chromosomes (left) and karyotype drawings (right) of *M. proliferata*. **A**, var. *arachnoidea* (Repp. 950), diploid, $2n=22$ with satellite on second chromosome of first pair; **B**, var. *texana* (Repp. 787), tetraploid, $2n=44$, five pairs of acrocentrics and one chromosome of last pair with secondary constriction; **C**, var. *haitiensis* (Jimenez s.n.), hexaploid, $2n=66$ with satellites on first pair. Photographs all $\times 1470$. Data for Jimenez s.n. in Johnson, 1978.

equal length) and uniform in size within an individual, but some variation in centromere position can be seen, especially in the tetraploid which has five pairs of acrocentrics (chromosomes with one short and one longer arm). (Meiotic confirmation of ploidy level has not yet been obtained in this particular tetraploid, R.787, which is morphologically *M. proliferata* var. *texana*, but the five pairs of acrocentrics show that the count, from three different roots, cannot be due to callus polyploidy; with five pairs, the chromosomes cannot be grouped into sets of four. Four, eight or twelve pairs would indicate a possible callus polyploid.)

Meiosis in the diploid taxa was regular with eleven bivalents being formed at metaphase I (Plate IID, which shows *M. armillata*). The tetraploids also mostly formed bivalents (22), although in *M. proliferata* var. *texana* R.984 some multivalents were observed. Assum-

ing it to be an allotetraploid, this would indicate some affinity between the genomes of its diploid ancestors. Meiosis in the other tetraploids and hexaploids appeared to be somewhat erratic, some pollen mother-cells exhibiting apparently regular meiosis whilst others were irregular. Irregular meiotic cells showed difficulty in pairing of more than two sets of chromosomes having limited homology. Some chromosomes did not pair, resulting in univalents which were not incorporated into the daughter nuclei at anaphase I (Plate IIE) and remained outside the main chromosome groups at anaphase II (Plate IIF). The cell illustrated also shows other irregularities with several bridges being formed. These irregularities at meiosis would give rise to different-sized nuclei at telophase II, including micronuclei. In further development each would form a separate pollen-grain, so although a few tetrads were

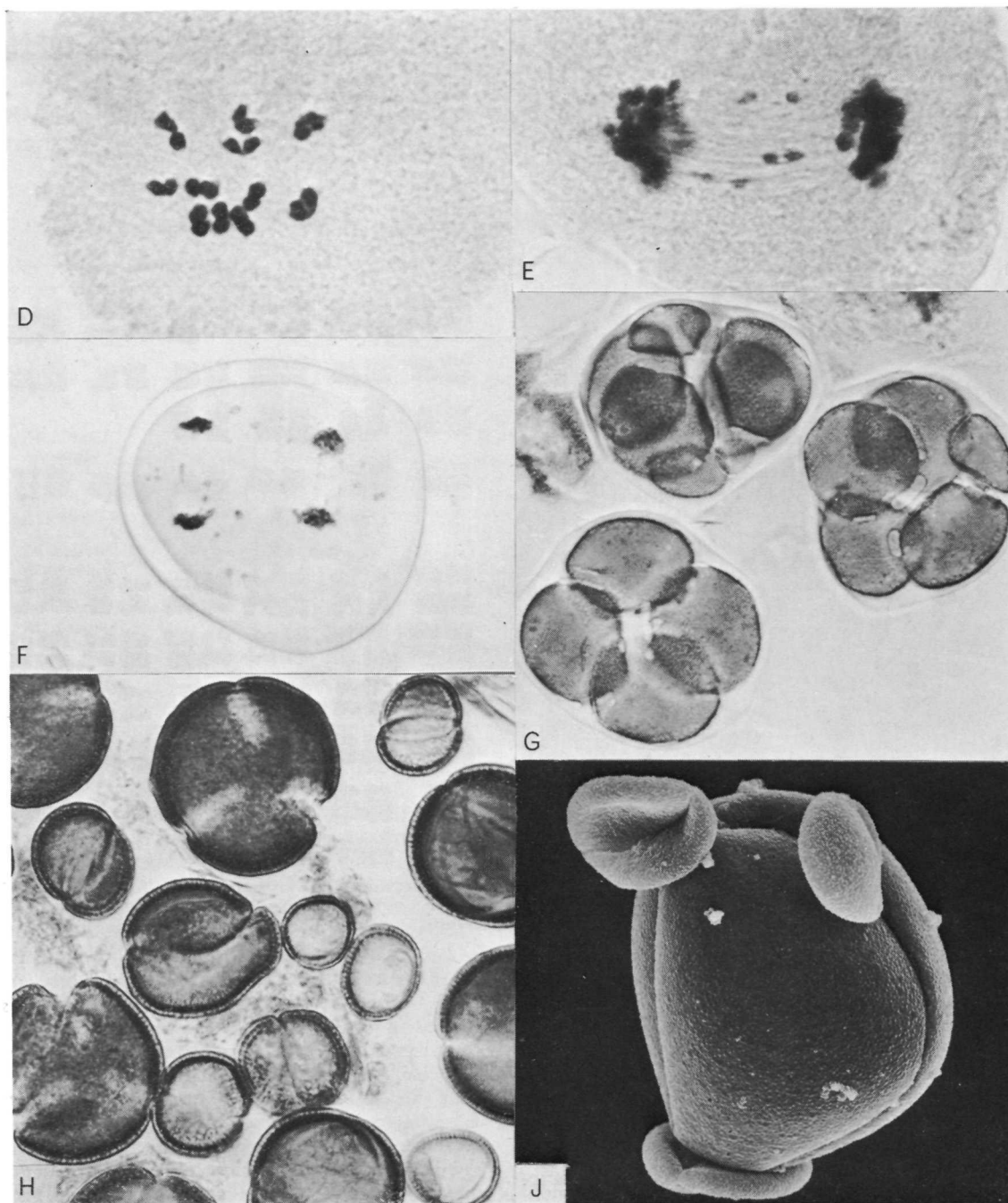


PLATE II. **D**, *M. armillata* (Hunt 8743), diploid, $2n=22$, meiosis showing eleven bivalents ($\times 1470$); **E**, *M. prolifera* var. *prolifera* (ex Meszaros), hexaploid, $2n=66$, anaphase I of meiosis showing lagging and fragments ($\times 588$); **F**, the same at anaphase II showing lagging and fragments ($\times 588$); **G**, *M. prolifera* var. *texana* (Repp. 984), tetraploid, $2n=44$, abnormal (top left with five and top right with 7-8 segments) and normal (lower left) tetrad formation ($\times 588$); **H**, the same, showing large (fertile) and small (sterile) pollen grains ($\times 588$); **J**, scanning electron micrograph of pollen grain of *M. prolifera* var. *texana* (tetraploid, $2n=44$) with three small micro-grains adhering (approx. magn. $\times 1000$).

quite normal containing four grains, many others contained from 5 to as many as 20 segments (Plate IIG),* some of which were very small. As a result of irregular segregation of chromosomes, the mature pollen is very variable in size and highly sterile (Plate IIH). Plate IJJ is an SEM photograph showing an abnormal pollen grain with three small micro-grains adhering.

So far, abnormal tetrads have been found in two hexaploid plants of *M. prolifera* and one tetraploid, but in none of the diploids. The tetrad stage of meiosis has not been studied in detail, since observations for chromosome-counting are made at earlier stages of meiosis. Further studies will be carried out to see if

*Similar abnormalities have been reported in hexaploid *Agropyron* by G. A. Johnson & Jalal (1979) who found pentads (with 5 segments) and octads (with 8). Remski (1954) also reported finding up to eight segments at the tetrad stage in polyploid *Mammillaria* species.

The three different ploidy levels of *M. prolifera* examined with the SEM showed no variation in pollen size or exine structure.

micro-grain formation occurs in other species and with what frequency.

References

- BOWEN, C. C. (1956). Freezing by liquid carbon dioxide in making slides permanent. In *Stain Technology* 31: 87-90.
- DOWRICK, G. J. (1952). The chromosomes of *Chrysanthemum* 1: The species. In *Heredity* 6: 365-375.
- JOHNSON, G. A. & JALAL, S. M. (1979). Analysis of physiological chromosome aberrations of native *Agropyron* and *Agrohordeum* Species. In *Cytologia* 44: 287-294.
- JOHNSON, M. A. T. (1978). Diploid cytotypes in *Mammillaria prolifera* and three other *Mammillaria* species. In *Cact. Succ. J. Gt. Brit.* 40(1): 9-12.
- LINDSTROM, E. W. & KOOS, K. (1931). Cyto-genetic investigations of a haploid tomato and its diploid and tetraploid progeny. In *Amer. J. Bot.* 18: 398-410.
- REMSKI, M. F. (1954). Cytological investigations in *Mammillaria* and some associated genera. In *Bot. Gaz.* 116: 163-171.

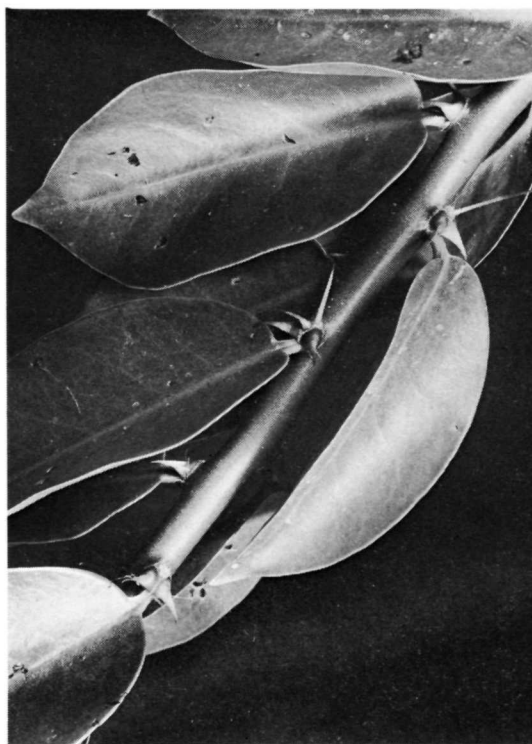
Leafy Cacti

by Margaret Martin and Peter Chapman

It is well known that 'cacti are covered with spines, instead of leaves'—but do they all fit this description? Certainly, most of them are leafless, spiny plants, although in the different species the spines vary from the formidable to the delicate. But there are a few species with quite definite leaves, and in these the spines are often reduced to mere bristles.

Pereskias are cacti with quite normal-looking leaves. The whole plant somewhat resembles a wild rose with rose-like leaves and even (when it blooms) rose-like flowers. They are not generally popular in small collections since they can only give of their best if allowed plenty of space to become the large, straggly bushes or even trees they need to be in order to flower well. However, a small potted specimen makes an attractive novelty in the collection. It can always be pruned when it grows too large, but cannot be expected to flower. There are short spines on the stems; like all cacti these arise from the areoles, characteristic of the family *Cactaceae*. The most commonly encountered species is *Pereskia aculeata* and its variety *rubescens* (with red backs to the leaves). This is sometimes met with under the name *P. godseffiana*. *P. grandiflora* will only live up to its name in large botanical collections, but can also be grown as a pot plant.

Pereskopsis species are rather intermediate in appearance between the un-cactus-like pereskias and the cylindrical opuntias. Whilst still having flattened leaves, these are far more fleshy than those of *Pereskia*. The one usually grown in this country is *Pereskopsis spathulata*. This makes a small shrub and needs less



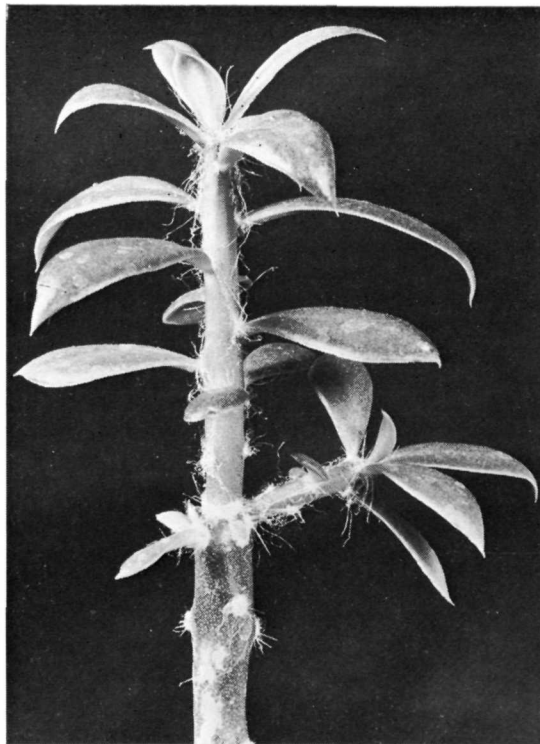
Pereskia aculeata, showing 'normal' leaves and spines of two types arising from the areoles (photo: Chapman)

space than a pereskia. Plants of both genera will probably need to be bought from a specialist cactus nursery and they require rather more winter warmth than most cacti, 10°C (50°F) or more. But they can quite easily

be wintered in the living room, if they are confined to a reasonable size. If not given this extra heat, they will lose their leaves and probably wither away. Any good porous soil, as used for other cacti, will suit them, but it is best not to let them dry out completely. Cuttings of pereskias, unlike other cacti, can be potted up at once, without any preliminary drying off.

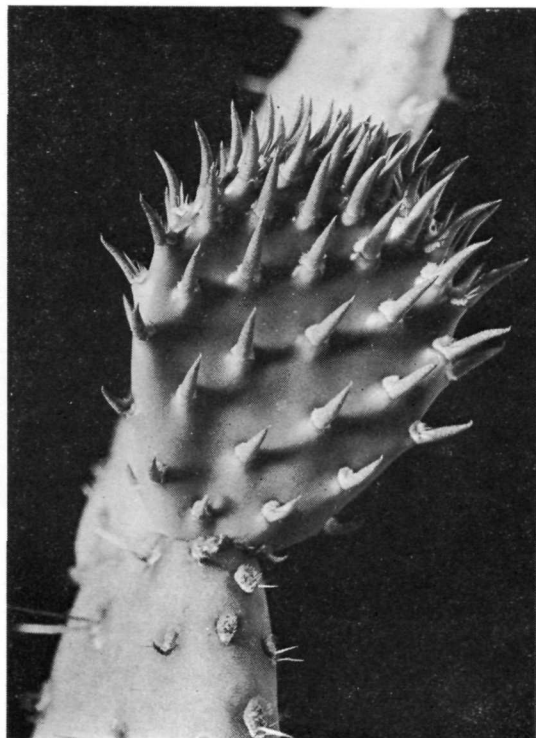
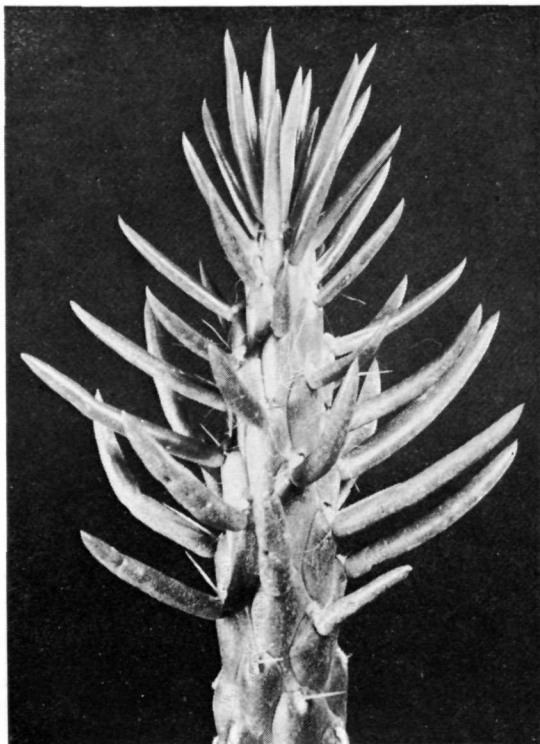
Amongst the opuntias, the cylindrical ones certainly have leaves, but these are far less leaf-like than those of the other genera we have described. They are also cylindrical and appear on the new growth, and whilst they usually fall as the growth matures, in some species, such as *Opuntia cylindrica* and *O. subulata*, they persist for most of the year. The latter plant rapidly forms a tall, robust specimen with leaves up to 5 cm. (2 inches) or more long.

The traditional flat-padded, segmented opuntias quite often have small, awl-like leaves on the newly-formed joints, but these always fall off before the joint is fully grown. As far as we know, no other cacti have leaves at all, but being dicotyledons, they all have a pair of seed-leaves between which the tiny spiny growth appears, but these very soon shrivel away. As may be expected, the cotyledons of the opuntias and their relatives are larger and longer lasting than those of other cacti; in some species they are almost like those of a cabbage!



Above, *Pereskopsis spathulata*, with thickish leaves, long areolar hairs and fine bristly spines

Below, left, *Opuntia subulata*, with stout cylindric leaves, sparse areolar hairs and spines; below, right, *Opuntia vaseyi*, showing small awl-like leaves on a young joint and part of an older joint devoid of leaves (photos: Chapman)



Grow the better Mammillarias (2)

by John Pilbeam

with photographs by Bill Weightman and David Hunt

Holding their own with the large-flowered species described in the first article in this series are some members of the *M. wrightii* Group. Good-sized seedlings of *M. wrightii* have become available in the last year. Knowing how this species can disappear in swift collapse I bought three as an insurance that I might be able to keep at least one going by varying their treatment. They duly flowered and their identity was confirmed with the evening sky pinkish-purple of their flowers, 3 or 4 cm. long and wide, mantling the plants royally. The lesser number of radials and single colour petals distinguish this species from *M. wrightii* var. *wilcoxii* (or, if you follow Castetter, Pierce and Schwerin; *M. meridiorosei*) which is similarly large-flowered but with more radial spines and whose petals have a distinct stripe in the centre of the petal and paler margins. The fruit of this, or these, species is the complete opposite of the retained, hidden fruit of the series *Longiflorae*, being large and round, purple coloured and full of liquid, resembling small grapes.

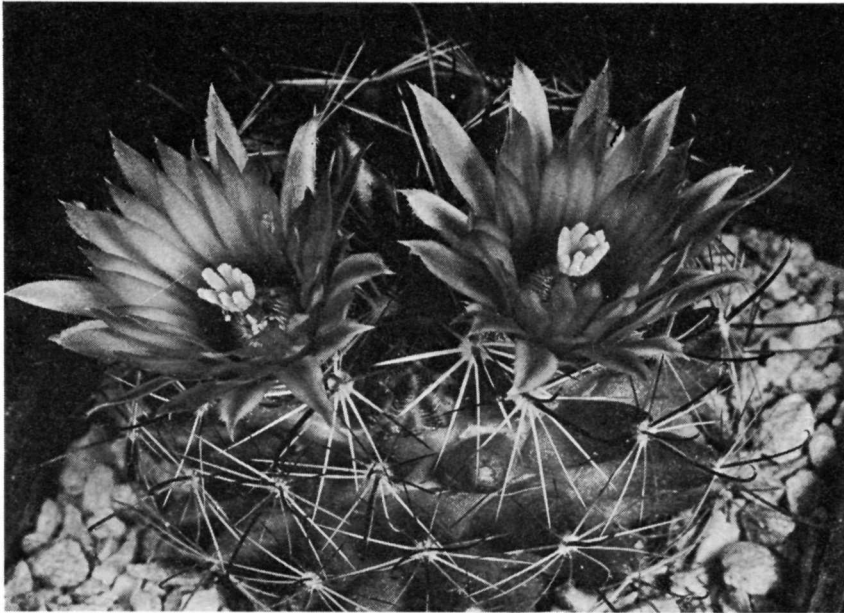
The smaller flowered members of this Group are *M. barbata* and the ineptly named *M. viridiflora* (or according to the trio aforementioned, *M. wilcoxii*,

which they maintain is the correct name for this species). Whichever name you prefer, it is a densely spined species with lovely, variably coloured, fringed flowers—rarely green as the name implies, more often a soft, greenish-pink. The spination is so close to *M. wrightii* var. *wilcoxii* (or *M. meridiorosei*) as to make identification of the plants almost impossible until the flowers appear, when the colouring and much smaller flower of *M. viridiflora* reveal the difference. The names *M. oresteria* and *M. chavezii* have been referred to *M. viridiflora*.

M. barbata, which is clearly destined to embrace the variants *M. garessii*, *M. morricalii* and *M. santaclarensis*, presents fewer problems in cultivation than the species discussed above, and will grow rapidly to a size of about 10 cm. or so tall and 5–6 cm. wide, producing its characteristically centrally placed flowers in abundance. Apart from variation in the spine colour and count, the three last-mentioned names are indistinguishable from each other and from *M. barbata*. They occur in different valleys in Chihuahua, sometimes growing on steep rockfaces in thick moss with just the tip of the plant showing. Steve Brack published an

Variable pyjama-stripes
in a batch of seedlings
of *M. blossfeldiana*
from field-collected
seed (Hunt 8723)
(photo: Hunt)





M. wrightii
(photo: Weightman)

excellent article on his finding of these species in the Mammillaria Society journal in 1978.

The *M. wrightii* Group are placed in series *Ancistracanthae*. David Hunt divides the rest of the series into four Groups based on *M. microcarpa*, *M. dioica*, *M. hutchinsoniana* and *M. schumannii*, and there are one or two orphans. It is extremely difficult to be selective, as the species all have an individual beauty that defies grading. Rather like a ladies' beauty contest, my final choice may not be yours. As a short list I shall choose up to three from each Group, with the observation that those left out may well be like Miss World contestants who don't make the final seven: still highly desirable and worth at least close inspection!

In the *M. microcarpa* Group there are two subgroups, that of *M. microcarpa* itself, embracing *M. grahamii*, *M. oliviae*, *M. milleri*, *M. marnierana*, *M. mazatlanensis*, *M. occidentalis*, *M. patonii*, *M. sheldonii* and *M. gueltemanniana*, and that involving *M. mainiae*, *M. thornberi* and *M. yaquensis*. In reverse order, as they say, my choice would be for *M. sheldonii*, which presents no difficulty in cultivation, and makes in time a handsome clump of stems, with an inclination to redden in full light, 12 to 15 radials and one true, usually hooked central spine. There is a straight-spined form usually seen under the name *M. mazatlanensis* var. *monocentra*. The flowers of this species are bright pink and large (3 cm. or so), so freely produced that a clump in flower is like a prickly bouquet, a sight to grace the show bench and catch any judge's eye.

My second choice would be *M. thornberi* (I find *M. yaquensis* not free-flowering in my greenhouse, or it

might be in the running, even with its jumping-cholla habit of attacking anyone within a foot of it). *M. thornberi* is by no means the easiest to grow, having a habit of drying up in patches, so that the clump of finger-size stems it will produce is often marred by the odd, clinging carcass. As with most in this Series a shallow pan and high shelf treatment seem best. The choicest of the Group is for me its namesake *M. microcarpa*, coming in a variety of shapes and sizes, but with consistently a beautiful show of largish, pink flowers, about 3 or 4 cm. across. Similar cultural treatment to *M. thornberi* is called for to avoid losing the roots, and a good-sized clump of its thickish stems is an achievement in skill of cultivation.

In the *M. dioica* Group the talent is only moderate. I must perforce leave weeping behind the scenes *M. estebanensis*, *M. angelensis* and *M. phitauiana*, still none of them common in collections, and with no really outstanding qualities except perhaps difficulty in obtaining them, which to some, who enjoy the chase for its own sake, will make them a must. And for lack of determination *M. swinglei* is best left out, as the name is so often confused with plants of *M. sheldonii* (*M. swinglei* usually has bristles in the axils and paler flowers). *M. dioica* itself is an extremely variable species coming from a vast range as it does, and can be had in all sorts of sizes and differing strengths of spination; the stronger spined forms appeal more to me, but it still does not make the short list. My only placing from amongst its allies is *M. armillata* from the deep south of Baja California (I must get there sometime), with variably coloured spines from yellow with the barest

tipping of brown to almost completely black, and with tubercles consistently tilted upwards. Its flowers are rather a handicap, being unambitiously small and cream-coloured.

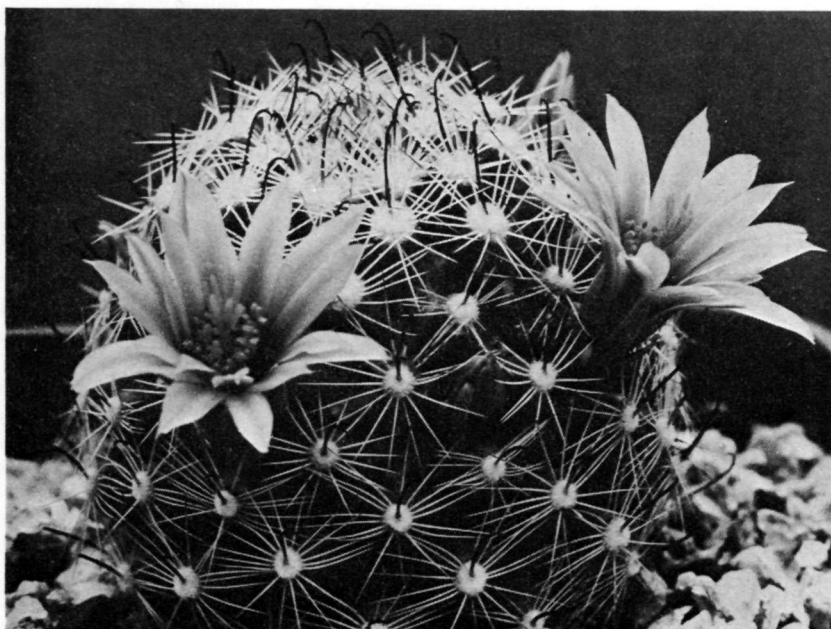
The *M. schumannii* Group has just three names, all strong contenders. *M. schumannii* itself (erstwhile *Bartschella*) has an individuality difficult to capture in words: maybe it is the large pink flowers or the cream and blackish-brown tipped spines, or the set of the tubercles in well-defined rows of milky-green. It is a lovely species to grow and rewards good treatment. All the same, I fear it will not win its Group, because of its rivals, *M. insularis* and *M. boolii*, inevitably to be merged under the prior name *M. insularis*, since they are probably one and the same species which has developed a mainland form (*M. boolii*) and an island form (*M. insularis*). *M. boolii* is arguably the better, with generally larger flowers and readier growth. It will sometimes swallow its emerging buds, but a good light position and ample water while the buds develop seems to ensure their final appearance, covering the body of the plant with their exuberance.

The *M. hutchinsoniana* Group consisting of probably only five species presents no problems since *M. capensis* is almost unobtainable (correctly named) and very difficult to grow, as I know to my chagrin. *M. fraileana* is about in collections and not too difficult, but does not really inspire me with its tangle of spines and whitish-pink flowers. This leaves three: *M. louisiae*, notoriously difficult to keep going for any number of years, and making small clusters eventually with modest spination and a free show of large, funnel-shaped flowers with prominent brown (occasionally green) stigmas, white

petalled with brown striping on the outer petals, reminiscent of some crocus species. Then *M. hutchinsoniana* (syn. *M. bullardiana*), another liable to collapse or go off its roots without a day's notice, but sometimes shooting up so rapidly that you can almost hear it growing, like rhubarb. Its free production of white flowers with again prominent stigmas make it a show-stopper. But the accolade for this Group and perhaps the whole Series, falls to *M. blossfeldiana* (surely to disappear under the prior, but less showy flowered *M. goodridgii*), which comes in two forms, either with a short-columnar habit but heavily clustering with a yellow cast to the radial spines and blackish-brown centrals, or low-growing, smaller headed, with creamy-white radial spines and almost black centrals. The flowers on both are deep pink striped on white, like old-fashioned pyjamas, and smother the plants with their wide open homage to the sun.

Moving on to the Series *Stylothelae*, we have for a start a plethora of names, which more than one authority has suggested are badly in need of revision. But until the necessary steps are taken, preferably physically in habitat, to determine their relationship, we have here some of the most attractively-spined Mammillaria species to grow. Their flowers are freely produced, but not noted for their size or intensity of colour.

They all have their own individual beauty, but for me *M. pennispinosa*, with its complete covering of heavily pubescent spines is the doyenne of the Group, with var. *nazasensis* (if variety it is) coming a close second. The latter seems more readily to grow into a fair-sized clump filling a 15 cm. (6 inch) pan in a few



M. boolii
(photo: Weightman)



A plant of the *M. zeilmanniana* group collected by David Hunt in 1974 near the borders of Sinaloa and Durango and tentatively identified as *M. guillauminiana* Backeb. (Hunt 8779) (photo: Weightman)

years, with its more flattened growth, compared with the downy, golf ball size of individual heads of *M. pennispinosa*, which in my experience takes many years to make a goodly clump. Other gems in the Group are *M. mercadensis*, with a stunning combination of reddish central spines with shell-pink flowers of more substance than most related species; *M. bombycina*, well-known on the show benches in massive clumps 18 inches or more across, has tremendous appeal with copious wool setting off the attractive, long, hooked red-brown or brownish-yellow central spines—the latter coloration by the way seems to be more free with its flowers; and *M. moellerana*, unusually for the Group, usually staying solitary, with a dense array of radials and centrals in either red-brown or golden-yellow, a good deal thicker than other species in this Series, and ring after ring of pale yellow flowers, and (I am told) there is a form with pink flowers.

Everyone must be familiar with *M. zeilmanniana*, in either its purple-pink or white-flowered form, such a commonly produced florist's plant. Look out for the clones with a generous share of petals in two or three layers. A similar but more unusual plant from further north in Mexico is tentatively identified by David

Hunt as *M. guillauminiana*, described by Backeberg in 1952.

The *M. wildii* Group in the Series Stylothelae has less serious contenders for bench-space I find, and for many years I admit I have not seriously grown a plant of *M. wildii*, which is high on my list of contenders for the most boring Mammillaria species. I hasten to add that I gave a superb specimen 'Best plant in Show' some time ago to the complete bewilderment of some believers in the cactus adage that 'only rare or new to cultivation wins prizes'. But there are better potential contenders for both bench space in shows and in the enthusiast's glasshouse, and one is a form of *M. bocasana* available recently under the name 'var. *multilana*', and without going into the plethora of sins covered by the name *M. bocasana*, this for me is the most attractive form seen, with dense wool completely obscuring the plant body. The only other in this Group I have a place for, as much in memory of years of faithfully produced spring show of multitudes of dusky pink flowers, is *M. erythrosperma*, not stunningly spined, but so generous with its subtly coloured flowers as to carry off prizes for 'best exhibit' at local spring shows dominated by daffodils—to the fury of the daffodil growers!

Notes from Members

Nomenclature of fasciated plants

from Len Newton

In a recent issue of this Journal, D. C. Speirs (1979) wrote that cristate and monstrose plants are not varieties, but forms or cultivars. This statement is not entirely correct.

When fasciated plants are featured in books and journals they are often referred to by the latinized epithet *cristata* or *monstrosa*. This practice gives the plants trinomials. Often no rank is indicated, as in the example *Cereus peruvianus monstrosus*. When the rank is shown, it is usually *forma*, as in *Mammillaria geminispina* f. *cristata*, though sometimes the rank *varietas* is used.

The use of a Latin trinomial for fasciated plants is contrary to the *International Code of Botanical Nomenclature* (ICBN). Article 71 of the Code states: 'a name is to be rejected if it is based on a monstrosity'. A monstrosity is a plant exhibiting an abnormal structural condition (McVaugh et al., 1968). Thus Article 71 clearly excludes the use of a botanical name for a cristate or a monstrose plant, other than the binomial of the species (which would be based on a plant of normal growth habit).

Whilst they are relatively rare in the wild, cristate and monstrose plants of many species of succulent plants have become widespread in cultivation as a result of vegetative propagation. Such plants are cultivars, and those which are sufficiently distinctive to warrant a name should be named in accordance with the *International Code of Nomenclature of Cultivated Plants* (ICNCP), i.e. they should be given cultivar names. New cultivar names must be in a modern language. If a Latin version of 'cristate' or 'monstrose' was published as a cultivar name before 1959 it can still be used, but if published at any time as *varietas* or *forma*, it contravenes Art. 71 of the ICBN and cannot be used. It is not my intention to precipitate a flood of new cultivar names to fill the pages of future issues of the Journal. However, it might be useful to publish cultivar names for the relatively few distinctive fasciated plants which retain their character (i.e. do not revert to normal growth habit), and which have become common in cultivation. Otherwise, reference should be made simply to a cristate (or monstrose) plant of a particular species.

What I have said so far does not disagree with the statement by Speirs. We part company over his use of the terms 'form' and 'variety'. *Varietas* and *forma* are listed as taxonomic ranks in Article 4 of the ICBN. Therefore, neither can be used for fasciated plants or any other kind of cultivar. Unless it is used in its strictly correct taxonomic sense, as an infraspecific rank, it is best to avoid using the term 'form' when discussing plants in any context involving nomenclature. (For this reason I have used the expression 'growth habit' rather

than 'growth form' earlier in this note.)

To complicate matters, the ICNCP states that the English terms *cultivar* and *variety* are exact equivalents (Art. 10). However, a distinction is made between a 'botanical variety' (*varietas*) and a 'variety (in the sense of cultivated variety)'. Thus we have the unfortunate situation in which the English word *variety* has two meanings. The English word *variety* is therefore acceptable when referring to a cultivar, but not as part of the name denoting rank. As with the term *form*, however, I would suggest that the term *variety* is best avoided in a text involving discussion of nomenclature, unless the sense in which it is used is clearly stated.

References

- GILMOUR, J. S. L., et alia. (1969). *International Code of Nomenclature of Cultivated Plants—1969*. I.A.P.T., Utrecht.
- MCVAUGH, R., et alia. (1968). *An annotated glossary of botanical nomenclature*. I.A.P.T., Utrecht.
- SPEIRS, D. C. (1979). The wordy wars of nomenclature and other horror stories. *Cact.Succ.J.Gt.Brit.* 41: 81–82.
- STAFLEU, F. A., et alia. (1972). *International Code of Botanical Nomenclature*. I.A.P.T., Utrecht.

L. E. Newton
University of Science & Technology
Kumasi
Ghana

Help sought from cristate collectors and other monstrose enthusiasts

from Wim Vanmaele

Sir, Lady,

As a teacher of biology and chemistry, and as a cactaceae-amateur, I decide, with some colleagues at school and other amateurs of our union, to make a study about *cristatisme* and *monstruosisme* by *cactaceae* and/or *succulents*. It is in this respect that I write you this letter. It is so, that without help of anyone, this project is due to be a disaster!

Which kind of help can you give me? Well, the following! At the moment, I'm making an inventory of all the kinds of existing cristates. So, I like to get following information:

- (1) The name of cristates.
- (2) The name and the address of the owner.
- (3) The date of which he got that cristate, and the last date that he had that cristate or if he still possesses that cristate?
- (4) Is it a cultureplant or an import?
- (5) Was it won by seed or by shoots? Grafted or on own root?

I need all this information for scientific accountability and justification, but be sure, the address and the name of the owners will rest *secret* and only known by me. This rule will be rigorously respected. By publication of the results and thus, the inventory, only the name of

the cristate and the land of appearance will be mentioned.

If you are interest, you can also get gratuitous that publication of the results. (First appearance not before 1981) Also, I'm even looking after photographs of cristates and cristateflowers with it, if possible, the information as asked for the inventory. Can you help me in these?

Please, will you spread and communicate this message to all members of your cactaceae-union, and even to every cactaceae-amateur or unions you know, so that this study may be successful? The asked information may be send to the added address.

I hope that you'll understand that this help is essential and that this study is made *without a lucrative point of view*. In expectation of a goodwill and a good and quick answer, I thank you cardial.

Faithfully yours,

Wim Vanmaele

Zaadcommissaris 'Grusonia'

Regent aardrijkskunde-wetenschappen

Kastanjelaan 6

B8060 Wingene-Zwevezele

Belgium

An unexpected interloper

from Ray Pearce

Some four years ago my wife obtained a cutting of an indeterminate, flat-padded, species of *Opuntia*. This has now grown into a fairly large plant, growing in a mixture containing a high proportion of a soil-less compost (Levingtons), in an 8-inch plastic pot. During July, when this plant was kept on the window-ledge of a very hot kitchen, I was surprised to find that a small, wholly sulphur-yellow toadstool had appeared on the compost in this pot.

The cap (pileus) was c.30 mm in diameter, thin-fleshed, and covered with minute scales. The stalk (stipe) was c.50 mm high and 5 mm thick, with a bulbous base and a membranous ring about half-way up. Development from a yellow button on the compost surface to eventual collapse took five or six days. A total of four such fruiting bodies (sporophores) were produced over a period of a few weeks in this pot. The fungus was identified as *Lepiota lutea* (Bolt.) Quél. Though not described in many of the recent books on mushrooms and toadstools, it is mentioned by Rea (1922), who gives its habitat as 'on coconut fibre in greenhouses. . . . Not uncommon', and Wakefield and Dennis (1950), who describe it as 'a delicate, sulphur-yellow species sometimes seen in greenhouses'.

Though not common, it does periodically occur amongst cactus collections; I have seen it once before, some years ago, in a pan of *Echinocereus*—again in soil-less compost, I believe. On this occasion the owner of the plant rapidly destroyed the fungus on sight. *L. lutea* grows saprophytically on the fibrous components of the compost—presumably the peat of a modern soil-less compost makes an adequate substitute for the coconut fibre used early in the century. Though perhaps

initially disconcerting, it is extremely unlikely that the presence of the fungus could in any way harm the rightful occupant of the pot, so its occasional appearance should perhaps be regarded as an interesting bonus!

References

REA, C. (1922). British Basidiomycetae. Cambridge University Press. 799 pp.

WAKEFIELD, E. M. & DENNIS, R. W. G. (1950) Common British Fungi. Gawthorne, London. 290 pp.

Postscript

Cacti are not alone in suffering from the attentions of taxonomists! Since the above was written I have learned that *Lepiota lutea* is now more properly called *Leucocoprinus birnbaumii* (Corda) Singer. A fuller description appears in Pegler, D.N., A Preliminary Agaric Flora of East Africa, in Kew Bull. Additional ser. 6:317 (1977).

R. B. Pearce,

Department of Forestry, University of Oxford,
Commonwealth Forestry Institute,
South Park Road, Oxford OX1 3RB.



Interloper: Lepiota lutea, alias Leucocoprinus birnbaumii, growing with an Opuntia in Ray Pearce's collection and blissfully ignorant of matters taxonomical (see postscript)

Seed-raising

by John Pilbeam

Ideas about raising our plants from seed have changed radically (no pun intended) over the last ten or twenty years, so that the advice so often followed from general books of any age at all seems positively archaic. Much of the advice in such well-meaning chapters on propagation has been proved not beneficial to production of the plants in any quantity or at all for the more difficult species to raise. For instance, we now know that:

- * plastic containers give better moisture control.
- * darkness is not essential for germination, and it is positively deleterious not to give a good amount of light once germination has been achieved.
- * a very high temperature (80°F plus) reduces the percentage of germination, as does a low temperature.
- * the glass or plastic covering does not need to be raised or removed as soon as germination has taken place.
- * nor does it need to be turned or removed each day to get rid of the condensation formed.

Containers

It is many years since I sowed seed in open trays with strips of plastic dividing the surface into squares like a seed-testing plot at Carters and numbers on tiny squares of label like impersonal gravestones marking each plot in an infuriatingly uninformative way. I now sow in 5 cm. (2 inch) individual square BEF pots, 28 of which fit nicely into BEF's deep seed trays with enough air space above the pots to allow the overall covering of glass or plastic to stay put for some time. The advantages over the former method are many. The stronger growing species do not vie for space above and below ground, and can be removed to less cosseted (though still enclosed) conditions, 10°C (50°F) being sufficient for continued good growth. Apart from the satisfaction of seeing immediately what is coming up and what is not, when individual labels with the names on are used from the start (Dunlop Self-lay floor tiles cut up into small strips are cheap), there is less likelihood with the individual pots, of the plants invading each other's territory, especially when sowing the seed, which I find takes off like Barnes Wallis's bouncing bomb at the last opportunity.

Compost

The compost I favour is half-a-pot depth of soil-less compost topped by an equal mix of soil-less, John Innes potting compost and gritty sand. On top of this I use a coarse grit top dressing, which gives the young roots much needed protection in the first few days and helps prevent caking of the surface and moss and algae formation.

Temperature and timing

Careful tests on germination of cactus seeds have been conducted, which show that 20°C (70°F) is the optimum temperature for germination. At this temperature maximum germination is achieved; the further away from the optimum the lower the rate of success. Provided this sort of level can be maintained for a good deal of the time at least, the time of year for sowing is not crucial, except that in Britain the low light levels in deep winter will often lead to etiolation of the seedlings unless they are kept near to the glass. I favour March onwards for sowing, with early August about the latest time for most, in order that a good sized seedling may be obtained before winter.

Moisture

There is no doubt in my mind that this is the major change in growing techniques over the last 20 years or so, which has led to the increase in so many and varied seedlings appearing for sale these days. The old shibboleth of removal of the glass covering soon after germination, has killed more aspiring young seedlings than any other misguided piece of advice, and some of the most successful growers now enclose their seeds completely in polythene for the first 3, 6 or even 12 months after sowing. One pot of *Ariocarpus* seedlings toted around to talks to illustrate the point was in its polythene bag for about three years before the demise of one or two prompted the owner to open it up—and they were beautiful little seedlings. If completely sealed of course watering is almost unnecessary, but a careful check on the moisture level should be kept if evaporation is at all possible, to replenish the supply and keep the compost damp—not soggy. An occasional watering or spray with a copper fungicide and a mild insecticide should prevent damping off and any pests, the worst of which is the recent one to cactus growers, the Sciarid fly. Dare I say it comes sometimes already in the bags of compost you buy, so keep an eye out for these skinny black flies, smaller than fruit flies and slow flying to the point that you can catch them without the quickness of eye of a slip-fighter. But this method of disposal, although satisfying is not to be relied on, and Malathion or a systemic insecticide is recommended, from time to time.

Light

Although subdued light (or none at all) is all right for germination, these plants must have light immediately they have germinated, and quite strong light is necessary for strong, compact growth. Light shading from direct sunlight is ideal.

Pricking out and overwintering

The seedlings may be pricked out (moved on) into shallow seed trays after about three months, or some growers prefer to leave them until the following spring. If pricked out early, the compost around the tiny roots

should be disturbed as little as possible, and a 'friable' state of both the compost from which and that to which the seedlings are being moved should be aimed at, i.e. not very wet and not very dry. They may be placed quite close together, say 2 cm. ($\frac{3}{4}$ inch) apart, and moved on again when they almost touch each other, usually the next spring. If a temperature of 13°C (55°F) or higher can be easily maintained the seedlings may be grown on through the first winter, but otherwise they are best kept almost completely dry with an occasional overhead spray on fine days.

ISI Plant List for 1980

The non-profit International Succulent Institute deserve high praise for their impressive 1980 offering of sought-after plants. Amongst the 62 varieties available there is something for everyone, be it the latest discovery, as yet undescribed, or the rare and previously unobtainable that you have only ever seen pictures of. Heading the list are names such as *Alluaudia procera*, *Echeveria laui*, *Mammillaria carmenae*, *M. laui* f. *dasyacantha* and *Xerosicyos danguii*, and there are lots of recently-named Asclepiads and Euphorbias for those who like to keep up with the times. Prices range from \$3 to \$12 US.

It is very pleasing to see these choice succulents put within reach of the collector through rapid and skilful propagation techniques, especially as it should help to reduce the risk to the species in the wild. Furthermore, all the plants listed are well-documented as to wild source and mode of propagation, so that most merit a rating of C on Gordon Rowley's scale (see CSJGB 41: 7-9, 1979); indeed some score a B, e.g. *Caralluma sarkariae* as cuttings taken from a plant originating from the type locality, or even A, for actual clonotypes, e.g. *Euphorbia malevola*. Hopefully, members purchasing these interesting species will endeavour to record the data supplied, and thereby establish some botanical value in their collections since, who knows when certain of these will next become available? This particularly applies to plants from countries such as Madagascar, e.g. *Aloe capitata* var. *gneissicola*, *Euphorbia enterophora* and *Pachypodium lamerei* var. *ramosum*, all derived from collections originally made by Rauh.

Requests for the list and orders should be addressed to N. E. Wilbraham, 7 Marlborough Drive, Macclesfield, Cheshire SK10 2JX, England, or to Jay Dodson, 10 Corte Sombrita, Orinda, Calif. 94563, USA.

IOS Congress in Mexico

The biennial IOS Congress was held in Mexico at the end of March and attended by several of our members. Will Tjaden, who was elected an IOS member at the Congress, has promised a full report for our next issue of what he calls 'a hugely enjoyable experience'. Nigel Taylor was also elected a member of IOS, bringing the number of members resident in Britain to 28.

THE CACTUS & SUCCULENT SOCIETY OF GREAT BRITAIN

Report of the Council for the year ended 31st December 1979

It is pleasant to be able to report that the upsurge in Membership reported last year has continued and that the various changes in and the consolidation of our organizational arrangements appear to have paid off. It would seem appropriate at this point to extend Council's thanks to Jackie Panter for her efforts during the time that she acted as Membership Secretary and to record our regret that she has found it necessary to relinquish the post.

The Annual General Meeting held on the 24th March was the first of our organized meetings in 1979 and whilst not quite so well attended as that of the previous year it provided a good opportunity for our members to meet and exchange views both prior to the meeting and during the tea interval and we are grateful to Dr. Bird for arranging the venue of the meeting for us at Queen Elizabeth College and for the excellent tea which he and his mother arranged for those present. Gordon Rowley and David Minnion rounded off this event with illustrated lectures on 'The Biology of Succulents' and 'Arizona' respectively. This meeting was followed by a successful 'Bring & Buy' evening at the RHS in May when many plants—several of them less common and newer varieties—came under the hammer. This event will be repeated in 1980.

Many of the Society's Members visited the NCSS National Show at Luton in late August coming by coach from some areas or by other means where the membership was thinner on the ground. This event lived up to its past high standard and must certainly have been the highlight of all Cactophiles' Show Year. We mounted a publicity display on this occasion and this was instrumental in securing thirty-three new members.

Turning to our own Shows, these were notable more for the quality of the plants on display than the number of entries. Both Summer and Autumn Shows drew a good attendance and business was decidedly brisk on the Trade Stands. Mrs. Hodgson has been an able and efficient Show Secretary for many years and Council is very sorry to see the end of her reign in that capacity but she certainly deserves a well-earned rest and she leaves with a very warm Thank You for her untiring efforts. Council decided during the year that as an experiment no London Shows would be staged in 1980 but as a result of a protest from a group of some thirty-five members it was re-considered and there will now be one Show in October 1980. Mr. Bowdery has agreed to be the new Show Secretary and Dr. Bird, Mrs. Ellis and Mrs. Maddams will form the Show Committee along with the Show Secretary.

Our own Society's highlight must surely have been the two-day event at the Dolphin & Anchor Hotel, Chichester, on October 20th and 21st. First-class organization by the Chairman and his wife and David Hunt ensured smooth running of the whole programme of Lectures, many of which were illustrated with high quality slides, and the Annual Dinner on the Saturday evening. Prof. Werner Rauh from Heidelberg was our Guest of Honour at the dinner and gave us a fine lecture during the week-end. Among other distinguished speakers were Dr. Roberto Kiesling from the Argentine, John Lavranos from S. Africa, Gordon Rowley, Bill Maddams, Tony Mace and Keith Mortimer, to name but a few. Council wishes to thank both the Organizers and the various Speakers for making the event such a success coupled with grateful thanks to Mr. Miller for the loan of high class projection equipment. Hardly had we returned from this week-end when we were further treated to the first of a series of colour-covered Journals and no less than three more half-page colour illustrations inside. Congratulations to our Editor, David Hunt, on a magnificent achievement.

Discussions have taken place during the course of the year between the Officers of this Society and their Counterparts in the National at two separate meetings with a view to exploring the possibility of publishing a joint Journal. It was recognized, in principle, that this could offer considerable advantages in providing a larger and better Journal more economically. These favourable discussions have encouraged further contact and the practical problems involved will be examined in detail during 1980.

Council was pleased to welcome Dr. Bird, Mrs. Pritchard and Paul Sherville to its midst and wishes to pay tribute to Mrs. Whicher for her past services. We are also pleased to record the appointment of Nigel Taylor as Assistant Editor and hope that this will take some of the load off our over-worked Editor/Treasurer.

Sales of Publicity items, which have been enlarged this year by the introduction of Tee Shirts, continue to flourish together with the Seeds Sales and Distribution under the watchful eyes of Mesdames Maddams and Boote respectively. Thanks must also be extended to Dr. Smale for his continued work as Seeds Purchasing Officer and to the Members of the Warrington Branch for packeting this year's seeds for the Society.

We are sorry that our President, Arthur Boarder, has not enjoyed the best of health this year and was unable to attend any of our Meetings or Functions. We send him our Best Wishes and also to his wife who has recently undergone a major operation. May they both have a better year in 1980.

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 Organizers and all the Society's Branch Officials 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

The net gain in the number of subscribers, which is the truest indicator of the Society's fortunes, was a healthy 10% in 1979, but this was not sufficient to offset increases in basic printing and postage costs of 27½% and 15% respectively. The deficit recorded on the year's account is not, however, entirely what it seems, since our expenditure included payment of two late bills from 1978 (amounting to about £200) and payment of about £500 for Journal covers in colour printed in readiness for 1980. Furthermore, we had not received payment by the end of the year of various sums due to us amounting to over £200. New stock purchased (badges, envelopes, membership cards), the experimental colour section in the November Journal, and subsidies to the Chichester meeting and seed distribution, all contributed to unusually heavy expenditure during the year and accounts which give a falsely pessimistic picture.

The increased subscription rates approved by Council for 1980 should cushion the effect of continuing rapid inflation, and I anticipate that our investment in colour printing in the Journal will help to widen its appeal.

D. R. HUNT
Hon. Treasurer

EXPENDITURE AND RECEIPTS FOR THE YEAR ENDING 31st DECEMBER 1979

EXPENDITURE			RECEIPTS		
1978 £		1979 £	1978 £		1979 £
3202.92	Journal: printing, etc.	5332.11		Subscriptions for year:	
450.60	Journal: postage and handling	713.00	1018.93	Paid in advance	392.23
206.35	Officers' postage, etc.	160.42	2948.91	Paid during year	4014.22
177.87	Printing, stationery	364.07			
40.91	R.H.S. Affiliation fee and hire of		3967.84		4406.45
	rooms	22.37		Journal sales:	
144.71	Seed purchases, packeting	302.32	727.24	Back numbers	729.92
—	Grant to new branch	28.50	207.80	Offprints	156.45
178.80	Show expenses and engraving	181.66	270.00	Advertising	264.00
195.16	Annual dinner and Chichester		72.50	Journal donations	201.00
	meeting	607.58	49.82	Booklet sales	83.44
253.05	Society Sales items, new stock		125.50	Seed sales	128.85
	purchased	264.60	185.40	Raffle and plant sales	161.68
18.35	Sundries and refunds	50.29	227.66	Society Sales items	269.19
—	Returned cheques	16.00	192.00	Annual dinner and Chichester	
				meeting fees	491.00
4868.72		8042.92	37.65	Donations	50.50
	Deficit (surplus 1978) carried to		91.98	Sundry receipts	189.67
1336.67	balance sheet	(900.84)	—	Building Society interest	9.93
			50.00	Shurly Bequest	—
6205.39		7142.08	6205.39		7142.08

BALANCE SHEET 31st DECEMBER 1979

815.81	Accumulated funds:	3777.70	Cash at Barclays Bank and in hand	800.00
	Balance at 1.1.79	2152.48	Halifax Building Society	2509.93
	Deduct deficit for year	900.84		
1336.67	(Add surplus, 1978)	2702.71		3309.93
2152.48				
	Current liabilities:	1251.64	Audited and found correct: J. S. KEESING, D. PHILCOX,	
392.23	Subscriptions in advance	2058.29	Hon. Auditors.	
158.00	Advertisements pre-paid	—	D. R. HUNT, Hon. Treasurer.	
2702.71		3309.93		

Forthcoming Events

Visit of Desmond Cole

Professor Cole, the *Lithops* specialist, will be in England in June, and will be lecturing in Coventry and London. He will give two talks at Coventry, on the afternoon and evening of Saturday, 21 June, on *Lithops* in habitat and variation in *Lithops*. Please write or phone Bill Keen, 8 Stonehouse Close, Cubbington, Leamington Spa CV32 7LP (tel. Leamington Spa 29702), for details of time and place. The London talk on Friday, 27 June, will be at the Dental Hospital, Leicester Square, at 7 p.m., details from Bill Tree, 4 Harvel Avenue, Rochester, Kent ME2 3JU (tel. Medway 70204).

Open Days

The Editors' collection (principally *Mammillarias*!) will be on view to members on Sunday afternoon, 15 June, at 64 Mincing Lane, Chobham, near Woking, Surrey. Please notify David Hunt, 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA, if you wish to attend and receive directions for reaching the Chobham venue.

The Chairman and Mrs. Maddams will be 'At Home' to members a fortnight later on Sunday afternoon, 29 June, from 3-6 p.m. Please let them know if you plan to make the visit. The address is 26 Glenfield Road, Banstead, Surrey (tel. Burgh Heath 54036).

London Show, 4 October

As reported in the last issue, there is to be one Society Show in 1980 and this will be held at the now usual venue, St. Saviour's Hall, St. George's Square, Pimlico, on Saturday, 4 October, from 2.0-5.15 p.m. Admission will be 20p (children 10p), exhibitors with five or more entries free. Schedules will be available from the Show Secretary: Mr. D. Bowdery, 14 Callander Road, Catford SE6 2QD—please send a self-addressed stamped envelope, or from Branch Secretaries.

As the schedule has been amended to include popular classes from the two previously held shows the class details are printed below:

Cacti

1. Six Cacti (Ibbotson Cup; this is the class for large specimen cacti from a selection of genera).
2. Three plants from the *Mammillaria* and/or *Coryphantha* and/or *Thelocactus* groups.
3. Six plants from the *Mammillaria* group in pots not exceeding 4½ inches diameter.
4. One *Mammillaria* (Sarah Cutler Cup).
5. One *Astrophytum*.
6. One *Notocactus* and one *Parodia*.
7. Two *Gymnocalycium* and/or *Weingartias*.
8. Three plants in *Echinocactus* Group (Luty Wells Cup).
9. Three plants in *Echinocactus* Group in pots not exceeding 3½ inches in diameter.
10. One plant in *Cereus* group.
11. Cacti raised from seed by the exhibitor on or after 1 January 1977 in a container not exceeding 15 by 15 inches (Shurly Cup).
12. Four cacti in pots not exceeding 6 inches diameter.

Succulents other than Cacti

13. Three *Euphorbias* (P. V. Collings Cup).
14. Three *Crassulas* in pots not exceeding 4½ inches.
15. One plant in *Asclepiadaceae*.
16. Two plants in *Liliaceae*.
17. One specimen Succulent.
18. Three Succulents (Joan Farrow Memorial Cup).
19. Six South African Succulents in pots not exceeding 4½ inches diameter (Mrs. Pryke Howard Cup).
20. Three *Conophytums* and/or *Ophthalmophyllums*.
21. Three *Lithops*.
22. Six stemless *Mesembryanthemums* (Denton Medal).
23. Succulents raised from seed by the exhibitor on or after 1 January 1977 in a container not exceeding 18 by 18 inches.

Intermediate Classes (for those who have not won a first prize in the open classes for cacti or other succulents at any Show organized by the Society or its Branches).

24. Three Cacti in pots not exceeding 6 inches diameter.
25. Three Other Succulents in pots not exceeding 6 inches diameter.

Novice Classes (for those who have not won any First prize except for miniature garden or Junior classes in any Show organized by the Society or its Branches).

26. Three Cacti in pots not exceeding 5 inches diameter.
27. Three Other Succulents in pots not exceeding 5 inches diameter.

General Classes

28. One Cactus and One Other Succulent in pots not exceeding 6 inches diameter.
29. Miniature Garden of Cacti and/or Other Succulents arranged for decorative effect (Pullen Cup).
30. Group of Cacti and/or Other Succulents arranged for decorative effect, to cover a space not exceeding 18 inches square (William Denton Memorial Trophy).

Details of the Cactus Groups and Succulent families can be found in the Society's new 'Guide to Genera for Show purposes', price 35p including postage from the Publicity Officer, Mrs. Maddams.

Branch Activities

Items for inclusion in the next Issue must reach the Editors no later than 27 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.

Future events:

7 June	Show discussion and plant auction
5 July	Epiphytic cacti
2 August	Talk by Jack Taylor
6 September	Members' Slide Evening

North London

Secretary: Roger Day, 50 Admiral's Walk, Hoddesdon, Herts. tel. no. Hoddesdon (STD Code from London: 61) 69521.
Meeting Place: Capel Manor Primary School, Bullsmoor Lane, Enfield.
Time: 3rd Friday in month, 7.30 p.m.

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 events:

3 June	Branch Restricted Competition (Judges: Dr. and Mrs. Smale)
--------	--

1 July Echeverias (Geoff Southon)
 29 July My favourite plants (Derek Stevenson)
 6 September Carshalton Cactus and Honey Show

As the London Borough of Sutton are no longer able to run the Carshalton Show, within which for many years the Branch has held its shows, a new venture is being tried. On Saturday, 6 September, at the Grove Hall, Carshalton, there is to be the Carshalton Cactus and Honey Show. North Surrey are running this in conjunction with the Carshalton Society of Beekeepers. The classes will be open to all so if you are interested in having a schedule please contact Mrs. Maddams.

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.

Future events:

11 June Members' mini-talks, including one on showing
 29 June Second Annual Show
 (Judge: Keith Grantham)
 9 July Hooked-spine Mammillarias
 (Robert Holt)
 13 August White-spined plants (W. Sykes)

The Show is open to all members of the Society and will be held at Padgate Community Centre, Warrington. If anyone would like a schedule, please contact the Secretary, Daphne Pritchard.

The Branch will also be staging displays at various local Shows and libraries during the summer.

Wirral

Secretary: Mrs. I. Boote, 110 Mount Pleasant Road, Wallasey, Merseyside L45 5HU, tel. no. Wallasey (051639) 4305.

Meeting Place: The Grange, Grove Road, Wallasey.

Time: 3rd Thursday in month, 7.45–10.30 p.m.

Future events:

19 June Members' night (including grafting)
 17 July Cactus literature (J. Arrowsmith)
 21 August 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, Wretton, 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 4×8p 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. Penrhynedraeth (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.

Jumaney 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.

Gloucestershire

W. G. Geissler, 1 Lyefield Road, Charlton Kings, Cheltenham GL53 8BA. Tel. no. Cheltenham (0242) 517846. Open weekends and evenings. No list, no orders by post, but visitors very welcome in Cotswold country.

P. Strong, Green Mead, Green Lane, Chedworth, Cheltenham GL54 4AR. Tel. no. Fossebridge (028572) 581. Surplus seed-raised plants.

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 Buttondene 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. Guiri, 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, Telscombe Cliffs, Sussex BN9 7LG. Tel. no. Peacehaven (07914) 3260. Open by appointment; closed Sundays. Send 12p 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. Send 25p for current catalogue of plants and seeds. 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. Sargent) Hampreston Village, Wimborne, Dorset BH21 7LX. Tel. no. Northbourne (02016) 3829. Not open Sundays and Mondays. List 12p. Plants and seeds.

Devon

Phil Goodson, 1 Marsh Lane, Chudleigh, Newton Abbot, Devon. Tel. no. Chudleigh (0626) 852309. Collection open, plants usually for sale. Between the scenic Teign Valley and Haldon Hills, five miles from M5. 'Phone for directions and convenient times.

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 Devonian Collection of Cacti & Succulents; over 4000 species. Surplus plants for sale or exchange.

Westfield Cacti (Ralph Northcott), 10 Shillingford Road, Alphington, Exeter, Devon. Tel. no. Exeter (0392) 56925. Nursery grown cacti and other succulents. S.A.E. for list. Opening April '80, but we regret no visitors until construction is complete.

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 12p. Large selection succulents. Cornish cream teas June-Sept. incl.

The Cactus and Succulent Journal of America

Six issues per year, fully illustrated, total on average 300 pages and catering for all levels of interest. Subscription: \$16.00. Apply direct to Box 3010, Santa Barbara, California 93105, USA.

DISCOCACTUS

Monograph based on a manuscript by
A. F. H. Buining

In English, 223pp., 60 coloured and 84 half-tone illustrations, 33 line drawings and 6 maps

Price £7.00 post free

Remittances, please, by International Money Order to Postcheck (Giro) Acc. No. 3742400, Succulenta, Venlo, Netherlands.
Please mention 'Discoboe'.

Hoyas - Senecio - Crassula - Ceropegia

Please write for price-list

MARIN CACTUS PATCH

**61 Granada Drive
Corte Madera, California 94925, U.S.A.**

H. GUIRL

Grower of Cacti and Succulent Plants

**'Glenholme' Nursery Road
Nazeing, Essex**

Telephone: Hoddesdon 62291

Sorry - No Lists

● VISITORS AND PARTIES WELCOME ●

A prior telephone call would be appreciated

LITHOPS Etc.

**ALSO OTHER MESEMB'S, CACTI,
SUCCULENTS & SEMPERVIVUMS**

Send 12p stamp for new 1980 Catalogue

More Lithops varieties are listed including the newer ones, also good value selections for beginners.

*Informative four-page leaflet given free
with most orders.*

ERNEST HEPWORTH

F.R.H.S.

**"Mira Mar", 133 Ambleside Avenue,
Telscombe Cliffs,
Sussex BN9 7LG.**

Phone Peacehaven 3260

AS SHOWN ON TV, ETC.,

THE LITHOPS SPECIALIST

*Visitors—Please let me know when you will
call—NOT OPEN SUNDAYS*

Whitestone

Whitestone Gardens has everything for succulent fanatics and beginners. A large stock of plants, seeds, books and sundries is constantly on view, and the nursery is open to visitors every day.

Our plants are primarily nursery-grown seedlings, but we also stock a range of larger plants. The nursery shop carries almost everything ever likely to be needed by the cactus enthusiast, including a range of books and other publications which is the most comprehensive in the world. We stock every book in print and many that aren't—why be kept waiting by your local bookseller when you can ring or write to us and get your needs by return of post.

Most of the Whitestone Collection is permanently on view to visitors—free of charge. This is constantly expanding, and now represents one of the best displays in the country. It is of special interest to serious students by virtue of the logical arrangement and the high proportion of authenticated reference material.

Anyone who hasn't been before can find us about 3½ miles from Thirsk on the A170 Scarborough road in the heart of North Yorkshire's most attractive tourist countryside.

1980 Whitestone Price List 45 pages of plants, books, seeds, and sundries, illustrated in full colour and monochrome. Free to existing clients (sent automatically). New UK customers please send *four 8p stamps*, and overseas customers *three International Postal Reply Coupons*.

A few popular book titles from our extensive range:

Cactus Lexicon (Backeberg) £25 plus 86p post

Illustrated Encyclopaedia of Succulents (Rowley) £7.95 + 80p post

Cacti: Botanical Aspects, Descriptions & Cultivation (Barthlott)
£7.95 + 50p post

Illustrated Reference on Cacti & Other Succulents (Lamb)

Vols. 1, 2, 3, 4 £7.50 per Vol. + 50p post each
Vol. 5 £8.50 + 50p post

The Cactaceae (Britton & Rose) 2 Vols. £25 + £1.25 post per set

Cacti & Succulents—A Concise Guide in Colour (Subik & Kaplicka)
£1.50 + 40p post

Post indicated above applies to UK and surface mail overseas

STILL WANTED!

Obsolete publications, especially American journals (we pay 50p per issue), NCSS and GB Society journals (we pay 15p per issue) and all kinds of books for our second-hand trade.



Whitestone Gardens Ltd
The Cactus Houses
Sutton-under-Whitestonecliffe
Thirsk
North Yorkshire YO7 2PZ

Telephone: Sutton 467

You will find a warm welcome
and a good selection of
cacti and succulent plants
at

THE CACTUS PLACE

(DAVID & BARBARA
BREWERTON)

33 BRIDGE AVENUE, UPMINSTER,
ESSEX, RM14 2LX

*"The Cactus Place" is almost
always open, but please phone
Upminster 29911*

Collections Bought — No Lists Issued
BRANCH VISITS BY APPOINTMENT

CACTUS and SUCCULENT PLANT SEEDS

from the deserts
of the world

s.a.e. for latest list.

SOUTHWEST SEEDS
200 SPRING ROAD
KEMPSTON
BEDFORD
ENGLAND

*Seeds despatched Air Mail
to all parts of the World.*

The National Cactus & Succulent Society

has over 100 Branches meeting
regularly in all parts of the British
Isles. The quarterly journal re-
plete with scientific and cultural
information, news and views, has
the largest circulation in the
English-speaking world, and is
amply illustrated on art-paper.
Seed-list with December issue.

Annual subscription £3.00 or \$7.50 U.S.

Further details from the Membership
Secretary, Miss W. E. Dunn, 43 Dewar
Drive, Sheffield, England S7 2GR, to
whom applications for membership
should also be sent.

WHELDON & WESLEY LTD.

Buy and Sell

BOOKS

on all branches of

NATURAL HISTORY

especially

Botany & Horticulture

in all languages

LYTTON LODGE,
CODICOTE, Nr. HITCHIN,
HERTS.

Telephone: Stevenage (0438) 820370
Telegrams: Wheldwesy, Codicote, Hitchin

Volume 42/Number 3
August 1980

The Cactus and Succulent Journal of Great Britain



President: A. BOARDER

Vice-Presidents: H. A. AUGER, Mrs H. HODGSON
Mrs. M. STILLWELL, J. E. TAYLOR

Chairman: W. F. MADDAMS, M.Sc., M.INST.P.

Hon. Secretary: R. H. I. READ, 5 Wilbury Avenue, Cheam,
Surrey, SM2 7DU.

Hon. Treasurer: D. R. HUNT, M.A.

Council: Dr. C. W. BIRD, D. BOWDERY, K. GRANTHAM,
L. HURLEY, Miss M. A. T. JOHNSON, Mrs. B. MADDAMS,
J. W. PILBEAM, Mrs. D. PRITCHARD, P. SHERVILLE



Editor: D. R. Hunt, M.A., 67 Gloucester Court, Kew Road, Richmond, Surrey, TW9 3EA.

Assistant Editor/Librarian: N. P. Taylor, B.Sc., c/o Editorial Office.

Show Secretary: D. Bowdery, 14 Callander Road, Catford, London, SE6 2QD.

Publicity Officer: Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey, SM7 2DG.

Seed Purchasing Officer: Dr. T. C. Smale, 28 St. Leonard's Road, Epsom Downs, Surrey.

SUBSCRIPTION RATES 1980

Full Membership		£5.00
Joint Membership		£6.00
Junior Membership (under 18 years)		£2.50
'Senior Citizens' who joined in 1975 or earlier		£3.00
Joint members (two in family) receive one journal but are entitled to free seeds and voting rights.		

BACK VOLUMES

Vol. 24 (1962)—Vol. 36 (1974), per volume	£2.50
Vol. 37 (1975), nos. 3—4 only	£1.00
Vol. 38 (1976)—Vol. 41 (1979), per volume	£5.00

Prices include postage by surface mail.

INDEXES

Vol. 26-30 (1964-68)		0.90p
Vol. 31-37 (1969-75)		0.90p

Applications for membership, advertising, back volumes and indexes should be made to the following address:

Cactus & Succulent Society of Great Britain
67 Gloucester Court
Kew Road
RICHMOND
Surrey TW9 3EA
England

SOCIETY SALES ITEMS

All items post-paid inland. Overseas extra.

Journal Binders (to hold 4 vols.)		£4.00
Society badge		£1.00
Car sticker		0.30p
Booklet on cultivation		0.30p
Key fobs (mixed colours)		0.25p
Ballpoint pens (black, blue or red)		10 for 0.60p
T-Shirts and Sweatshirts		write for details

Order from: **Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG, England.**

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 illustration: *Selenicereus testudo* (Karw. ex Zucc.) F. Buxb. in Krainz, Die Kakteen Lfg. 30 (1965), the vining cactus better known as *Deamia testudo*. From the lithograph by W. H. Fitch published in Curtis's Botanical Magazine, t. 5360 (1863) (as *Cereus pterogonus*).

The Journal is published quarterly by the Society, price £1.25 (ISSN 0007-9375).

The Cactus and Succulent Journal of Great Britain

Volume 42 Number 3 August 1980

edited by David Hunt and Nigel Taylor

In this issue

Notes on <i>Melocactus</i> (1): E. Brazil	63
Conservation by Propagation	71
I.O.S. in Mexico, 1980	75
The Cultivation of <i>Sansevierias</i>	79
The Safe Use of Insecticides	81
<i>Dorstenia renneyi</i> , sp. nov.	87
Literature Notes	89
Forthcoming events	90
Branch activities	91

In Memoriam: Peter Bally, B. K. Boom, Hans Krainz and Edgar Lamb

The world of succulents mourns the loss of four well-known authorities in recent months. Dr. Peter R. O. Bally died in Nairobi on 26 July at the age of 85 after a stroke. He was trained as a chemist but when in his forties took up a post at the Coryndon Museum, Nairobi (now the East African Herbarium) as a botanist. He travelled widely in little-known areas of north and north-east tropical Africa, becoming one of the most important plant-collectors of that area and a well-known authority on its succulent plants. He was an accomplished artist and illustrated his own magnum opus, the monograph of *Monadenium*. He was awarded an honorary doctorate for his botanical work by the University of Mainz, and was elected a member of I.O.S. in 1953.

Dr. B. K. Boom, who died on 21 March a few days before his 77th birthday, was for many years a staff-member of the Institute for Horticultural Plant Breeding at Wageningen, Netherlands, and an expert and author on the whole gamut of cultivated plants whose *Flora der Cultuurgewassen van Nederland* (1948-) though uncompleted, is one of the most useful standard works of reference. Dr. Boom was Hon. Secretary/Editor of the International Organization for Succulent Plant Study from 1961 to 1971, a frequent contributor to the Dutch journal 'Succulenta' and its editor from 1962-67.

Hans Krainz, who died at the age of 74 on 30 May, was a founder-member of I.O.S., its first Hon. Secretary and its Hon. Treasurer from 1961-69. As Director of the Städtische Sukkulentsammlung, Zurich, he developed

the living and museum (herbarium, spirit and seed) collections with equal vigour and brought the institution to the pre-eminence it currently enjoys. He founded and edited 'Sukkulentenkunde' (1947-63), the fine Yearbook of the Swiss Cactus Society, and later conceived the serial publication 'Die Kakteen' of which he was chief editor throughout its run from 1956-75.

Edgar Lamb, who died on 19 May aged 75, was known to succulent plantmen the world over as founder and director of 'The Exotic Collection' at Worthing, a private botanical garden principally devoted to succulents, for the 'Monthly Notes' and for his numerous books (the more recent co-authored with his son Brian) including the five-volume 'Illustrated Reference on Cacti and Other Succulents'.

The Society Library

Our library is now housed at the Editorial Office and enquiries will be dealt with by Nigel Taylor, whom Council have appointed Hon. Librarian in succession to Mr. G. G. Leighton-Boyce.

Postal charges and damage to books in transit have forced us to discontinue postal lending facilities, but it is hoped to make the library available to personal callers on dates to be announced in the journal. Further details will be published as soon as the books and periodicals have been re-catalogued.

Cactusman's holiday

Leaving me (D.H.) pinned to my desk by the In-Tray, the new Hon. Librarian has been spending his holiday engrossed in the *Melocactus* collection at the Städtische Sukkulentsammlung, Zurich, greatly helped and encouraged by our very good friend, the Director, Dieter Supthut. Nigel returned brimming over with new revelations on *Melocactus* (incorporated Stop Press in his review of the Brazilian species on pp. 63-70 of this issue) and on *Escobaria*, after seeing Mr. Alfred Froehlich's splendid collection of the latter genus. He was also full of admiration and gratitude for Swiss hospitality, and managed to enrol several of Dieter's friends as members of the Society! Unfortunately, our German is not up to writing summaries of journal articles, but we are working on the idea.

Open Days

Owing to the late publication of the May issue, the Editors' Open Day was postponed to 22 June. We had about 40 visitors, including a party from Woking Branch (NCSS). The Heavens also had an 'open' day and let loose in no uncertain way just as everyone arrived.

The Chairman and his wife combined their Open Day on 29 June with a Mammillaria Society Study Meeting. Those who took part in the latter had a useful discussion centred on the Series *Ancistracanthae*.

Seed-raising: More letters please!

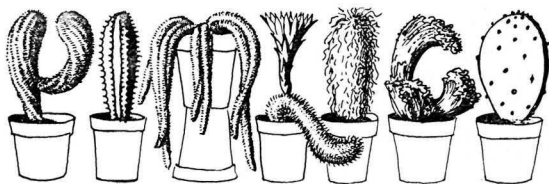
A few members have responded to our request for statistics on the results of their 1980 sowings from GB seed, but we should like more letters on the subject, and have deferred our report till the November issue. If you just send a note of the varieties that failed (listing them by the order numbers, preferably), we shall be grateful, but the fuller the data the better.

Membership/Rule Cards

All personal members should have received a new membership card with their membership number and the revised constitution and rules. These were sent with the February (UK) and May (Overseas) issues of the Journal. If anyone failed to receive their card, or has mislaid it and would like another, please notify the editorial office.

See you at the Show?

The Society's Show is on **Saturday 4 October** at St. Saviour's Church Hall, Pimlico. Further details on p. 90.



Annual Dinner, Saturday 22 November

With last year's Chichester event, we broke with our tradition of a formal November dinner in London. This year, we return to November and London, but have decided on an informal supper at a more popular price than would be possible at our old venue. For many years, after Council meetings, some of the officers have revived themselves (at their own expense, I hasten to add!) at a modest Italian restaurant, and we think that you too may enjoy the Caprini's cuisine, the inexpensive house wine and the good service. Accommodation is limited, so please book early. Details on p. 90.

Anyone for Peru?

Experienced nature-photographer and keen cactophile Ken Preston-Mafham is planning a field-trip to Peru commencing about November and wants a companion to share the cost of car-hire. Any takers please contact Ken direct at 42 Coughton Lane, Coughton, Alcester, Warwicks., tel. 0789 764710.

Internoto

This is the name of a new specialist organization for Notocactus enthusiasts, formed in Holland last April. Annual subscription is DM 25 (about £6.20). All enquiries to Mr. K. H. Prestle, Vijverweg 12, 5461 AL-Veghel, Netherlands, or Mr. S. Theunissen, Vierschaarsstraat 23, 4751 RR Oud Gastel, Netherlands.

Cactaceas y Suculentas Mexicanas

We have now received new stock of back issues of the Mexican journal which is fully illustrated and has full English translations of most articles.

The following volumes are available: Vols. 21 (1976)–23 (1978), price £3.00 each volume, post free, and Vol. 24 (1979), price £3.50. We also have a few copies left of the 'Field Manual to the Cacti and Succulents of the Barranca of Metztitlan' by H. Sanchez-Mejorada (1978), price £2.75, post free. Order from: D. R. Hunt, 67 Gloucester Court, Kew Road, Richmond, Surrey TW9 3EA.

Little Yellow Mushrooms seen again

from Bill Putnam

I was very interested to read Ray Pearce's notes on the sulphur-yellow 'mushroom' *Leucocoprinus birnbaumii* in the May GB Journal, since the appearance of this fungus in my own collection last year caused me some alarm. Indeed, I took its presence as an awful reflection on the state of cultivation in my greenhouse and, having ruthlessly destroyed several bright yellow caps or sporophores, I allowed no hint of this shameful occurrence to reach the ears of my friends, whose plants thrive hygienically in fungus-free bliss.

Thus I am greatly relieved after learning that *Leucocoprinus* is harmless and interesting and occurs in Dr. Pearce's collection too. If it reappears I shall not blush with shame again but let it have its way, for I have an insatiable appetite for the bizarre and unusual.

In my collection this yellow fungus appeared in a pot containing a long-established *Copiapoa cinerea* (a plant obtained as a seedling in 1964 and now taken to be an unusually well-spined import by cactus show judges and others—see Dr. Mace's remarks on p. 31 of the May Journal!).

E. W. Putnam,
72 Church Lane Avenue,
Hooley,
Coulston,
Surrey, CR3 3RT.

Notes on the genus *Melocactus* (1): E. Brazil

by N. P. Taylor

Royal Botanic Gardens, Kew
Richmond, Surrey

Introduction

Britton & Rose (1922) accepted four species of *Melocactus** (under the rejected name *Cactus* L.) for E. Brazil, of which two were the result of exploration by Rose & Russell in 1915. Subsequently Werdermann travelled in E. Brazil and described four more species between 1932–4. Thus eight taxa were known up till 1970, but since then some 36 'new species' have been published following the explorations of F. Ritter (1963–4) and those of Horst, Uebelmann and Buining (1967–74).

With the possible exception of Ritter (1979), no attempt has been made to catalogue and classify these numerous new plants. The alphabetical checklist with notes which follows aims to summarize the relevant data as a precursor to a more comprehensive treatment. The nomenclatural types that are listed have not been examined; the arrangement of taxa and remarks made being based on the interpretation of original illustrations and descriptions, in many instances backed up by the examination of living material at the Städtische Sukkulentsammlung, Zurich, much of which is derived from the type (and often, only) collections.

Reference to taxa described since 1970 has been restricted to the documentation of the holotype, authority and place of publication, since the ample descriptions and illustrations of these novelties are readily available in the recent literature. The first descriptions of earlier taxa are given in full. Most of the many provisional names generated by field-collectors and nurserymen have not been listed in view of the confusion which surrounds them. A checklist of HU numbers has appeared in *Succulenta* 57(2):46–7 (1978) and *Kuass* 29(9):210–11 (1978); see also *Succulenta* 57(5):108–9 (1978).

Delimitation of *Melocactus* species in Brazil

It is clear that the genus *Melocactus* has diversified considerably in E. Brazil, but not to the extent suggested by the plethora of new taxa described during the past decade. Only eight species are tentatively recognized here. Nevertheless much of the region shown in the Map remains unexplored botanically and may hold other distinctive taxa awaiting discovery. The writing of a key to the Brazilian *Melocacti* has been deferred until a study of the genus as a whole can be completed. How-

ever, a few notes on the distinguishable taxa may help in their identification.

M. zehntneri is the most widely distributed E. Brazilian *Melocactus*, ranging from N. Minas Gerais to the state of Paraíba in the north. It is recognised by the short and stout, curved, white to grey-brown spines, relatively sharp-edged ribs and strongly tuberculate seeds. In the north of its range the plants are often very large and columnar, but further south a depressed-globose variety occurs which corresponds to the name *M. macrodiscus*. This trend towards low-growing or dwarfed southern infraspecific taxa is repeated in *M. levitatus* and *M. oreas*, s.l. At the western edge of the range of *M. zehntneri* a stouter-spined variety has been found and named *M. curviconis* (*M. giganteus*). Further west the related **M. levitatus** (incl. nos. 10 & 11) occurs, which resembles *M. zehntneri* in its stout curved spines, but these are reddish-brown and the seeds are very smooth. The undescribed '*M. warasii*' (HU 456) clearly belongs within the variation of this species.

M. concinnus (incl. no. 13), **M. glaucescens** and **M. violaceus** are the smallest E. Brazilian species, with few (c. 6–9), short spines. The first and second have limited inland distributions in Bahia: *M. glaucescens* has entirely straight spines, a grey-glaucous stem and pale pink fruit, while in *M. concinnus* one spine is curved upwards, the stem is green and the fruit red. *M. violaceus* inhabits the coastal sand dunes of E. Brazil from Rio de Janeiro to beyond Recife. It is not common in cultivation (see illustration).

Two of the remaining three species are broadly defined so as to include the majority of the most 'critical' Brazilian taxa. Members of the **M. oreas complex** (nos. 23–39) have round-edged ribs and very numerous long and often flexible spines, the lowermost radial being of exaggerated length. *M. conoides* and the undescribed '*M. iacuensis*' (HU 166) with shorter spines seem to belong here, together with the somewhat distinctive *M. deinacanthus* (*M. longicarpus*), but the many other named populations here included scarcely differ from *M. oreas* itself. **M. azureus** may also merit inclusion, but for the present is distinguished by its intensely blue-glaucous epidermis. Plants referred to the **M. salvadorensis complex** (nos. 16–22) have acute-edged ribs and straight, slender spines of variable length. (Short-spined plants commonly labelled *M. bahiensis* in cultivation would seem to belong here, but as to type this name is probably referable to the *M. oreas* complex.)

**Melocactus* Link & Otto, nomen conservandum, see ICBN (1978), p. 369; type: *M. communis* Link & Otto (*Cactus melocactus* L.) (typ. cons.).

The above three species are clearly allied, and their points of distinction and the status of the many forms they comprise, are problems requiring detailed study in the field.

The occurrence of so many similar yet slightly different *Melocactus* populations may be due to the predominance of self-pollination in the genus, leading to the formation of local inbred races, each of uniform appearance. Characters of doubtful value include the number of ribs, which could well depend on environmental factors affecting phenotypic expression. Observation of cultivated specimens suggests that the degree of exertion, and therefore the apparent size of *Melocactus* flowers may be related to the age of the cephalium (A. W. Mace, pers. comm.).

Notes on the distribution map

The symbols indicate the type localities, with the exception of nos. 15 and 24. The position of these localities is sometimes rather approximate owing to the vague way in which they have been recorded in the literature. It is desirable that localities should be recorded with latitude and longitude coordinates, but as Buining (1974) points out, this may be contrary to the interests of conservation. The order of taxa listed in the caption to the Map may be used as a quick method of determining their affinity, so long as it is remembered that the relationships are of a highly reticulate nature.

Acknowledgments

My thanks go to Dr. A. W. Mace and Mr. R. Holt for allowing me to examine their personal collections of melocacti; also to Mr. R. D. Meikle for suggesting interpretations of Hoffmannsegg's strange abbreviations (see *M. melocactoides*). I am greatly indebted to Mr. J. D. Supthut, Director of the Städtische Sukkulentsammlung, Zurich, for facilities provided during my visit to the Institution in June-July, 1980.

Bibliography

- BRITTON, N. L. & ROSE, J. N. (1922). The Cactaceae 3: 227-36.
 BUINING, A. F. H. (1974). *Melocactus* in Brazil. In *Cact. Succ. J. Amer.* 46: 206-12.
 KRAINZ, H. (1964-75). Die Kakteen, CVId, Lfg 26-62.
 RITTER, F. (1979). Kakteen in Sudamerika 1: 130-43.
 SCHUMANN, K. M. (1898). Gesamtbeschreibung der Kakteen, 457-9.

Species list

M. acispinosus Buining & Brederoo ex Buining in Krainz, Die Kakteen, Lfg 62, with figs. (1975); (*M. rectispinus* F. Ritter, nom. nud.). Type: Bahia, nr. Jacobina, 430-700 m, in fine quartz sand, Horst 258A (U).

M. albicephalus Buining & Brederoo ex Buining in Krainz, Die Kakteen, Lfg 52, with figs. (1973). Type: mid-Bahia, W. 'Sierra do Espinhaco' [Serra do Tombador], (W. of Morro do Chapeu, Buining (1974), pp. 210-11), c. 900 m, in crevices on flat rocks, 1971, Horst & Uebelmann 350 (U). Other illustrations: Buining in *Succulenta* 53: 63 (1974). Sympatric with *M. erythracanthus* and *M. glaucescens* according to Buining, ll.cc.

A member of the *M. salvadorensis* complex.

M. amethystinus Buining & Brederoo ex Buining in Krainz, Die Kakteen, Lfg 50-1, with figs. (1972). Type: Bahia, nr. Caitité, nr. Brejinho das Ametistas, c. 1000 m, 1968, Horst & Uebelmann 270 (U). Found with *M. macrodiscus*.

A member of the *M. salvadorensis* complex.

M. arachnites F. Ritter, nom. nud. = *M. diersianus*.

M. axiniphorus Buining & Brederoo in *Succulenta* 55(10): 193-7, with figs. (1976). Type: Bahia, above Vitoria da Conquista, 1000-1200 m, in quartzite sand amongst bushes, Horst 450 (U).

Probably a synonym of *M. concinnus*.

M. azulensis Buining & Brederoo ex Theunissen & Brederoo in *KuaS* 28(7): 154-6, with figs. (1977). Type: NE. Minas Gerais, nr. Pedra Azul, on bare mountains, Horst 168 (U).

Scarcely differing from *M. florschuetzianus*; cf. *M. oreas*.

M. azureus Buining & Brederoo ex Buining in *KuaS* 22(6): 101-3, with figs. (1971) and in Krainz, Die Kakteen, Lfg 48-9 (1972). Type: Bahia, 'mid Serra do Espinhaco' [W. of Serra da Batista], mountains by the Rio Jacaré, 450 m, on bare, coarsely weathered rocks, Horst & Uebelmann 256 (U).

M. bahiensis (B. & R.) Luetzelb., *Estud. Bot. Nordeste* 3: 111 (1923); Buining in *CSJA* 47: 16-7, with fig. (1975); *Cactus bahiensis* B. & R., *Cact.* 3: 234-5 (1922); non *Melocactus bahiensis* sensu Krainz in Die Kakteen, Lfg 25 (1963) (*M. salvadorensis* s.l.). Type: Bahia, Machado Portella, on tops of nearly barren hills, 1915, Rose & Russell 19935 (US).

Dull green, 10 cm. high, 15 cm. in diam.; ribs 10-12, broad at base, 25 mm. high, each bearing 6-7 ar.; spines all brown; rad. sp. c. 10, to 25 mm. long; cent. sp. usually 4, to 35 mm. long. Cephalium low, with many dark brown bristles. Fl. pinkish. Fr. red, clavate, 15 mm. long; seed black, shining, 1 mm. in diam. Range: 'The plant was found only at a single locality in cent. Bahia'; it is likely that this taxon is now endangered at the type locality, cf. Buining, loc. cit.

A short-spined ally of *M. oreas*

M. brederooianus Buining in *Succulenta* 51(2): 28-33, with figs. (1972). Type: Bahia, Andorinha, (at Senhor do Bonfim, Buining (1974), p. 211), c. 500 m, 1968, Buining 1001 (U).

A member of the *M. salvadorensis* complex.

M. canescens F. Ritter, *Kakt. Südamer.* 1: 134, t. 230 (1979). Type: Bahia, nr. Brumado, Ourives, 1964, F. Ritter 1333 (U). *M. canescens* var. *montealtoii* F. Ritter, loc. cit. Type: Bahia, Palma de Monte Alto, 1964, F. Ritter 1437 (U).

Ritter's illustration suggests affinity with *M. macrodiscus* Werderm. (q.v.); see *M. zehntneri*.

M. concinnus Buining & Brederoo in *KuaS* 23(1): 5-7, with figs. (1972). Type: Bahia, W. of Seabra, 1000 m, amongst rocks in sandy soil (scree), Horst & Uebelmann 214 (U). Also found further south near the town of Rio de Contas, Buining (1974), p. 211.

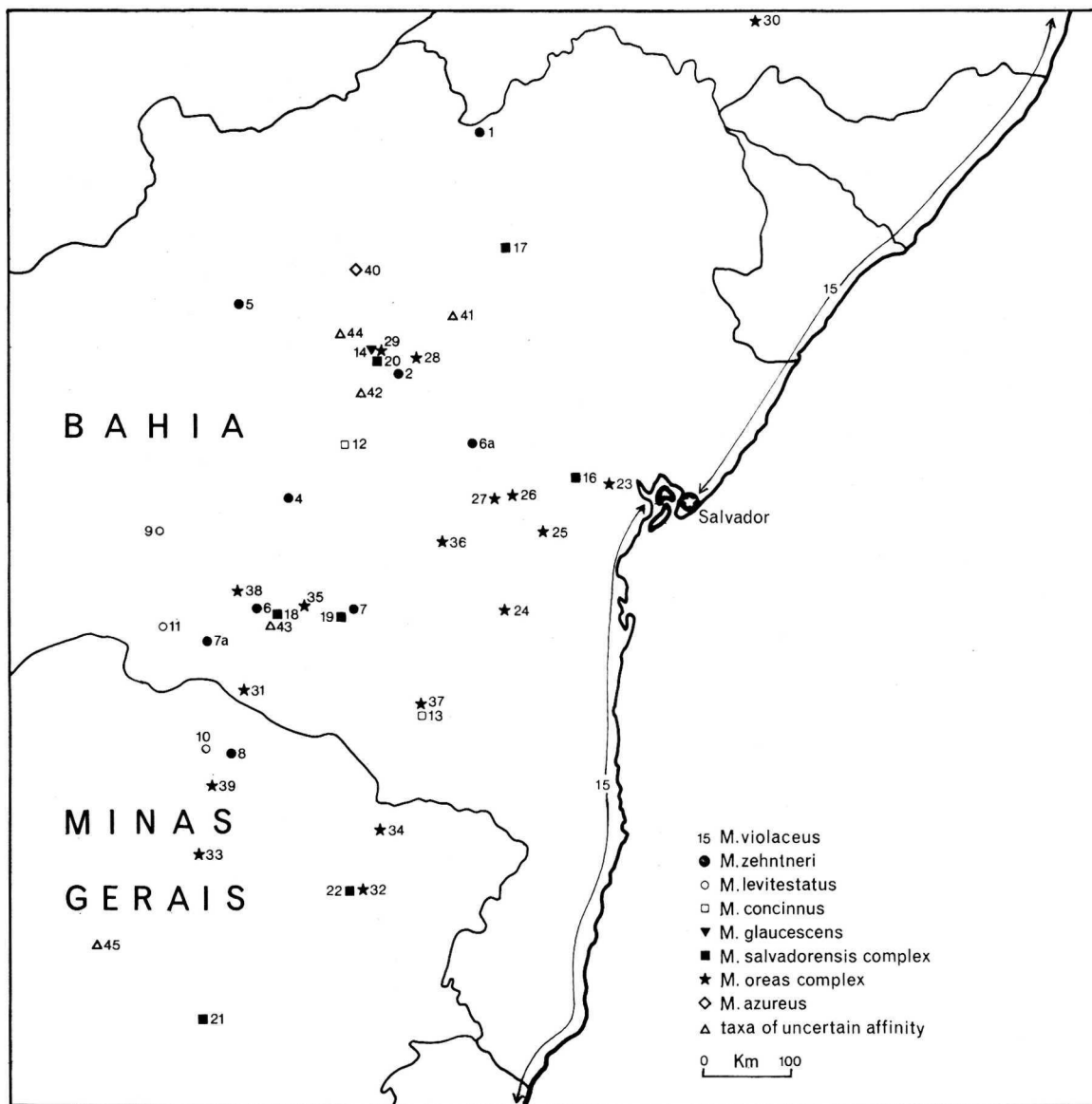
M. axiniphorus seems to belong here.

M. conoides Buining & Brederoo ex Buining in Krainz, Die Kakteen, Lfg 55-6, with figs. (1973). Type: Bahia, N. of Vitoria da Conquista, c. 1200 m, in quartzite-sandy soil, under and between shrubs, Horst & Uebelmann 183 (U).

A short-spined ally of *M. oreas*; cf. *M. bahiensis*.

M. cremonophilus Buining & Brederoo in *CSJA* 44(1): 3-5, with figs. (1972). Type: cent. Bahia, E. slopes of 'Serra do Espinhaco' [Serra do Tombador], (E. of Morro do Chapeu, Buining (1974), p. 210), c. 850 m, in clefts of bare, flat rocks, Horst & Uebelmann 223 (ZSS cited, but type not deposited).

M. erythracanthus may be a later name for this plant which is allied to *M. oreas* (q.v.).



1. *M. zehntneri*, 2. *M. pruinus*, 3. *M. helvolilanus* (Piauí), 4. *M. curvicornis*, 5. *M. giganteus*, 6. *M. macrodiscus* & 6a. var. *minor*, 7. *M. canescens* & 7a. var. *montealto*, 8. *M. robustispinus*, 9. *M. levitestatus*, 10. *M. diersianus*, 11. *M. securituberculatus*, 12. *M. concinnus*, 13. *M. axiniphorus*, 14. *M. glaucescens*, 15. *M. violaceus*; THE *M. SALVADORENSIS* COMPLEX (nos. 16-22); 16. *M. salvadorensis*, 17. *M. brederoianus*, 18. *M. amethystinus*, 19. *M. inconcinus*, 20. *M. albicephalus*, 21. *M. griseoloviridis*, 22. *M. lensselinkianus*; THE *M. OREAS* COMPLEX (nos. 23-39) 23. *M. oreas*, 24. *M. ernestii*, 25. *M. rubrisaetosus*, 26. *M. longispinus*, 27. *M. interpositus*, 28. *M. cremnophilus*, 29. *M. erythracanthus*, 30. *M. horridus*, 31. *M. montanus*, 32. *M. nitidus*, 33. *M. florschuetzianus*, 34. *M. azulensis*, 35. *M. mulequensis*, 36. *M. bahiensis*, 37. *M. conoideus*, 38. *M. deinacanthus*, 39. *M. longicarpus*; 40. *M. azureus*; TAXA OF UNCERTAIN AFFINITY: 41. *M. acispinosus*, 42. *M. ferreophilus*, 43. *M. pachyacanthus*, 44. *M. krainzianus*, 45. *M. rubrispinus*.

Map drawn by Christabel King.

M. curvicornis Buining & Brederoo in KuaS 23(2): 33–5, with figs. (1972). Type: Bahia, nr. Macaubas (NW. of Serra das Almas), 950–1000 m, amongst cracks in flat rocks, *Horst* 128 (U).

Probably conspecific with *M. zehlneri* (q.v.).

M. deinacanthus Buining & Brederoo in KuaS 24(10): 217–9, with figs. (1973). Type: Bahia, NW. of Caitité, c. 200 m, in and among bare rocks, 1971, *Horst* 153 (U).

A distinctive taxon, though perhaps an ally of *M. oreas*.

M. depressus Hook. (1838) = *M. violaceus*.

M. diersianus Buining & Brederoo in KuaS 26(8): 169–71, with figs. (1975); (*M. arachnites* F. Ritter, nom. nud.). Type: Minas Gerais, Barriero Vermelho, Francisco Dumont, c. 700 m, on bare rocks, 1974, *Horst* 404 (U). Other illustration: Ritter (1979), p. 301, t. 77.

M. securituberculatus and this taxon are synonymous with *M. levitatus*.

M. ernestii Vaupel in MDKG 30: 8, with figs. (1920); Buining in Krainz, Die Kakteen, Lfg 58, with figs. (1974). Type: Bahia, on the Rio Contas, *Ule* (based on the two photographs published by Vaupel, l.c.).

Stem conical; ribs c. 10, deep, acute, somewhat spiralled, crenate; ar. c. 12 per rib; spines c. 10, 3 much longer than the others and downwardly directed, one more than half the length of the whole plant. Cephalium massive, truncate globose, with exserted bristles in the older parts, woolly at the top. Fl. conspicuous. Fr. ? Range: Drainage of the Rio Contas from 30 km. E. and 70 km. W. of Jequié, N. to Machado Portella; on almost bare rocks.

Scarcely differing from *M. oreas*.

M. erythracanthus Buining & Brederoo in CSJA 45(5): 223–6, with figs. (1973). Type: mid Bahia, W. slopes of 'Serra do Espinhaco' [Serra do Tombador], (W. of Morro do Chapeu, Buining (1974) pp. 210–11), c. 900 m., on and between flat rocks, *Horst & Uebelmann* 220 (U). Other illustration: Buining in Succulenta 53: 64 (1974). Sympatric with *M. albicephalus* and *M. glaucescens* according to Buining, ll.cc.

Scarcely differing from *M. cremonophilus*, and allied to *M. oreas* (q.v.).

M. ferrophilus Buining & Brederoo ex Buining in Krainz, Die Kakteen, Lfg 52, with figs. (1973). Type: Bahia, (60 km. SW. of Morro do Chapeu, Buining (1974), p. 211), nr. 'Cameleiros' [? Gameleiras], c. 840 m., on bare, flat, iron-containing rocks, *Horst & Uebelmann* 217 (U).

M. florschuetzianus Buining & Brederoo ex Buining in Ashingtonia 2(2): 25–7, with figs. (1975). Type: Minas Gerais, vicinity of Barroão, 950 m., on bare rocks, *Horst* 148 (U).

M. azulensis is perhaps a later name for this plant; both are members of the *M. oreas* complex.

M. giganteus Buining & Brederoo in CSJA 45(5): 227–30, with figs. (1973). Type: Bahia, Serra Santo Inacio (S. of Xique Xique) c. 520 m., 1968, *Horst & Uebelmann* 266 (U).

Little more than a variety of *M. zehlneri* (q.v.).

M. glaucescens Buining & Brederoo in CSJA 44(4): 159–61, with figs. (1972). Type: cent. Bahia, W. slopes of 'Serra do Espinhaco' [Serra do Tombador], (W. of Morro do Chapeu, Buining (1974), pp. 210–11), c. 900 m., *Horst & Uebelmann* 219 (U). Other illustrations: Buining in Succulenta 53: 64 (1974). Sympatric with *M. albicephalus* and *M. erythracanthus* according to Buining, ll.cc.

A rather distinctive plant.

M. goniodacanthus Lem., Cact. Aliq. Nov. 11 (1838). Based on a plant of unknown origin and not illustrated by Lemaire; a name of no value. Both Schumann (1898), p. 459 and Britton & Rose (1922), p. 235 credit this plant with a Brazilian origin, trusting to the opinion of Weber in Bois, Dict. hort. 2: 826, who treats *M. depressus* Hook. as a synonym, but it cannot be identified with any certainty.

M. griseoloviridis Buining and Brederoo ['griseoloviridis', sphalm.] in KuaS 25(5): 98–100, with figs. (May, 1974). Type: Minas Gerais, nr. Itamarandiba, 850 m., on almost flat, bare rocks, 1972, *Horst* 405 (U). A synonym of *M. bahiensis* according to Ritter (1979), p. 137, but considered to be a member of the *M. salvadorensis* complex here.

Scarcely distinguishable from *M. lensselinkianus* (q.v.).

M. helvolilatanus Buining & Brederoo in Succulenta 55(12): 261–5, with figs. (1976). Type: Piauí, nr. Santa Antonio [?], 250 m, *Horst* 444 (U).

A synonym of *M. zehlneri* (q.v.).

M. horridus Werderm. in Notizbl. Bot. Gart. Berlin 12: 227–8 (1934). Type: Pernambuco, Villa Bella, 1932, *Werdermann* 2934a (B, extant, see Leuenberger in CSJGB 40(4): 104, 1978).

Stem semi-globose or sub-pyramidal, c. 15 cm. high (incl. cephalium) and 15 cm. at base, deep green, sometimes glaucescent; ribs c. 12, c. 30 mm. broad at base of stem and almost flat, to 20 mm. broad and 15 mm. high near apex, broadly rounded, subcrenate; ar. 20 mm. apart, orbicular, nearly 8 mm. in diam., becoming glabrous; rad. sp. 8–10, perfectly straight, very rigid, subulate, pointed, smooth or somewhat rough, brownish-red, bulbous at base, lowermost the thickest and longest to 50 mm. long, downwardly directed, uppermost spines very short, c. 10–15 mm. long; cent. sp. 3–4, coloured as the radials, lowermost $\pm$ porrect, thicker, c. 20–30 mm. long, remainder directed upwards, shorter. Cephalium c. 20–30 mm. high and 50–60 mm. in diam., of dense whitish wool and slightly exserted reddish-brown bristles. Fl. ? Fr.; seed ?

Perhaps an ally of *M. oreas* (q.v.).

M. inconcinus Buining & Brederoo in KuaS 26(9): 193–5, with figs. (1975); (*M. permutabilis* F. Ritter, nom. nud.). Type: Bahia, nr. Brumado, by Rio São João, 450 m., on and between rocks with grass and shrubs, *Buining* 1003 (U). Other illustration: Ritter (1979), p. 301, t. 78. A variety of *M. brederooianus* according to Ritter (1979), pp. 136–7.

A distinctive member of the *M. salvadorensis* complex.

M. interpositus F. Ritter, Kakt. Südamer. 1: 140–1 (1979). Type: Bahia, Iacu, on rocks, 1964, *F. Ritter* 1207 (U).

According to Ritter this plant is allied to *M. nitidus*, which seems to belong with *M. oreas* and its allies.

M. krainzianus Buining & Brederoo ex Buining in Krainz, Die Kakteen, Lfg 62, with figs. (1975). Type: Bahia, E. of Irecê, c. 760 m, on and between bare, flat, ridged rocks, *Horst* 264 (U).

M. lensselinkianus Buining & Brederoo in Succulenta 53(4): 68–73, with figs. (April 1974). Type: Minas Gerais, Itoabim, c. 370 m, on almost bare, flat rocks, *Horst* 381 (U).

M. griseoloviridis is a later name for this plant, which is allied to the *M. salvadorensis* complex.

M. levitatus Buining & Brederoo in CSJA 45(6): 271–4, with figs. (1973). Type: Bahia, W. of Bom Jesus de Lapa, W. of Rio São Francisco, c. 450 m., on flat volcanic rocks, *Horst* 397 (U).

M. diersianus and *M. securituberculatus* are synonyms of this species.

M. longicarpus Buining & Brederoo in CSJA 46(4): 191–4, with figs. (1974). Type: Minas Gerais, vicinity of Porteirinha, rocky places, 400 m., *Horst* 149 (U).



A form of *Melocactus oreas* photographed in habitat near Seabra, Bahia

(photo: Harley)

Cf. *M. deinacanthus* and the *M. oreas* complex.

M. longispinus Buining & Brederoo ex Brederoo and Theunissen in Succulenta 56(6): 137-42, with figs. (1977). Type: Bahia, E. of Rio Paraguacu, E. of 'Lacu' [lacu], 320 m., on bare rocks, 1974, Horst 435 (U).

Probably conspecific with *M. oreas* (q.v.).

M. longispinus F. Ritter, nom. nud. = *M. nitidus*.

M. macrodiscus Werderm., Bluhende Kakteen (Feddes Repert. Sonder-Beih.C.), Lfg 12, t. 47 (1932). Type: Bahia, nr. Caitité, Brejinhos, on crystalline sandstone rocks, 1932, Werdermann (B†).

Stem depressed globose, c. 14 cm. high and 18 cm. broad, matt, bright to darker green; ribs c. 11 or more, 25-30 mm. high near stem apex and 50 mm. broad near the base; ar. oval, 6 × 8 mm., with whitish-grey wool when young, later naked; rad. sp. (7-9), strongly subulate, somewhat recurved, one directed downwards, six lateral and two pointing upwards, three lowest spines to 30 mm. long, remainder shorter to 20 mm. long, thinner, the uppermost pair to 10 mm. long sometimes one absent; cent. sp. 0-1 porrect, directed and curved upwards, 15-20 mm. long, weaker than the strongest radials but otherwise similar; all spines on mature specimens glaucous grey with a yellowish to brownish-red sheen, black-brown at tip, very stiff and sharp. Cephalium c. 75 mm. in diam., often nearly level with stem apex, but eventually somewhat raised, of grey-white wool interspersed with rust-red bristles exerted for c. 5 mm. Fl. 4-5 mm. in diam., rose-red, mostly expanding in the early afternoon. Fr. 15-18 mm. long, delicate rose-violet, glossy; seed 1 mm, broadly truncate-ovoid, testa matt or shining black, strongly rounded-tuberculate. Range: S. Bahia

and N. Minas Gerais. Other illustrations: Krainz (1964), Lfg 26, and see below.

The following variety has also been described from E. Bahia, but unfortunately has not been illustrated: *M. macrodiscus* var. *minor* F. Ritter, Kakt. Südamer. 1: 133 (1979). Type: Rui Barbosa, 1964, F. Ritter 1209a (U).

M. canescens F. Ritter and *M. robustispinus* Brederoo & Theunissen seem closely allied, and are probably conspecific.

The above are considered to represent a low-growing variety of *M. zehntneri* (q.v.).

M. melocactoides (Hoffmanns.) DC., Prodr. 3: 461 (1828); *Cactus melocactoides* Hoffmanns., Verz. Pf.-Kult., Nachtr. 3: 24 (1826). Based on a cultivated specimen said to have originated from Brazil. Hoffmanns's brief diagnosis is the only, and unsatisfactory means of typifying this name: '*C. (melocactoides)*, globose, angles ? 10, with a series of woolly tubercles each with a single fascicle of spines, which are subrecurved, pale to dark at apex'. Following this diagnosis is a phrase contrasting his species with *C. melocactus* (*Melocactus communis*) from which it may be gathered that *C. melocactoides* has 7-8 spines per ar. The exact meaning of part of this phrase is obscure and contains a number of unexplained abbreviations, viz. 'E S. N.f.' These may indicate that the plant was sterile (e.g. Exemplar Sterilis. Nondum floruit), and furthermore the measurement '2' diam.' (elsewhere in the work this means 2 inches) might suggest that the type was a small seedling. Whatever can, or cannot be read into Hoffmanns's writings, the fact remains that this name is inadequately typified and should be abandoned. Britton & Rose (1922), p. 235, and subsequent authors, have used *C. melocactoides* Hoffmanns. for the plant correctly known as *M. violaceus* Pfeiff.

M. montanus F. Ritter, Kakt. Südamer. 1: 141 (1979). Type: Bahia, mts. above Urandi, on rocks, F. Ritter 1358 (U).

Not illustrated, but from its description belonging in the *M. oreas* complex.

M. mulequensis Buining & Brederoo in Succulenta 55(3): 46-51, with figs. (1976). Type: Bahia, E. of Caitité, nr. 'Muleque' [?], c. 500 m., on rocks and in open caatinga, Horst 122 (U).

Cf. the *M. oreas* complex.

M. nitidus F. Ritter, Kakt. Südamer. 1: 139-140, 302, t. 80 (1979); (*M. longispinus* F. Ritter, nom. nud.). Type: Minas Gerais, Itaobim, on flat rocks, 1963, F. Ritter 1210 (U). Also at Flamengo, Bahia (Ritter, loc. cit.).

Clearly allied to *M. oreas* (q.v.).

M. oreas Miquel in Nov. Act. Nat. Cur. 18: (Suppl. 1) 192 (1841, first publ. as a differently paginated reprint in 1840); Buining in Krainz, Die Kakteen, Lfg 55-6, with figs. (1973); *Cactus oreas* (Miq.) B. & R., Cact. 3: 227 (1922). Type: 'around Bahia [S. Salvador], probably on slopes of mountains', [collector?; probably not preserved]. Based only on the original diagnosis: stem oblong (in the type 17.5 cm. high), ribs 16; ar. crowded, 10 mm. apart, naked or woolly, cent. sp. 8 [some presumably radials] of various sizes, filiform-flexuose; rad. sp. few or absent. Cephalium flat with long white wool. Range: E. Bahia, along the Rio Paraguacu, on rocks.

The following invite interpretation as local forms or varieties of the above: *M. cremonophilus* Buining & Brederoo, *M. erythracanthus* Buining & Brederoo, *M. longispinus* Brederoo & Theunissen, *M. interpositus* F. Ritter, *M. rubrisaetosus* Brederoo & Theunissen, *M. ernestii* Vaupel, *M. azulensis* Theunissen & Brederoo, *M. florschuetzianus* Buining, *M. montanus* F. Ritter, *M. nitidus* F. Ritter and *M. mulequensis* Buining & Brederoo; the poorly known *M. horridus* Werderm. from Pernambuco may belong here too. *M. deinacanthus* Buining & Brederoo (incl. *M. longicarpus* Buining & Brederoo) is a distinctive taxon

that may belong here. *M. bahiensis* (B. & R.) Luetzelb and *M. conoideus* Buining are shorter-spined members of the complex.

Points of relationship with *M. azureus* and the *M. salvadorensis* complex need to be resolved.

M. pachyacanthus Buining & Brederoo in KuaS 27(1): 1-3, with figs. (1976, publ. 1975). Type: Bahia, E. of Umbaranas, 430-700 m., in and between rocks, 1972, Horst 407 (U).

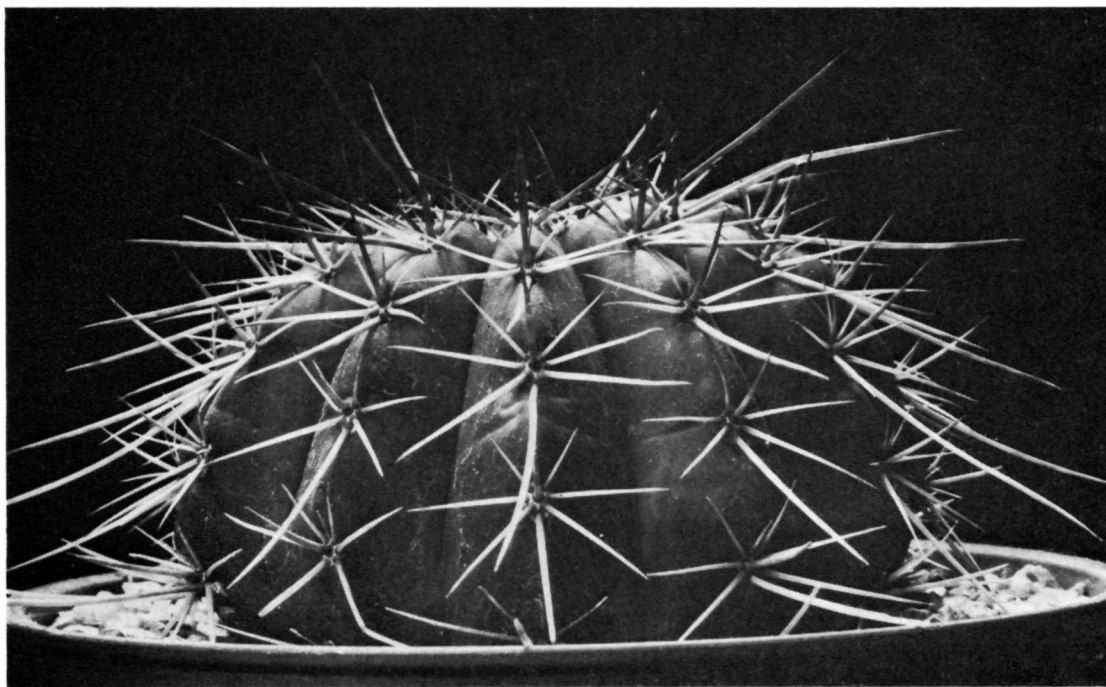
M. pentacentrus Lem. (1839)=*M. violaceus*.

M. permutabilis F. Ritter, nom. nud.=*M. inconcinus*.

M. pruinosis Werderm. in Notizbl. Bot. Gart. Berlin 12: 228-9 (1934). Type: Bahia, nr. Ventura, on sandstone rocks, 1932, Werdermann 3285 (B†).

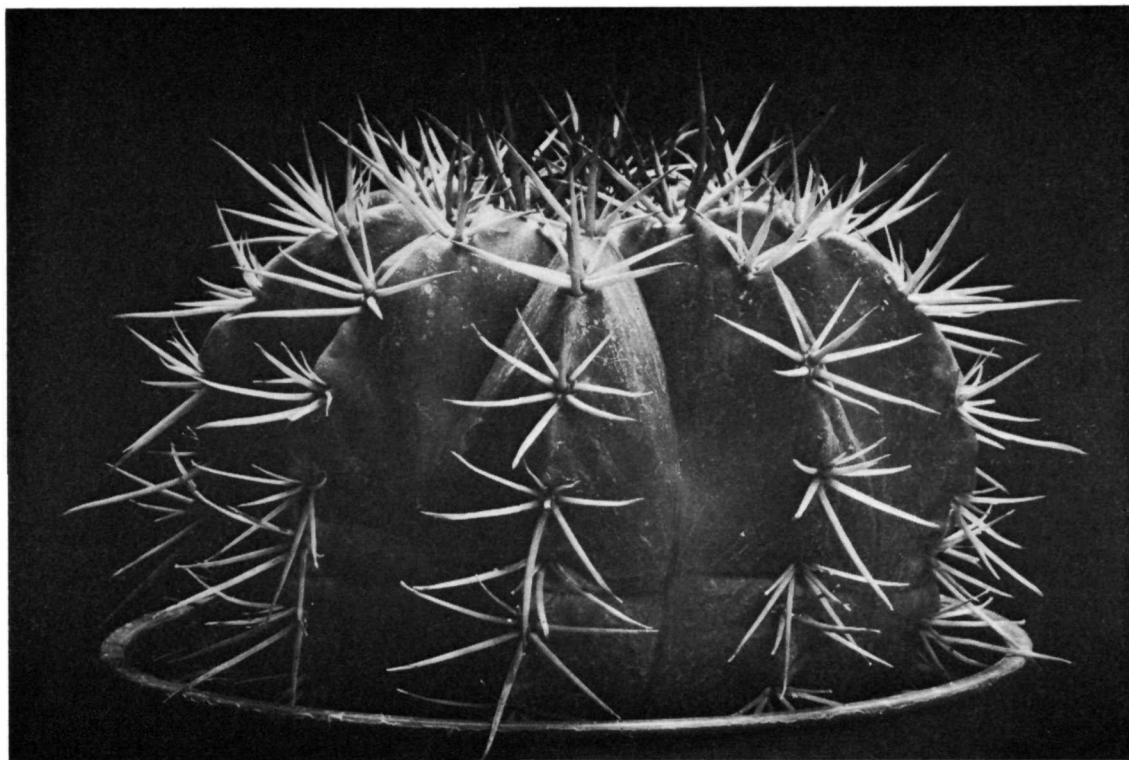
Stem semi-globose to somewhat depressed, rarely subovoid, c. 10-12 cm. high and 11-14 cm. diam., glaucous especially when young, later glaucescent; ribs 9-10, c. 25-30 mm. high, ± flattened at stem base, acute, sides conspicuously furrowed, crenate; ar. 15(-20) mm. apart, with white wool when young, later greyish and naked; rad. sp. 5-6, or occasionally with 2-3 additional small spines above, somewhat stout, subuliform, incurved, reddish-brown when young, to brown, later greyish-white, apex very dark, lower-most the longest, to 30 mm. long, others shorter, the uppermost (sometimes absent) the shortest to 10 mm. long; cent. sp. 0-1, ± erect, to 20 mm. long, like the rad. sp. Cephalium short and flat, to 70 mm. in diam., composed of dense white or grey wool intermixed with red or reddish bristles. Fl. ? Fr.; seed?

Ritter (1979), p. 132, justifiably suggests that this plant is allied to *M. zehntneri*, while in contrast, Werdermann himself suggests *M. neryi* K. Schum. as its affinity. Buining (1974), p. 210 believes that this taxon may now be extinct at the type locality.



Melocactus oreas (Milagres, Storr 162)

(photo: Svanderlik)



Melocactus salvadorensis

(photo: Svanderlik)

M. rectispinus F. Ritter, nom. nud. = *M. acispinosus*.

M. robustispinus Buining & Brederoo ex Brederoo & Theunissen in *Succulenta* 56(5): 113, 116-119, with figs. (1977). Type: [Minas Gerais], 15 km. E. of Mato Verde, 850 m., in sand, Horst 403 (U).

Probably conspecific with *M. macrodiscus* (q.v.); see *M. zehntneri*.

M. rubrisetosus Buining & Brederoo ex Brederoo & Theunissen in *Succulenta* 56(7): 161-7, with figs. (1977). Type: Bahia, Milagres, Horst 137 (U).

Allied to *M. oreas* (q.v.).

M. rubripinus F. Ritter, *Kakt. Südamer.* 1: 135-6 (1979). Type: Minas Gerais, Granjas Reunidas, on limestone rocks, 1964, F. Ritter 1330 (U).

Not illustrated; perhaps allied to *M. diersianus* and *M. levitestatus*.

M. salvadorensis Werderm. in *Notizbl. Bot. Gart. Berlin* 12: 228 (1934); Buining in *Krainz, Die Kakteen*, Lfg 54, with figs. (1973). Based on syntypes:—Bahia: nr. San. Salvador (Bahia), nr. Bananeiras, on rocks, 1932, *Werdermann* 3391 (B†); between Camisao and Baixa Grande, in open rocky places of the caatinga, 1932, *Werdermann* 3392 (B†). Buining, loc. cit., appears to have selected the former locality for the lectotype.

Stem hemispheric, deep green or paler when adult, to c. 12 cm. diam., ribs 10-12, up to 15 mm. high, subacute, not

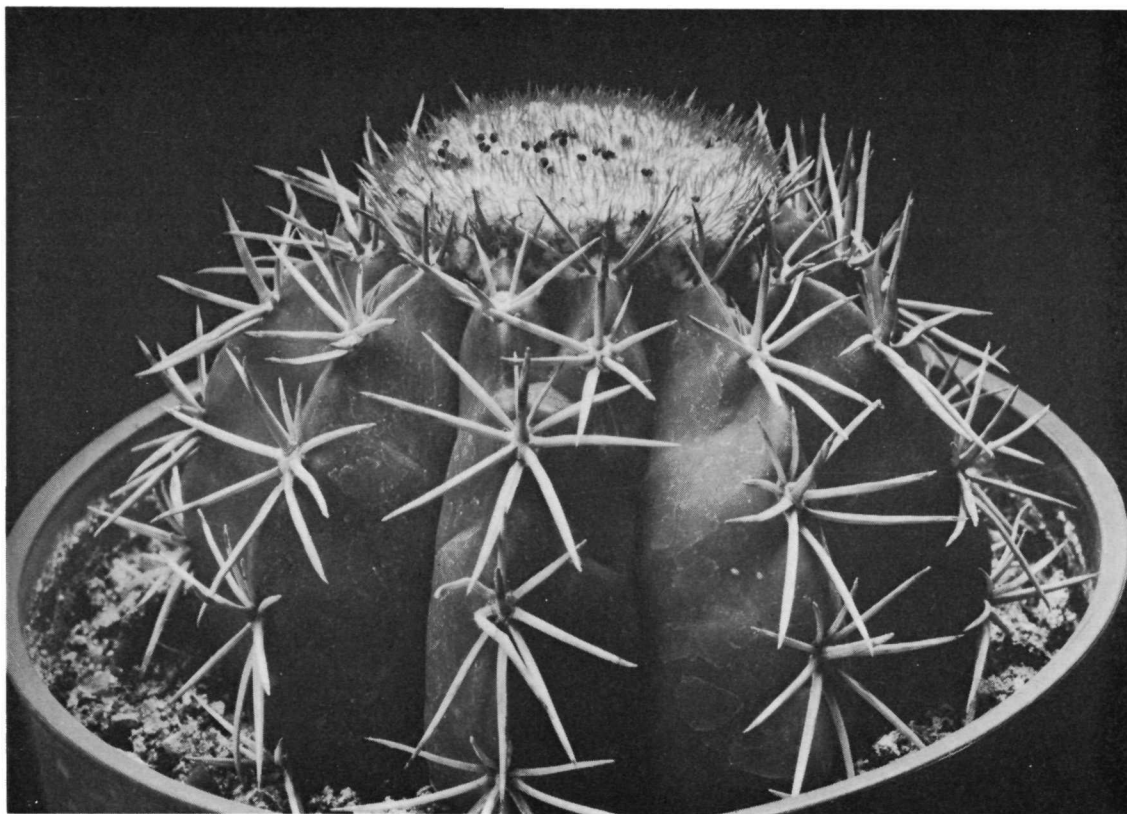
particularly crenate but thickened at ar.; ar. suborbicular, c. 5-7 mm. diam., at first densely white lanuginose then tomentose, later naked, 15-20 mm. apart; rad. sp. 8(-9), regularly arranged, sometimes slightly porrect, straight or slightly curved away from the stem, subulate, subpellucid when young, dark or rusty, sometimes reddish, smooth, thickened and paler at base, more often almost yellowish then slightly rough, greyish-white, dark at apex, the lowermost longest, 30-40 mm, laterals shorter, the uppermost ones shortest, to 10 mm.; cent. sp. (0-)1, porrect or direct upwards, c. 20-25 mm. long, otherwise like the radials. Cephalium c. 10-20 mm. high and 50-60 mm. diam., consisting of whitish or grey wool intermixed with very numerous somewhat exerted reddish bristles. Fl., fr., seed ? Range: Along the Rio Paraguacu, together with *M. oreas*.

M. salvadorensis is perhaps the oldest name for a complex taxon encompassing the following plants with broad, acute ribs: *M. lensselinkianus* Buining & Brederoo, *M. griseoloviridis* Buining & Brederoo, *M. brederooianus* Buining, *M. albicephalus* Buining, *M. inconcinus* Buining & Brederoo, and *M. amethystinus* Buining.

Clearly there are points of relationship to be resolved with the *M. oreas* complex.

M. securituberculatus Buining & Brederoo in *CSJA* 48(1): 38-41, with figs. (1976). Type: SW. Bahia, vicinity of Iuiú, 520 m., on almost bare rocks, amongst trees and shrubs, 1974, Horst 446 (U).

A synonym of *M. levitestatus*.



Melocactus violaceus (Storr 34)

(photo: Svanderlik)

M. violaceus Pfeiff. in Allg. Gartenz. 3: 313 (1835) and Enum. Cact. 45-6 (1837); K. Schum., Gesamtb. Kakt. 457-8 (1898). Type: cultivated plants in the care of Schelhase, who obtained them from Brazil via Parmentier. One plant was preserved by Pfeiffer, and Schumann, loc. cit., claims to have seen the specimen (now destroyed) at the Berlin herbarium, where he identified with it plants collected in the vicinity of Rio de Janeiro. Syn. *M. pentacentrus* Lem., Cact. Nov. Gen. Sp. 108-9 (1839); *M. melocactoides* auctt. (q.v.); *M. depressus* Hook. in Bot. Mag. 65: t. 3691 (1838).

Stem subpyramidal, to 7.5 cm. high and 12.5 cm. diam., ribs 10-12, crenate, with broad furrows between; ar. somewhat widely spaced, white tomentose when young, later bare; rad. sp. 6-8, long and straight, rigid, red when young, later violet, transversely striate, uppermost very short; cent. sp. 0[-1]. cephalium 50 mm. [? in diam.], obtusely conical. Fl. pale red, 13 mm. in diam.; outer per. segs. 10-11, patent, apex crenulate; inner per. segs. 7, smaller, erect, denticulate; stamens shorter than perianth, white, anthers pale yellow; stigmas 5, red. Range: coast of E. Brazil from Rio de Janeiro to N. of Recife (Pernambuco), in sand dunes. Illustrations: Martius, Fl. Bras. 4(2): t. 48 (1890); Vaupel in Engler, Pflanzenf. 21: 631, fig. 283 (1925).

M. zehntneri (B. & R.) Luetzelb., Estud. Bot. Nordeste 3: 111 (1923); Buining in CSJA 46: 26-7, with figs. (1974), and in Krainz, Die Kakteen, Lfg 58, with figs. (1974); *Cactus zehntneri* B. & R., Cact. 3: 236, fig. 248 (1922) (illustration shows the rather dehydrated type plant). Type: Bahia, Joazeiro, 'common on the flats', 1915, Rose & Russell 19728 (US).

Stem often cylindric, sometimes 20-30 cm. high; ribs 12-15, rather thin, acutish; rad. sp. terete, stout, dark brown, more or less incurved, 25 mm long or less; cent. sp. 1, similar to radials, porrect or ascending. Fl. pinkish. Fr. red. Range: Minas Gerais, Bahia, Piaui, Pernambuco, Paraiba; Alagoas and Sergipe, fide (?) Luetzelburg, loc. cit.; ? elsewhere to the N.

The following has also been described, but regrettably, not illustrated: *M. zehntneri* var. *viridis* F. Ritter, Kakt. Südamer. 1: 132 (1979). Type: Piaui, Gaturiano, nr. Picos, 1963, F. Ritter 1206a (U).

The following are probably only varieties: *M. curvicornis* Buining & Brederoo, *M. giganteus* Buining & Brederoo and *M. helvolilanus* Buining & Brederoo.

M. macrodiscus Werderm., and its allies seem to represent a southern, depressed-globose variety or subspecies of *M. zehntneri*.

Conservation by Propagation

by Werner Reppenhagen

The wild populations of many cactus species are in immediate danger. For over 20 years now, and at fairly regular intervals, I have been visiting the cactus homelands of Mexico. Over and over again I have had the same experience: in places where numerous species of cacti were once to be seen growing in company, even as recently as a few years ago, now only a few pitiable survivors are to be found, from species not highly esteemed by the collector since they are neither rare nor attractive. At the former sites of magnificent *Echinocereus pectinatus*, *Mammillaria candida*, *Turbinicarpus* and uncommon dwarf *Mammillarias*, the only cacti now remaining are a few specimens of the green *Mammillaria vagaspina*.

There is no point in detailing yet again all the different ways in which man's intervention results in the destruction of Nature and the extermination of species; yet I am convinced that, in the not-too-distant future, the concept of conservation will prevail—but it can become a practical reality only when the countries involved have the will to use all the resources and powers at their command. But even these countries will only act to protect their natural heritage when compelled to do so by a majority of their own people; and such a majority may well not make its voice heard until many more natural communities of animals and plants have been destroyed. Only then will people say: 'If only we had. . .'. At the present time the essential factor is to preserve all possible habitat-data for different species and, above all, to save the plants themselves.

The remarks which follow are devoted to what can be done to help save *Mammillarias* which are at risk, since that genus is my special interest. But my comments have equal validity for other plants and animals in peril.

There are no alternatives open to us: we *must* take all endangered species into our care and protection, so that they may be preserved for future generations. In many cases this cannot be done at the natural sites and then the only course is to take these plants into cultivation for the time being, in the hope that one day prospects will be better and there will be a chance to return the plants to their natural homelands.

What should be done in the field?

At this moment the most important task for the research worker or enthusiast in the field is to photograph the wild plants he finds, showing them in their

natural surroundings, and to describe them on the spot, with all possible accuracy. It is essential to record conditions at each site, the following in particular: associated plants, climate (especially temperatures), air-movements, relative atmospheric humidity, altitude, exposure, and geological and hydrological conditions.

Plant collections must be made with maximum regard for the protection of natural populations. Where the available plant-numbers permit, at least 10 specimens should be collected. In cases where there is wide variability within any given stand, it would be preferable to take still more material so that all the different variants are, if possible, represented. Where the population shows morphological constancy, a smaller number of collections will suffice. It is important to ensure the full range of any variability is represented, taking the following factors into account: different lengths and colours of spines, differences in epidermis-colour and, where recognizable, of flower-colour also. Where the body-form varies, this too must be represented. It is thus not enough just to take extreme forms, such as those with black, red or white spines; the greatest number of intermediates should be included as well. Only then is it possible to build up a complete picture of the variability of any one population of any one species. This of course is vitally important for drawing up descriptions.

It is absolutely essential that the wild plants taken into cultivation should not be allowed to hybridize, but that they should be propagated, and that the propagated material is authentic; this has special importance since the threat to the wild plants may mean that the plants in cultivation are the sole survivors. Even better than the taking of plant-material from natural sites is the collection of seed from plants there, so that progeny may be raised for conservation purposes.

This procedure has several benefits: firstly, natural populations are not depleted, even when numerous fruits are gathered; by comparison with other factors contributing to the destruction of a species the collection of seed for scientific research and the building up of plant-populations for conservation is of negligible significance; secondly, by raising some hundreds or thousands of plants from collected seed, the full range of the species or population will certainly be represented.

Unfortunately seed-collection is not always a practicable possibility since the period of ripening varies very widely from year to year, sometimes by many months. Thus one is seldom on the spot when seed matures.

Obviously success in raising plants from seed depends

Based on a lecture delivered at the Annual General Meeting of the Deutsche Kakteen Gesellschaft at Nuremberg, 12 May 1979. Translated by Lois Glass. Author's address: Bahnhofstr. 39, A-9300 St. Veit/Glan, Austria.

on the operation being undertaken by knowledgeable and experienced growers who must have the necessary equipment and an adequate heated area, or a garden in some country with a climate similar to that of the cactus-homelands; in our case that means climatic conditions approximating to those of Mexico. The latter option is of course much the best, and from the European's point of view the obvious areas are countries bordering the Mediterranean, and the Atlantic islands, the Canaries and the Azores.

Organization of reserve collections

It needs to be said at the outset that a collection dedicated to conserving *Mammillarias* or any other group is not the same thing as a specialist collection (reference collection), or one intended for display purposes; and should the conservation-collection be managed in conjunction with collections in one or both the other categories, then great care will be vital in order to keep the conservation material completely separate—above all to ensure there is no cross-pollination by visiting insects.

Until such time as a large institute or foundation can be persuaded to grant land and money for the purpose, we must obtain the active support for our cause of the greatest possible number of thinking collectors; and this is not without problems since there is no prospect of any financial reward, and the 'curator' of any conservation-collection can hardly look forward to the praise and admiration of his visitors since the collection must, after all, be limited to a relatively few species, shut away and kept intact: plant-material cannot be handed on to others until the stock of propagated material is sufficient to ensure the perpetuation of the species.

I believe it to be important that collections for species-conservation should be sited far away from one another so that, in the event of any catastrophe, some at least would continue unimpaired. Even a small collector, if certain conditions are fulfilled, can devote himself to preserving a single species. Whether that is practicable or not depends on the character and interests of the person responsible for that collection. His complete dependability and his integrity would determine success or failure in each individual undertaking.

The ordinary cactus collections of our time are almost valueless in terms of conserving endangered species; the exceptions to this rule are few. The deciding factors in building up most collections are aesthetic and ornamental appeal: individual items are judged and brought together primarily for their decorative value, or as status-symbols; where several specimens of one species (and sometimes only the rarest plants are represented in considerable numbers) these are distributed throughout the plantings for the sake of decorative effect. True, the uncommon plants are usually propagated, but this is not done sufficiently systematically. In the case of propagation from seed there is often disastrous cross-pollination: thoughtlessly the owner

will use one brush only to pollinate several species; insects wing from flower to flower; and while bees are admittedly surprisingly colour-constant in terms of the flowers they visit, they make no distinction between *Mammillaria spinosissima* and, let us say, *M. matudae* since the blooms of both are carmine-pink, and they blossom simultaneously.

Of course it is easy to say things must now be improved—but there *must* be reserve collections, and they can indeed be organized effectively. The problem, as I see it, lies in co-ordination, and long-continuing cultivation over a considerable period of time, probably several generations. Nevertheless, I will try to make a start and offer some practical suggestions.

Suitable candidates for our project are most likely to be found among really interested young people who already have a real concern for conservation and the survival of individual species. They need not be cactus collectors as the term is usually understood, but they must genuinely care about practical attempts to perpetuate endangered plant species.

After providing satisfactory proof of their aptitude and the suitability of their growing equipment, each candidate could be allocated responsibility for one or more species or varieties, etc. Their plants could later be examined from time to time, and here I can envisage that the IOS Reserve Collections scheme* would have a vital role in the whole campaign.

Practical propagation

Translated into practical terms, a propagation programme might work as follows: Two field-collected individuals of a suitable species are allocated to the participating grower. Let us assume the species is not self-fertile, so that pollen from a genetically different plant is needed for seed production. But even for self-fertile plants it is desirable for the progeny also to carry genetic material from a different individual (genotype).

The two original plants must first of all be provided with some form of permanent label so that no confusion can arise. The same rule applies to their later progeny. The next step is to propagate vegetatively to increase the number of plants of the individual genotypes, partly as a precaution and partly for breeding purposes; this can be done by means of grafting or by taking cuttings. It is immaterial which method is chosen, but one point I would like to make here is that the best long-term grafting stock that I have found is seedlings from the complex around *Trichocereus pasacana*.

Each of the original plants might be propagated so as to obtain say 10 individuals which, of course, represent two genotypes only. These two groups of 10 must then be cultivated in separate trays or pans which are kept segregated at all times. Clear and careful labelling

*Details on application from D. R. Hunt, Chairman, IOS Reserve Collections Committee, 67 Gloucester Court, Kew Road, Richmond, Surrey, TW9 3EA.

is of the first importance and the plants must be isolated by fly-proof netting during the flowering period. Pollination, carried out with a camel-hair brush which must be kept specifically for this one operation, consists of transferring pollen from the stamens of one to the stigmas of the other, and vice-versa. When the fruits have ripened, the seeds can be sown and, for this first sowing all the seeds which were harvested should be sown.

After 2-3 years the seedlings will have developed sufficiently for individual characters to be clearly recognizable; they may also be flowering. Some experienced person managing the project now has to select say 20 plants in such a way as to ensure the inclusion of any important variants that have arisen: differences of spine and wool development, body shape, flower-colour and shape. Only when that point has been reached may any remaining plants be distributed to collectors as authentic descendants of the collected plants.

Since the plant stock thus obtained has genetic material from different sources, we have for the time being ensured the perpetuation of a significant part of the 'gene pool' of the population originally sampled. This generation is, and remains, the basic stock which must be conserved against the eventuality of the plant's disappearance from its homeland. This stock must be kept alive for as long as possible; furthermore, it must be supplemented and, if need be, renewed every five years.

The first example I have taken is a purely arbitrary one; a species easily raised from seed and one that flowers readily, even as a young plant, and it is thus probable that two plants of approximately equal age will soon be flowering simultaneously; propagation could then be undertaken immediately from seed, without the need first to increase stocks by vegetative means as a safeguard. In this particular case such a procedure is perhaps not essential, but in most instances the precaution should be taken; and for that reason I suggest it should be obligatory, in every reserve collection. Although many species are easily raised from seed and flower readily, I would nevertheless reiterate my recommendation that, in every reserve collection, a stand-by stock should be built up as quickly as possible by vegetative means whenever only a restricted number of habitat-collected plants is available.

The initiation and maintenance of a conservation-collection for any difficult species makes heavy demands on patience, skill and sympathetic handling of the plants.

Mammillaria heidia may be taken as an example of a 'difficult' plant: it was discovered only a few years ago by Mrs. Heidi Krähenbühl, and it seems to have a restricted distribution, so that the species can already be considered as at risk. *M. heidia* is not easy to grow and, worse still, it is difficult to propagate: I have managed an occasional flower in a warm greenhouse with the



Mammillaria heidia

(photo: Krähenbühl)

plants close under the glass; but I have never yet succeeded in persuading any fruits to set. Mr. Krähenbühl, who has had the plant longer in cultivation than anyone else, has actually managed to harvest some seeds; but his germination-ratio was so poor as to be valueless for propagation purposes.

At the present time *M. heidia* is known from only two localities, and since it is uncommon at both sites it is urgently necessary to ensure its preservation.

I hold five specimens from locality A, and eight from locality B and intend to use them for a conservation project.

No risks can be taken with such valuable plants; each of them will be grafted on to a two-year-old *Trichocereus pasacana* seedling, just as soon as the stocks are growing well. For such important plants the correct cut is of crucial importance, and the operation has to be done with great care. This means in practice that only a super-sharp knife is used. Any spines which could interfere with the cut must first be shortened, using scissors, and the cut itself is made in such a way that no second attempt is necessary. If the incision is made too high, the crown of the plant is damaged and is usually

then lost; only rarely can it be persuaded to throw out offsets. If the cut is made too *low* one is into the hard tissue and the stem-base is so reduced in size that it cannot survive, and yet another mother-plant has been lost. The head itself must be cut back to soft tissue, and any slices that have to be removed represent waste of the reserves of the stem base. Where the cut is judged correctly, both apex and base can be placed on ready-prepared grafting stocks after a single cut. The lower section of the plant-body is grafted in the inverted position, i.e. with its roots in the air. After the union is complete it usually makes a number of offsets and these, in turn, can be removed and grafted the following year.

It will inevitably take many years before the existing pool of plants can be increased tenfold, when its future can be considered more or less assured. It is now essential that each specimen and its vegetative progeny should be kept separate and clearly labelled. This is vital for pollinating any flowers later on, since the species is self-sterile.

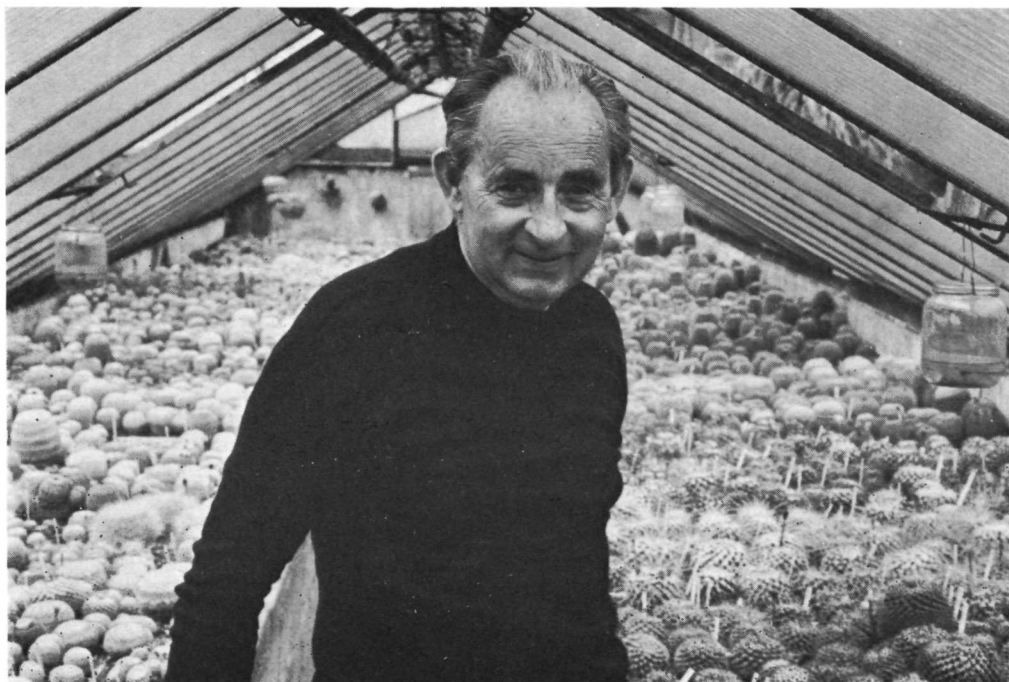
M. heidia is a dwarf species which grows to only a few centimetres in size in the wild. It occurs on crystal granite on more or less south-facing slopes carrying large cacti and a sparse bush-vegetation, at an altitude of 1400 m. (c. 4500 ft). The cracks resulting from the weathering of the granite hold very little humus. The locality is hot, dry and sunny. We should try to reproduce these conditions in order to retain the natural habit of the plant, but this is not essential during the

propagative phase; it is better to keep the grafted plants in vigorous growth in order to obtain propagants as soon as possible. Once a good stand-by population has been achieved it is permissible to start experimenting in order to achieve regular flowering and seed-setting; only then has the time come to try out possible combinations of sowing techniques and different temperatures.

For these experiments with a variety of techniques for cultivation and seed-sowing it will probably be necessary to bring other growers into the project, so that their experiences can provide valuable additional information for future use.

It is to be hoped that sooner or later a satisfactory population of seedling plants will be produced; when that time arrives it will at last be safe to start growing some of the plants on their own roots, and under conditions simulating those of the original habitat, in order to achieve the dwarf stature and natural growth-form of the species.

Werner Reppenhagen, seen below with his plants at St. Veit/Glan, Austria, has a very extensive and well-documented Mammillaria collection, mostly plants he has collected himself in Mexico during travels by himself or with Fittkau or Lau. His field-numbers tally over a thousand, of which about 650 are Mammillarias. Now aged 69, he is devoting much of his time to studying the genus and writing a book based on his fieldwork. He was elected a member of IOS in 1978 (photo: Hunt).



I.O.S. in Mexico, 1980

by W. L. Tjaden

85 Welling Way, Welling, Kent

Two years ago my wife and I were fortunate indeed to be invited to attend the XVth Congress of the International Organization for Succulent Plant Study held in Monaco. When we learned that the next meeting was to take place in Mexico, we at once said that we should like to attend, especially as a tour by coach to special succulent plant localities would be arranged as well. Mexico is surely for most of us the pre-eminent cactus country, but it is very large and even the commonest opuntias are not to be seen everywhere. Here then was a chance, without the need to acquire special knowledge, to be given one of the biggest thrills which can be granted to any plant enthusiast, of seeing the plants he grows or perhaps would like to grow, actually there in the wild. This is a thrill known to almost all alpine plant enthusiasts, because the European Alps are so easily reached. It is, of course, an experience known only to a small proportion of European succulent plant hobbyists. There was, however, to be a very reasonable restriction. In return for the privilege of being shown special plant sites, the I.O.S. stipulated that no plants were to be collected. The Organization is deeply concerned with the problem of the conservation of plants in the wild, and it was a topic again to be discussed at the Congress. Most participants including the English met this obligation, collecting only a few seeds of those plants present in substantial numbers. A few odd-people-out were reprimanded on the spot, although the difficulty may have arisen in an initial misunderstanding in the multilingual party.

The main party of British and French participants arrived at Mexico City late in the evening of 17 March, having changed aircraft at Dallas, and the next morning two comfortable coaches took us on the 600 km. journey north via Querétaro and San Luis Potosí to Matchuala. Most of us were, I think, impressed by the vast extent of Mexico City, by the wide, straight and very busy roads, and perhaps above all by the seemingly endless spread of one-storey houses over the surrounding hills. After the hilly outer suburbs, the motor-toll road to Querétaro, and the later first-class road to San Luis Potosí and beyond, is on the Mexican plateau, with dead-straight stretches many miles in length. There is no feeling of being some 7,000 ft. (2100 m.) above sea-level. The hills bordering the plain are perhaps some 2,000 ft. to 3,000 ft. (600-900 m.) above it. Great areas of prickly pears, and a little later of columnar cerei, were our first glimpse from the coach of cacti in habitat, and therefore exciting, but the real moment was

the first roadside stop, between Querétaro and 'S.L.P.' There was quite a rush to be first out of the coach, and little heed was paid to the warning that the stop was for half-an-hour only. The tour-operators and their couriers had little idea of how to control a coach-load of cactophiles. Every stop throughout the tour was said to be for ten minutes, half-hour etc., but no stated time for return was ever given. A few members were always late back, and the cumulative delays led eventually to us missing an intended stop entirely. That day we arrived at Matchuala in the dark, after 8 p.m. None of us minded. We had seen our first 'collectors' cacti, echinocerei, echinocacti and some mammillarias. I failed to identify my very first habitat plant, a rather small mammillaria. It did not matter, they were 'our' plants, many growing as we had always been told, underneath or in the shade of the predominant, often very prickly shrubs. Some small cacti indeed were in open sandy stretches, flat on the ground. Often, but not always they had plenty of spines for protection against the sun. The predominance in many areas of small trees, many of them leguminous such as *Cassia* and *Prosopis* (Mesquite), often in full green leaf, created a strange contrast to the stony ground, arid because we were still in the lengthy dry season. There is no such thing as a purely cactus landscape. Most of us, but not all, managed to avoid awkward encounters with the frequent and aggressive specimens of *Opuntia tunicata* and even *O. leptocaulis*.

The second day gave us our first big visual treat, the sight of a dozen or so many-branched specimens, some more than 6 feet in height, of *Ferocactus pilosus* (*F. stainesii*), seen from the now cobbled road to the former mining town of Catorce. The tops of these amazing plants stood clear of the surrounding thickets of shrubs. Catorce is in a hollow of the mountains at an altitude of 9,000 ft. (2700 m.), and is the highest town in Mexico. It is reached through a rough tunnel over a mile long, once part of the mine-workings. The town has a huge church, evidence of its former prosperity, but the place is now little more than a village with only 1,000 population. We had to spend almost the entire afternoon awaiting a protracted lunch in a small restaurant, when we could have been on the mountain-side looking for cacti. The tour operators did not, perhaps, really understand our true priorities. Only after 5 p.m., when the sun was already behind the mountain and the light was inadequate for good photographs, did we once more briefly resume our search.

The highlight of the third day was a stop at Huizache, half-way between Matehuala and San Luis Potosí, for more than two hours. This time we had a packed lunch, so no time was lost indoors eating. A hill surmounted by a micro-wave station a half-mile from the main road was to be the focal point, but almost before setting out we nearly stepped on a large cluster of *Lophophora williamsii* in the baked mud behind a roadside café. A little way further we found superb ferocacti, *Ariocarpus*, *Coryphantha*, and *Mammillaria formosa* and *M. candida*, all in a thick scrub of *Hechtia* and *Agave*, mainly *A. stricta*. Had I had more success in the past at home in cultivating habitat-collected plants, I should have been tempted indeed by the 7 inch (20 cm.) diameter *Ariocarpus retusus*, but they all stayed where they were, to rejoice later visitors. Rather aggressive dogs in charge of a herd of goats were the only slight drawback to what was described recently in the American Journal as 'perhaps the richest spot for varieties of cacti' in the state of San Luis Potosí. At the next stop we had the pleasure of seeing *Echinocereus cinerascens* with a dozen open flowers, and *Opuntia stenopetala* making a fine display. In general, however, we were perhaps a little too early to see many cacti in full bloom, and many, like the ferocacti, spread their display over a lengthy period.

Lophophora williamsii near Huizache

On arrival at San Luis Potosí there was a rush to buy straw hats, the party taking on quite a Mexican look when in the field next day. The tropical sun we enjoyed throughout the tour, reinforced by the thinner atmosphere of the Mexican plateau, had caught some unwary European victims in only a very few hours on our first day. From the state capital we made a field trip along the Zacatecas road, and although it was not as exciting as Huizache, we saw several familiar favourites such as *Mammillaria bocasana* and *M. magnimamma*, an *Echinocereus pectinatus* with two open blooms, and numerous stenocacti. The relative disappointment this day was that we were taken back to town at 3 p.m., to be given a well-intentioned guided tour of the main sights including the museum. The wax-work exhibit of the beautiful Princess Salm-salm, by birth an Englishwoman, on her knees begging the successful insurgent Benito Juárez in vain for Emperor Maximilian's life, was no compensation for our lost hours in the field. The final day of the pre-congress tour was taken mainly by the long journey back to Mexico City, but we had a number of stops, including an especially fine one half-way to Querétaro. There, on a hillside a short distance from the main road we found numbers of large *Echinocactus platyacanthus* growing in thickets of *Euphorbia antisiphilitica*, superb *Ferocactus latispinus*,

(photo: Hunt)





The IOS Congress tour party inspecting branched specimens of Cephalocereus senilis and large plants of Echinocactus ingens near Metztitlan
(photo: Tjaden)

Mammillaria muehlenpfordtii and other treasures. It was almost as fascinating as Huizache. After this Elysium came an anti-climax. The lunch arrangements again went awry. We spent the whole afternoon over a large meal served at prolonged intervals, in a restaurant in the delightful resort town of Tequisquiapan, some miles off the main road. The day was a Mexican holiday, when all who can afford it fill the restaurants all the afternoon.

During the week of the Congress itself there were more field trips, the best being to the Barranca or gorge of Metztitlan beyond Pachuca to the north-east. The steep hillside flanking the road a short distance before the small town of Metztitlan, seems almost to have been planted as a superb cactus garden, so great is the number of fine specimens, easily visible from the road. Hernando Sanchez-Mejorada, President of the Mexican Cactus Society, did trojan work throughout the tours and congress to make them a success. To him, too, we are indebted for a fine guide to the succulent flora of this gorge, in Spanish and English and with many photographs. Among the numerous treasures of the area the huge mounds of *Mammillaria geminispina*, the fine groups of *Ferocactus glaucescens*, the *Astrophytum ornatum* over a

foot and a half high (50 cm.), and the form of *Echinocactus platyacanthus* so rightly named *ingens*, were all photographed many times over. We returned up the valley to eat our packed lunch by a stream bordering fertile fields, then most of us hastened once more into the up-hill scrub to inspect large plants of the Old Man Cactus, *Cephalocereus senilis*, which unlike the majority so common in this area, had branched freely from the base. Matching their dignity were numerous *Echinocactus ingens* likewise conspicuous among the scrub (see coloured illustration).

Our debt to Sr. Sanchez-Mejorada was increased still more on our return journey by the refreshments he and his wife gave the whole large party in the garden of their family home at Velasco near Pachuca. On another day we were taken to the Botanic Garden of the Biological Institute of the University of Mexico, and once more given hospitality. This was also to celebrate the very fitting award of the Government of Monaco's Golden Cactus trophy, first awarded to Prof. Rauh in 1978, this time to Helia Bravo Hollis, author of the invaluable standard work on Mexican cacti first published in 1937 and now appearing in a new edition. After seeing so many fine plants in the wild we were perhaps

a little disappointed by some of the plants in the garden. It was still the dry season and even for Mexicans it is not easy to out-do in cultivation what nature alone achieves. More field trips were enjoyed on the journey to Tehuacan in the state of Puebla, where more lectures and the concluding banquet were held. We also made an excursion to another famous cactus area at Zapotitlan, south-west of Tehuacan. On the journey to the latter town a few of us were shown one or two remaining small specimens of *Mammillaria pectinifera*, all that remain there after the greediness of collectors in the past.

The excursion to Zapotitlan provided numerous highlights, hillsides dominated by tall cerei following each other in intriguing variety. One wondered just what slight differences in soil, aspect or climate, scarcely noticeable to the observer, could cause one species to dominate one area, only to give way soon to another. Here again the Mexican Cactus Society have published a fine field-guide, this time by Jorge Meyran, editor of the Society's journal 'Cactaceas y Suculentas Mexicanas'. Among the cerei, which included an old favourite of mine in cultivation, the rather plain *Stenocereus chichiipe*, we found *Wilcoxia viperina* in flower, a fine grove of *Nolina* (*Beaucarnea*) *gracilis*, and another large barrel-cactus, the form of *Echinocactus platyacanthus* known as *E. grandis*. Once again some of us felt that we were taken too soon from all these wonders to return to Tehuacan and its colourful Saturday market. However, comparing Gordon Rowley's experiences of Mexican cacti recounted in the NCSS Journal for 1975, we at least achieved more than 5% each time in the field, and had glorious weather throughout.

The post-congress tour was to Oaxaca (pronounced Wa-ha-ka) by the direct, fairly new route via Tomellin. It gave us not only magnificent mountain scenery, but cacti we had not yet encountered such as the wavy-branched cereus, *Escontria chiotilla*, and the most symmetric candelabra cereus of them all, *Pachycereus weberi*, as well as handsome xerophytic trees such as the red-stemmed *Bursera microphylla* and the Kapok tree, *Ceiba pentandra*, the latter bursting its silk-laden capsules. In the hills before reaching Oaxaca there was one final delight, *Aporocactus conzattii* in flower, massed on the trunk of an oak-tree together with bromeliads and *Cattleya citrina*, also in flower. Nearby on the ground were numerous specimens of *Feroactus macrodiscus* a foot (30 cm.) in diameter, to mention but one other treasure there.

The last two days of the tour were spent visiting the impressive ruins of ancient civilizations at Monte Alban and at Mitla. The vast ruins in Mexico, typified by the innumerable pyramids, really need a tour to themselves to be properly appreciated: my mind was still on the superb vegetation of Mexico alone. We knew that we had sampled only a tiny fraction of it, for instance, we had encountered no Echeverias or Sedums.

Knowing that many participants had not visited

Mexico before, the organizers compressed the lecture sessions into the least possible period. The theme set to give unity to the papers which were presented, was a broad one, Succulents in Habitat, their ecology and taxonomy. Of the two dozen papers given, I personally liked Len Newton's the best, for its content, on the geographical associations of the succulents of Southern Arabia and the Horn of Africa, and for the manner of its delivery. On the same level was Edward Anderson's on the Galapagos Opuntias and their ecology, although he exceeded the time allowed slightly, and Heidi Hartmann's, delivered in faultless English, on the adaptation of mesembryanthema to arid areas in SW. Africa. The linguistic talents of many of the German members was impressive: Beat Leuenberger not only gave an interesting account in English of detective work on pereskias, but chaired many of the lectures with comments in Spanish as well. To mention these few talks is, however, to be unfair to many others. My own lack of any Spanish meant that I could not appreciate quite a number of the talks, despite the hard work put in by Sr. Sanchez-Mejorada in giving summaries in English. Some lecturers were a little unlucky in that their talks came at the end of some very hot days and their audiences by then could not do them full justice, and the slide projectors sometimes had a mind of their own, bent on causing some awkward gaps. Nevertheless, it was a highly successful congress, and the Mexican Cactus Society deserve the heartiest thanks of all those who took part, both for organizing it and for their generous hospitality.

The IOS Executive Board for 1980-82 is John Donald (GB), President; Professor Dr. Werner Rauh (W. Germany), Vice President; Lloyd Brinson (USA), Secretary; Dr. Heimo Friedrich (Austria), Asst. Secretary; J. D. Supthut (Switzerland), Treasurer; D. R. Hunt (GB), M. Kroenlein (Monaco), H. Sanchez-Mejorada (Mexico), Members; Dr. Heidrun Hartmann (W. Germany), Co-opted Member/IUBS Delegate.

The Board will meet at Zurich in the autumn of 1981, when discussion will include a revised procedure for admission of new members and reorganization of active members according to their specific areas of interest. The next Congress will be held at Vienna in late Summer 1982.

Membership of IOS is by election only, but the Organization's Bulletin and the Repertorium Plantarum Succulentarum are available to non-members.

The cultivation of *Sansevierias*

by Horst Pfennig

In all species of *Sansevieria* the inflorescence terminates the growth of the shoot. In unfavourable conditions of soil, temperature and moisture, flowering—generally desired by the grower—will not take place. The plant will continue to produce new leaves or offshoots.

Drier, brighter and warmer conditions favour the formation of flowers, produce more compact growth and reduce the number of leaves. On the other hand moister, darker and cooler conditions inhibit flowering, while the plant produces more leaves which are frequently etiolated.

Even though, in the wild, *S. singularis* is sometimes encountered in the deep shade of dense bush or *S. parva* in the full sun, the general rule is that the more cylindrical and fleshy the leaves, the brighter their position should be in the greenhouse, and the flatter and thinner the leaves the more likely they are to favour more sheltered conditions. A habitat with too much insolation is apt to cause a metallic sheen on flat leaves and eventually the surface may be bleached.

During the winter months when there is less sunlight the temperature in the greenhouse should not be allowed to fall below 15°C at night. In daytime it may rise by 5°C, and if the plants are kept dry and sunlight is present, somewhat more.

During the summer months the night temperature should be increased by 2-3°C, while in daytime temperatures up to 40°C will be tolerated, if necessary with some shading, without damage, provided, of course, that the plants are healthy and have well-developed roots.

The onset of root-rot—and also lack of moisture—shows on the leaf surface by the appearance of grooves due to shrinking. Healthy root-growth is achieved in a permeable sandy soil-mixture. The following mixture has proved satisfactory: $\frac{1}{3}$ coarse sand, $\frac{1}{3}$ peat, $\frac{1}{3}$ compost. Loamy mixtures, although often recommended, are not advisable for they often lead to inadequate root-formation, poor flowering and (especially with the more delicate species) waterlogging. For this reason containers should not be larger than absolutely necessary. Where the usually downward-growing rhizomes permit their use, $\frac{3}{4}$ clay pots, half pots or pans are recommended.

When the recommended soil-mixture is used, watering can be lavish but excess water must not be allowed to stagnate. The next watering should not take

place until the top of soil is completely dry to a depth of 1-2 cm. Mature plants can be induced to flower by reduced watering or complete dryness. As soon as an inflorescence appears normal watering should be resumed.

A steady supply of nutrients is physiologically better than intermittent dosage and small amounts of fertilizer should always be added to the water. With the soil mixture recommended above it has been shown that a good dosage is 0.2 gr. of a soluble fertilizer containing trace elements to each litre of rain water applied throughout the year. During winter when watering times are reduced the plants will also receive a diminished supply of nutrients. But if they are kept in very dry air or above a heat source, such as a radiator, a smaller amount of the fertilizer might be indicated.

Propagation

Sansevierias develop either an underground rhizome or offshoots above ground. Propagation is achieved most easily by division, i.e. the separation of sufficiently mature offshoots near the parent plant. Rhizomes as well as aerial branches often have to be shortened. After dusting with charcoal powder the cut pieces can be planted at once, but watered very sparingly. Old offshoots when replanted usually develop new plantlets, thus giving a constant supply of new material.

It is also possible to propagate *Sansevierias* from leaf cuttings, but this is more difficult and takes longer. Mature leaves are cut into strips of 10-15 cm. length with a very sharp knife or a razor blade. Depending on the fleshiness of the leaves the cut sections should be allowed to dry for some days or even weeks. The lower end of the cutting is then inserted to a depth of 1-2 cm. into a mixture of one part of peat to one part of sharp sand. After watering gently with 0.1% solution of Chinosol the container is stood in a warm but shady place. The most suitable container is a small aquarium covered with a pane of glass to preserve the moisture.

Treating cuttings with a growth-hormone does not appear to be necessary but it may help. Root and offshoot formation sometimes starts soon but may also take up to one or two years. Very cautious watering is essential to prevent rotting.

Simpler but scarcely quicker is propagation from seeds. Fruits are easily obtained through pollination by hand, best carried out in the late evening. The 1-3-locular berries ripen after 2-3 months, turning to an orange colour. The fleshy mesocarp is removed and the bone-white round or oval seeds can be sown in the soil mixture recommended above, preferably in small

Translated by Dr. Peter Bally and G. A. Classen from Dr. Pfennig's article 'Die Kultur der *Sansevierien*', in *Gartenpraxis* 1977, pp. 550-3. Author's address: Stieglitzweg 18, 4900 Herford, W. Germany.



Three attractive forms of *Sansevieria hahnii*. Left to right, 'Hahnii', 'Golden Hahnii' and 'Silver Hahnii'. (photo: Pfennig)

clay dishes. The seeds must be covered with about 0.5 cm. of soil and watered with a 0.1% solution of Chinosol. They will germinate in 4–6 weeks at the greenhouse temperatures recommended earlier. It is not abnormal for the first leaves of cuttings or seedlings to have a different shape (usually flatter), than those of the parent plant. In some species the characteristic leaf- and growth-form will appear only on a secondary offshoot. *S. singularis*, for instance, produces exclusively flat leaves at first and only after the production of several offshoots with a gradual reduction in the number of leaves is the typical single-leaved cylindrical form achieved.

Pests and diseases

Sansevierias suffer from few pests and diseases. Occasionally scale insects attack the leaves. If the infestation is slight they are best removed manually.

Also, the larvae of certain weevils attack the roots, while the mature weevils feed at night, preferring young leaves and leaving semi-circular depressions. In a small collection the best remedy is to take out the plants and thoroughly shake off all the soil and then replant. Alternatively 0.1% of Basudin emulsion should be added to the water.

Yellowish spots on the leaves which later become brown and sunken may be caused by harmless 'corki-

ness' or by the fungus *Fusarium moniliforme*. Since it is difficult to distinguish between the two it is advisable to cut off heavily infested leaves and to spray the plant with the well-tolerated fungicide Cercobin M in a concentration of 0.1%.

Literature

- BROWN, N. E. (1915). In Kew Bull. 1915: 185–261.
 PFENNIG, H. (1970). In Jacobsen, H., Das Sukkulentenlexikon, 293–305.
 ——— (1974). In Palmengarten 38: 47–50.
 ——— (1979). In CSJGB 41(3): 56–60.

Sansevieria Publications

Sansevieria enthusiasts will be interested in a booklet recently published by Adelaide Botanic Gardens, North Terrace, Adelaide 5000, Australia. It is 'Sansevieria in Cultivation in Australia' by Robert F. G. Swinbourne, and has short chapters on history and use, culture, propagation, hybridizing and selection, a key to species and short descriptions of species and cultivars. The text occupies 18 pages and is followed by 30 pages of line illustrations.

We also understand that N. E. Brown's monograph of the genus, originally published in the Kew Bulletin in 1915, is being reprinted, and will give further details when available.

The Safe Use of Insecticides

by N. P. Davis

Table of Contents

- I. Introduction
 - A. General
 - B. Methods of Insect Control
- II. Types of Chemical Insecticides
 - A. Organochlorine
 - B. Organophosphorus
 - C. Carbamates
 - D. Other Organic Materials
 - E. Arsenicals and Mercurials
 - F. Naturally Occurring Materials
 - G. Chemical Attractants and Juvenile Hormones
 - H. Miscellaneous Folk Remedies
- III. The Proper Use of Insecticides
 - A. Know the Pest
 - B. Dangers to Man and Animals
 - C. Safety Precautions
 - D. Avoiding the Use of Insecticides
- IV. References
- V. Appendices
 - A. Common Insecticides and their Toxicities
 - B. Phytotoxicity Table
 - C. Compatibility Chart

I. Introduction

A. General

In the following discussions some terms may be new to the reader. This general introduction is intended to give an explanation of a number of words and concepts to make the rest of the paper more easily understood.

The word 'insecticide' is derived from *insect* combined with the Latin word *caedere*, to kill. Many similar terms have been formed in this way, e.g. *nematocide* (for killing nematodes), *acaricide* or *miticide* (for killing mites), *molluscicide*, *fungicide*, *algicide* and so on.

Some compounds will, of course, kill more than one kind of pest. Those that destroy a wide range of different life forms are called *wide spectrum* formulations; those that are restricted in action to a few species are *narrow spectrum* or *specific* insecticides.

These materials may be classified according to their chemical type, since related chemicals often have similar toxic properties, giving rise to 'families' of poisons. Three such classes of pesticide dominate the market and these are the OC or *organochlorine* compounds, OP or *organophosphorus* compounds and the *carbamates*. The organo- in the name of the first two refers to the fact that the materials are composed mainly of carbon and hydrogen. This usage stems from the time when scientists thought that such compounds of carbon and hydrogen, in association with a few other elements, could only be produced by living organisms, and so were *organic*. Although the theory has been discredited the nomenclature has been retained as a useful distinction between carbon-hydrogen containing materials and other compounds.

The carbamates are also organic compounds, characterized by a particular arrangement of additional nitrogen and oxygen atoms. Obviously, inorganic chemicals play a very minor role as insecticides (but are more important as fungicides).

Insecticides may also be classified as *contact*, *systemic* or *stomach* poisons depending on the route by which they attack the pest. Contact poisons must reach the body of the insect directly and be absorbed through the skin. Systemic poisons are those which are taken up into the sap of the plant and enter the body of the insect when it feeds on the plant juices. Stomach poisons are taken in by chewing insects which ingest the poison along with the plant material.

A measure of the toxicity of chemicals which is commonly quoted is the LD_{50} (or 50% lethal dose).

This is the dose required to kill 50% of whatever test animal is used for the determination. The value of the LD_{50} depends on the way the poison is administered, viz. by feeding (oral) or injected into the skin (dermal).

The values are usually determined with rats and rabbits and so are not necessarily good estimates of the toxicity to humans. Another criticism is that the LD_{50} does not give any indication of the effect of chronic exposure to low levels of the toxic material. However it does provide a useful means of showing which insecticides are particularly dangerous for short term exposure to high concentrations, which are the conditions likely to be encountered by the home gardener.

The labels of some pesticide containers have a number after the name of the material, e.g. ROGOR 40. This states the concentration of the active ingredient (per cent weight per volume). This information is also to be found printed on the bottom of the label where the name and concentration of all the ingredients are listed. This allows the buyer to make a wise choice when purchasing insecticides, for he can avoid those substances which are extremely toxic or damaging to the environment.

Different substances have different effects on the environment depending on their *bio-degradability*, i.e. the ease with which soil organisms break them down, and the nature of their products. Those that are not readily broken down are termed persistent insecticides and include many organochlorines, e.g. DDT, Dieldrin. Sometimes a material is degraded rapidly but gives rise to products which are even more poisonous. Such *intoxification* processes are shown by the organochlorine compounds Aldrin and Heptachlor which degrade respectively to the persistent and more toxic Dieldrin and Heptachlor epoxide.

B. Methods of Insect Control

The suitable methods of insect control differ according to the type of pest and the situation in which they occur. The treatment required in an open garden differs from glasshouse practice or the requirements of a metre-long window box. The present discussion will not be concerned with environments larger than a suburban garden, the usual province of the amateur gardener.

Preventive action to limit the occurrence of insect pests will be covered in Section D. The paragraphs below deal with the direct control of established insect populations, where the term *insect* is deemed to include mites (mites are not insects but are arachnids). We shall divide the subject into three categories, viz. Physical, Biological and Chemical.

Reprinted by permission from The Cactus and Succulent Journal of New South Wales 11: 114-120, 136-140 (1978). Prices quoted in the original paper have been omitted. Author's address: 542 Grand Junction Road, Northfield, South Australia 5085, Australia.

1. *Physical Methods* include washing and squashing! Unfortunately for cactus and succulent growers the spininess of the plants and nature of the pests render physical attack generally unsuccessful.

Washing is feasible only where all surfaces are accessible and so cannot be applied to clustering plants. Furthermore it is unsuitable for the glasshouse where pests will simply be washed from one pot to the next. Aphid populations can be controlled by hosing them off leaves and flowers if it is done regularly. Heavy infestations of mealy bug can be reduced by taking plants out of their pots and washing away every visible bug from every section of the plant. (After a few days, pesticide should be applied to kill any remaining or newly hatched bugs. The solutions may be more dilute than normal to avoid poisoning the plant in its insect-weakened condition, followed up later by a stronger application.)

Scale insects and aphids on smooth-leaved plants can be controlled by crushing them between the fingers or with any blunt instrument. A constant vigil must be kept to eliminate every new insect as it appears. Greater success can be achieved if the ants that feed off and spread the pests are also controlled.

Recently, a very interesting method of getting rid of all insect pests and their eggs was brought to my notice (Potocki-Roth, 1974), viz. the 'Heat-Shock Treatment'. If done correctly, it is claimed, no injury is done to even small plants and flowering is not reduced. Equipment required is a good thermometer and a container large enough to immerse the whole plant. The first step is to shower the plant and pot with lukewarm water, wetting the soil right through. Stand the pot in a container and fill it slowly with water at 40°C to 1 cm. above the top of the plant. Then by adding hotter water carefully, bring the temperature up to a minimum of 55°C. It must stay at this temperature for no more or less than 10 minutes, especially at the bottom where the eggs and soil-dwelling pests are located.

To avoid burning the plant the temperature is lowered slowly after the 10 minutes, to 25°C, by adding cool water. During the whole procedure the plant body should not touch anything, otherwise marks will be produced on it, so care must be taken when removing the plant from the cooled bath. Afterwards they should be placed in a warm but completely shaded position, free from draughts, for a fortnight, to recover from the treatment.

Plants from outside the glasshouse should be acclimatized inside before being treated in this way and rested the fortnight before going outside again. It is advisable to allow one year or at least six months between treatments (better still, do not allow the plants to become re-infested!). It is claimed that after their bath the plants have a fresher look.

The larger the collection of plants, the less efficient physical methods become, especially when the infestation is widespread.

2. *Biological Control* is not of great use in the glasshouse because that environment is inimical to the agents that would destroy the pest. Furthermore, the result of a stable biological control situation is a dynamic equilibrium between the numbers of the pest and its enemy. Although one may temporarily breed to disproportionately large numbers, the equilibrium is usually restored within a few generations. However the cultivator of ornamental plants usually wants a zero population of bugs especially where the damage they cause is prominent and long-lasting (the Red Spider Mite, *Tetranychus opuntiae*, is the usual cause of long-term disfigurement of cacti and succulents). Consequently in an effort to achieve 100% kill, the horticulturalist turns to chemical preparations which have the result of killing off many useful bugs as well as the harmful ones. Outside in the garden when biological control is continually in operation, poisonous chemicals should be avoided so as not to kill off beneficial insects.

Natural restraints on insect populations may be summarized under three P's—Predation, Parasitism, and Pathogens. Predation is where one animal feeds directly on another, attacking and killing a number of individuals of the food

species over a period of time. Examples are the Vedalia beetle, *Cryptolaemus montrouzieri*, a ladybug (lady bird) which attacks cottony cushion scale, the larvae of various ladybugs and hover flies; and of lacewing flies which feed on aphids and mealy bug. Praying mantids may help control grasshoppers and crickets.

Parasitism is the situation where the attacking insect lives in or on the victim and does not kill it immediately. It is mainly practised by various minute wasps that lay their eggs on or within the bodies of many pests including scale insects, aphids, and caterpillars. The larvae hatch out and feed on the host, eventually leaving nothing but a mummified skin.

Pathogens are disease-causing organisms, i.e. fungi, bacteria or viruses. They have been applied to the control of caterpillars, e.g. the virus infections, granulosis and polyhedrosis and the bacterial infection caused by *Bacillus thuringiensis*. An advantage of pathogenic control of pests is that the infections are generally restricted to a few species and cause no injury to other organisms.

Two other methods of use in the open garden which may be included here are:

I. interference with insect breeding and,

II. companion planting.

In the first, sterilized males of an insect such as the fruit fly are released in large numbers to compete with natural males for mates. This reduces the number of fertilized eggs laid and the insect population drops. Companion planting refers to the growing of plants with insect repelling properties in association with ornamental or food plants. An example of this is the growing of marigolds to repel nematodes; nasturtiums or chives to repel aphids and tansy to repel ants. Little is known about the efficacy of such companion plantings.

3. *Chemical Methods* of control refers to the use of natural and synthetic products which are poisonous to the harmful insect. Such methods have a number of serious disadvantages—the fact that they may be toxic to a wide range of organisms both harmful and beneficial, they tend to produce resistant strains of insect, and they are costly and need to be used in heavier and heavier concentrations to combat the resistant strains.

If, for example, a number of red spider mites have thick skins they can survive an application of pesticide because less of the material penetrates their bodies. Consequently their proportion in the mite population is increased even though their numbers were initially very small. Stronger applications of poison are required to keep the numbers of the resistant mites down but even more resistant individuals are bred to replace them. This aspect is further discussed in Section III A.

Many insecticidal materials have been discovered by accidental observation of their effects on insects. Many more have been tested purposely for such activity, particularly the analogues of known insecticides, i.e. chemicals based on the same structure. Lyle & Heavner (1975) have reported that the synthetic pyrethroids (analogues of Pyrethrum) may soon be among the most important insecticides because they are very active, bio-degradable and harmless to mammals. Because a substance occurs naturally does not mean that it is necessarily better or that it is not a chemical. (The oxygen you breathe is no less a chemical than Pyrethrum or Malathion.)

In the glasshouse the use of chemical deterrents to insects is mandatory once the pest becomes established. It is to be hoped that the following sections remove some of the mystery of poisons and allow you to use various materials safely.

II. Types of Insecticides

A. Organochlorine

This is a group of chemicals which has been in widespread use for many years. DDT is the most well-known and is said to be the cause of much damage to other organisms including sea-birds. OC insecticides are fat soluble and can be rapidly absorbed through the skin and stored in the body fat for long periods. Their residues have been detected in milk and may be carried through into other foods. They are characteristically

persistent and should be avoided by the home gardener where possible. Poisoning by OC materials may lead to irritability, tremors and convulsions.

(1) *Aldrin*: A relatively non-phytotoxic contact insecticide. It is persistent in the soil and is stable to heat, alkali and mild acid but is slowly oxidized to *Diieldrin*. It is effective against soil insects and is marketed as 2½–5% dusts, 2–20% w/w in granules or 24–28% w/w emulsifiable concentrate.

(2) *Chlordane*: Technical chlordane consists of 60–75% isomers (structural forms) of chlordane and 25–40% of related compounds including up to 10% of the dangerous material *heptachlor*. A new grade, AG Chlordane, contains approximately 95% chlordane and less than 1% of heptachlor (Tafari et al., 1977). This substance is a persistent non-systemic stomach and contact poison and is not phytotoxic in dilution. It is formulated as dusts and granules (5–10%) and as an emulsifiable concentrate of 50–80% w/v or up to 20% w/v in kerosine. It is effective against ants, cockroaches, spiders, beetles, centipedes and others.

(3) *DDT*: Also known as dichlorodiphenyl trichloroethane, dicophane and chlorophenothane; the major isomer is p-DDT. This material is very persistent non-systemic contact and stomach insecticide. It is said to be non-phytotoxic except to cucurbits and is not toxic to mites. The usual formulations available to the home gardener are 12.5% w/w solutions with Malathion (10% w/w) and as a component (2% w/w) of cabbage and of rose dusts.

(4) *Dicofol*: A non-systemic miticide without much insecticidal activity; also known as *Kelthane*. It is less persistent than most organochlorines and also less toxic. It is sold as a wettable powder or emulsifiable concentrate up to 42% w/v.

(5) *Diieldrin*: An oxidation product of Aldrin, it is stable to alkali, mild acids and to light and its chemical stability makes it compatible with many other insecticides. It is non-systemic, persistent with high stomach and contact activity to insects but with low phytotoxicity. This is a very poisonous material sold as 15–20% emulsifiable concentrate.

(6) *Endosulfan*: This is a mixture of two isomers, stable to sunlight and compatible with non-alkaline insecticides. It is a non-systemic contact and stomach poison and is *highly toxic to fish*. The half-life (time for half the material to be destroyed) is about one week on plants and it is not accumulated in fat. Available as 35% w/w in a liquid hydrocarbon solvent. It is also known as Thiodan.

(7) *Gamma-BHC*: The gamma isomer of 1, 2, 3, 4, 5, 6-hexachlorocyclohexane, also known as *Lindane*. It is stable to air, light, heat and acids but it reacts with alkali. A potent contact and stomach poison and also a fumigant. Said to be non-phytotoxic in dilute solution. Available as wettable powder, emulsifiable concentrate and as dusts. It is a component of a rose dust and a cabbage dust available locally.

(8) *Heptachlor*: This material was first isolated from technical chlordane and is a non-systemic stomach and contact poison, also with fumigant action. It is stable to air, light and moderate heat and is compatible with most insecticides. Formulated as wettable powders, emulsifiable concentrates, dusts and granules.

(9) *Kelthane*: see *Dicofol*.

(10) *Lindane*: see *Gamma-BHC*.

B. Organophosphorus

Compounds of varying toxicity, *Malathion* being among the safest insecticides and *Parathion* among the deadliest. They can deactivate the enzyme cholinesterase resulting in muscle spasms and death by paralysis. They are not cumulative poisons and are rapidly broken down in the soil.

(1) *Demeton-methyl*: This is a mixture of *Demeton-O-Methyl* and *Demeton-S-Methyl* (differing in the arrangement of oxygen and sulphur atoms around the phosphorus). A systemic and contact insecticide and acaricide, incompatible with alkaline materials. Sold as emulsifiable concentrates up to 50% w/v under the name *Metasystox*.

(2) *Dimethoate*: A contact and systemic insecticide and acaricide effective against many insects including fruit fly, aphids, thrip, leaf miners, bronze orange bugs, etc. Also known as *Rogor*. It can be toxic to some olive, citrus and nut trees and is not compatible with alkaline materials. Available as 30% w/v e.c. or as 40% w/v e.c.

(3) *Fenthion*: Also known as *Lebaycid*, *Baycid*, *Baytex*, *Mercaptophos* and other names. A contact and stomach poison, it is relatively persistent because of its stability to heat, light and alkalis. It is oxidized in the plant to other insecticidal products. Available as 55% w/v e.c. it is most used against fruit flies, codling moth, leaf hoppers and other enemies of fruit trees.

(4) *Lebaycid* see above.

(5) *Malathion*: Also known as *Mercaptothion* and *Maldison*, this is a material rapidly degraded in the soil. It is not compatible with alkaline materials and is corrosive to iron (do not spray it on metal fittings). It is a non-systemic insecticide and acaricide, not phytotoxic (except perhaps to some cucurbits and beans). It is however, highly toxic to bees. Available as 50% w/v e.c.

(6) *Parathion*: Also known as *E605* and *Folidol*, this material is a non-systemic contact and stomach insecticide and acaricide. Its toxicity is due to a metabolic oxidation product and it is *extremely dangerous*. It is unstable in alkaline conditions. In the United States of America its use is subject to legal restrictions and it should be totally avoided by the home gardener.

(7) *Rogor* see *Dimethoate*.

(8) *Dichlorvos*: Also referred to as *DDVP*. Of medium toxicity this is used as a fly killer in the form of polymer strips impregnated with the material. It is extremely volatile and rapidly decomposed.

C. Carbamates

The production and use of carbamates (and organophosphorus) insecticides is increasing as a replacement for the carcinogenic and less biodegradable organochlorine compounds (Takusagawa & Jacobsen, 1977). Like the OP materials the action of carbamates is deemed to be via the inhibition of the enzyme acetylcholinesterase.

(1) *Benomyl*: This is essentially a protective and eradicator systemic fungicide, but it is effective against mites as an ovicide (destroyer of eggs). It has a very low mammalian toxicity. It is quite expensive.

(2) *Carbaryl*: A contact insecticide with some systemic activity. It is stable to light, heat and hydrolysis, is non-corrosive and compatible with all but strongly alkaline pesticides. It is commonly sold as a component of dusts at the level of 2% w/w or as part of a wettable powder (10.7% w/w).

D. Other Organic Materials

(1) *Organofluorine*: Compounds such as sodium fluoracetate (or 1080) are extremely poisonous materials. Their use should be opposed by those concerned with the protection of native fauna. 1080 has been used against rabbits and as baits for dingoes but other animals undoubtedly succumb to these baits.

(2) *Methyl bromide*: This is an extremely toxic gas that is used as a fumigant. It is employed by the Department of Agriculture to treat imported plants and has been proven to be toxic to some succulents, especially euphorbias, exposed to it for several hours. Only licensed fumigators are legally entitled to use it because of its dangerous qualities. It is odourless and tasteless and so has 2% *chlorpicrin* mixed with it as a warning agent. Methyl bromide can cause damage to the brain cells. *Chlorpicrin* is used as a destroyer of rabbits and soilborne pests such as nematodes.

(3) *Ethylene dibromide*: Sold as a 15% w/v solution for the control of nematodes by fumigation.

(4) *Metalddehyde*: This is a very common molluscicide (killer of slugs and snails), sold mixed with bran as a powder or in pelletized form.

E. Arsenicals and Mercurials

Both of these classes of material are extremely toxic. The arsenical and inorganic mercurial compounds are dangerous

by ingestion and by inhalation whilst organic mercurials have the added danger of being absorbed through intact skin. Arsenate of Lead is sold as a control of moths and caterpillars on fruit trees. This group of poisons should be scrupulously avoided.

F. Naturally Occurring Materials

(1) *Nicotine*: This is a very poisonous material extracted from tobacco. It is a non-persistent non-systemic contact insecticide and also has some action as an ovicide. Certain nicotine salts have been used as stomach insecticides.

(2) *Derris Dusts*: Derris is obtained from the roots of *Derris elliptica* and is used in the control of caterpillars and other leaf eaters. Most dusts contain 0.75% of *Rotenone* (the main active constituent) and up to 2% of other active components. These materials are very toxic to fish and have been used as a means of catching fish by crushing the plant in ponds and streams.

(3) *Pyrethrins*: These are obtained from the flowers of *Chrysanthemum cinerariifolium*. Much research is currently in progress to evolve more potent analogues of these materials. Formulations are usually in spray cans and contain 0.025% w/w of pyrethrin and 0.1% w/w of piperonyl butoxide. The latter is a synergist or material used to increase the potency of the insecticidal component.

(4) *Refined Mineral Oil (Clear White Oil)*: This is used to control various forms of scale by removing their protective waxy shields. It is plausible that other natural oils will have the same effect.

(5) *Methylated spirits*: This is not an effective means of control of mealy bug. Dabbing with a probe moistened with methylated spirits probably causes additional physical damage to the plant. Spraying with this is not effective unless the dose is repeated and heavy. In an experiment with adult mealy bugs, methylated spirits was applied directly to the insect with a dropper. After about 10 minutes the insects had recovered and were active again.

G. Chemical Attractions and Juvenile Hormones

Many creatures of the world are guided in their actions by chemicals secreted by their fellows. These substances may act as warnings of danger or as a guide to sources of food or as attractants for a mate. The last aspect has been put to the service of man by subverting its action from that of procreation with the female to sterilization or destruction by the pest removalist. These hormonal attractants are called pheromones and each insect species has pheromones different from those of other insect species. The attractant is effective in very small concentration and does not interfere with any other organism, but is exceedingly difficult to obtain. Furthermore every pest that may be controlled by luring it over a sterilizing medium must have the appropriate substance identified and then synthesized. Juvenile hormones, which control the metamorphosis of the insect from the juvenile to the breeding or adult stage, also promise to give effective and safe control of insect pests. They suffer from the same difficulties as pheromones and consequently such materials will probably be developed only for insects of considerable commercial importance.

For the purposes of the home gardener, the lid of a jar smeared with honey or jam will suffice to lure certain types of insect from their hiding places so that they can be killed.

H. Miscellaneous Folk Remedies

Many home remedies have been suggested over the years, often involving the use of 'companion plants' as ingredients. It is a project well within the means and ability of the average gardener to experiment with these materials to test their efficiency against garden pests.

An anonymous contributor (Cact. Succ. Soc. J. NSW 8(3): 44. 1971) suggests grinding garlic and making a spray by adding it to water as a remedy for sucking insects. Other solutions recommended are made from ground onion, mint and geraniums, hot peppers and shallots mixed with water.

Other 'botanicals' recommended include Oil of Cade for

moths, cucumber juice for woodlice and cockroaches, cyclamen extracts and tomato leaf extracts for aphids (Cact. Succ. Soc. J. NSW 8(8): 145. 1973). Dittany, pennyroyal oil, red cedarwood oil, sweet flag root, tansy, thyme and tobacco leaves (as a decoction) are also suggested.

The editor of this journal has provided recipes for Quassia chips spray to kill aphids, thrips and caterpillars and to repel possums (Cact. Succ. Soc. J. NSW 9(1): 11. 1973). A mixture of white vinegar, baby oil, and water is recommended for the removal of scale (Cact. Succ. Soc. J. NSW 9(2): 27. 1973).

Further information can be obtained from the list of reading material in Section V.

III. The Proper Use of Insecticides

A. Know the Pest

The identity, life cycle and habits of the pest is essential information if your spraying programme is to be successful. A little reading on insect lore can give a much greater understanding of the problem that is to be faced.

Firstly, it is necessary to realize that many insects can breed very rapidly, often asexually, going through a generation in ten to twenty days. The eggs of insects are rarely destroyed by insecticides and so one application of spray will kill the adult insects and leave a new generation unscathed in the eggs ready to hatch out. It is important then, to repeat the attack on them every ten days for a month.

Secondly, remember that some tough individuals will survive your spraying and will transmit their resistance to their offspring. You should use a different insecticide for each application to ensure that a population resistant to any given pesticide cannot develop.

Thirdly, you should pay attention to whether your pesticide will actually reach and kill the insect or not. Consider those with waxy shields, the scale insects, or those resident below the soil level, e.g. root mealy bug. Emulsifiable concentrates contain a percentage of synthetic detergent so that they can be mixed with water but additions of white oil may be necessary to dissolve waxy coverings and allow penetration of the insecticide. Dipping of the pot is more effective than spraying to eliminate root mealy bug.

A period of thought and some research will help you to take effective action—you must know the enemy!

B. Danger to Man and Animals

You must realize that pesticides can also be a subtle enemy. It has been mentioned that OC compounds are persistent and very toxic and the action of OP and carbamate materials has also been described. However, it should be borne in mind that even slight exposure may lead to headaches, irritation to sensitive tissues, nausea, dizziness and other unpleasant effects.

Moreover, these chemicals have varying effects on animals other than man. The following notes give an idea of the compounds to which some animal groups are particularly susceptible.

- (i) TOXIC TO BIRDS: DDT, DIMETHOATE, FENTHION.
- (ii) TOXIC TO BEES: DIMETHOATE, ARSENICALS, CHLORDANE, MALATHION.
- (iii) TOXIC TO FISH: CARBARYL, CHLORDANE, DDT, DIELDRIN, DIMETHOATE, ENDOSULFAN, ROTENONE.

N.B. Snail baits may be attractive to CATS and DOGS.

C. Safety Precautions

(1) Storage of Poisons

Pesticides should be stored in the container in which they are purchased and made into solutions only as required. Storing the diluted solution will hasten its degradation, especially if subjected to heat or to light. The usual container for emulsifiable concentrates are dark glass bottles. This acts as a warning of their toxicity, slows decomposition and avoids problems of corrosion. Dusts and wettable powders are sold in cardboard cylinders with metal caps.

All poisons should be CLEARLY LABELLED and must be locked away out of the reach of children and the weather.

(2) *Read the Label*

Read the label carefully to determine the recommended mixing proportions and take notice of any information regarding the dangerous properties of the material. Be sure that it is suitable for your purpose and follow the precautions that are recommended on the label.

(3) *Protective Clothing*

Skin absorption of poisons is the greatest hazard to the home gardener and adequate measures should be taken to avoid contact with the insecticide vapour. Wear a hat, impervious gloves and footwear, and clothing that covers the body from the ankles to the throat and to the wrists. A respirator is also advisable to avoid inhalation of the vapours.

(4) *Mixing and Application*

When you have donned all the necessary protective clothing and everything that you require to do the job has been assembled, then proceed to mix the solutions. Make no more than is required, re-cap all the containers and return them to their locked cupboard as soon as possible.

DO NOT SMOKE while preparing mixtures, many concentrates are dissolved in kerosene; and it is also possible to transfer some of the poison to the lips.

All protective and spraying equipment should be in good working order and without leaks. Pouring the solution over the plants or dipping the pots into the solution will reduce the amount of insecticide in the air but splashing and spilling the liquid must be avoided. Never allow the concentrate or solution to touch your bare skin.

Spray only where the material is needed and where it will be effective. Insecticides may be carried on the breeze to neighbouring gardens causing your neighbours and their pets great discomfort.

NEVER SPRAY ON WINDY DAYS.

(5) *Afterwards*

Check to see that all dangerous materials have been removed and correctly stored. The hands should be washed before smoking or eating. Change your clothing immediately and take a shower. The clothing used should be washed regularly and SEPARATELY from the family laundry.

D. *Avoiding the Use of Insecticides*

It is certainly preferable to avoid insecticides than to use them, even with the greatest care.

Companion planting, onion sprays and physical methods have all been discussed and should be given a trial at least.

The best situation is one where the pests are not allowed to gain a foothold in the collection. The first step is to make sure that all pests currently infesting your plants are destroyed. Remove any rubbish that can provide hiding places for cockroaches, beetles, crickets or ants. For a month make an intensive daily check for any sign of insect pests. Remove and burn any dead plants or soil infested with pests.

Once rid of all pests you must reduce the probability of reinfestation. This is a difficult task but the following actions will be helpful.

1. *Quarantine* all new plants and cuttings in an enclosed place some distance from your collection. Mealy bug, for instance, can move up to 5 cm. per minute so distance is not an insurmountable barrier to them.

2. *Repot* all new plants into fresh soil, burning the old soil and destroying any pests that come to your notice. Wash the pot that brought the plant for it may harbour eggs or adult insects.

3. *Transfer* the new plants to your collection when you are sure that they are pest free.

4. *Inspect* all your plants regularly and take appropriate action immediately.

IV. References

- Lyle & Heavner (1975). In J. Org. Chem. 40(1): 50-54.
 Potocki-Roth, B. (1974). In Kakt. u.a. Sukk. 25(4): 94.
 Tafuri et al. (1977). In J. Agric. Food Chem. 25(2): 353.
 Takusagawa & Jacobsen (1977). Ibid. 25(2): 329.

V. Appendices

A. TABLE 1. COMMON INSECTICIDES AND THEIR TOXICITIES

NAME	CLASS	LD ₅₀ mg/kg (rats-oral)
Aldrin	OC	45-70
Arsenicals	Inorganic	—
BHC (Lindane)	OC	90-125 ^a
Benomyl	Carbamate	10,000
Carbaryl	Carbamate	850 ^b
Chlordane	OC	450-600
DDD (TDE)	OC	2500
DDT	OC	100-250 ^c
Demeton-S-Methyl	OP	40 ^d
Dimeton-O-Methyl	OP	180
Dicofol	OC	680-810 ^e
Diazinon	OP	125
Dichlorvos	OP	25
Dieldrin	OC	45-55 ^f
Dimethoate	OP	245-400 ^g
Disulfoton	OP	10
Endosulfan	OC	55-220 ^h
Fention	OP	215-245 ⁱ
Formothion	OP	400
Heptachlor	OC	100-160
HETP	OP	7
Malathion	OP	3000-5000
Menazon	OP	2000
Metaldehyde	Aldehyde	—
Methoxychlor	OC	2000
Mevinphos	OP	7
(Phosdrin)		
Morphothion	OP	200
Nicotine	Botanical	50-60
Parathion	OP	3.5-13
Phosphamidon	OP	17
Pyrethrins	Botanical	1500
Rotenone	Botanical	60
Ryania	Botanical	1200
Schradan	OP	10
TEPP	OP	2
Toxaphene	OC	60
Trichlorphon	OP	450
(Dipterex)		

- a. 100 mg/kg dermal for rats.
 b. 4000 mg/kg dermal for rats, 020 mg/kg for rabbits.
 c. 2500 mg/kg dermal for rats.
 d. 65 mg/kg for technical Metasystox.
 e. 1870 mg/kg dermal for rabbits.
 f. 10-102 mg/kg dermal for rats. Less than 40 parts per billion for goldfish.
 g. 500-600 mg/kg of the pure compound.
 h. 75 mg/kg for dogs, 200-750 mg/kg for ducks.
 i. 320-330 mg/kg dermal for rats.

B. TABLE 2. PHYTOTOXICITY OF SOME INSECTICIDES

Poison	Tolerant	Plant Susceptible	Not Known
BHC	Bromeliads Cacti Crassula Cissus Echeveria Euphorbia	Kalanchoe	
DDT	Bromeliads Cacti Euphorbia	Kalanchoe Crassula	Cissus Echeveria
METASYSTOX	Cacti Kalanchoe	Bromeliads Echeveria Euphorbia Crassula	Cissus
DICOFOL	Cacti Kalanchoe Crassula		
DIMETHOATE	Cacti Some Crassula	Bromeliads Cissus Some Crassula	Cissus Echeveria Euphorbia Cissus
MALATHION	Most Cacti Euphorbia Most Kalanchoe Most Crassula	Bromeliads Some Cacti Echeveria Some Kalanchoe Some Crassula	
NICOTINE DIAZINON	Most plants Most Cacti Kalanchoe Crassula	Bromeliads Some Cacti Cissus Euphorbia	Echeveria
ALDRIN DIELDRIN ENDOSULFAN DICHLORVOS	Echeveria Euphorbia Echeveria Euphorbia Euphorbia	Bromeliads	

C. TABLE 3. COMPATIBILITY OF MATERIALS USED IN SPRAYS

	BHC	Captan	Chlordane	Copper Oxychloride	DDT	Dicofol	Dieldrin	Dimethoate	Lime	Lime/Sulphur	Malathion	Nicotine	Sulphur	White Oil	Zineb
BHC	C	C	C	D	C	C	C	C	I	I	C	D	C	C	C
Captan	C	C	C	D	C	C	C	C	I	I	C	D	C	C	C
Chlordane	C	C	C	C	C	C	C	D	I	D	C	D	C	C	C
Copper Oxychloride	D	D	C	C	C	D	C	C	I	I	D	C	C	C	D
DDT	C	C	C	C	C	C	C	C	I	I	C	C	C	C	C
Dicofol	C	C	C	C	C	C	C	C	I	C	C	C	C	C	C
Dieldrin	C	C	C	C	C	C	C	C	I	C	C	C	C	C	C
Dimethoate	C	C	D	C	C	D	C	C	I	C	D	C	C	C	D
Lime	I	I	I	I	I	D	C	I	I	C	D	C	C	C	C
Lime/Sulphur	I	I	D	I	I	D	C	I	I	C	D	C	C	C	D
Malathion	C	C	C	D	C	C	C	C	D	D	C	C	C	C	C
Nicotine	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C
Sulphur	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
White Oil	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Zineb	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

C = Compatible. I = Incompatible. D = Doubtful compatibility.

***Dorstenia renneyi* sp. nov.**

by H. K. Airy Shaw and N. P. Taylor

Royal Botanic Gardens, Kew
Richmond, Surrey

Dorstenia renneyi Airy Shaw and N. P. Taylor, **sp. nov.**, aff. *D. zanzibarica* Oliv. sed fere glaberrima, caule erecto simplici vel superne breviter ramoso, hypanthodiis brevissime (usque 5 mm.) pedunculatis plerumque quadratis (2-)4(-5)-brachiatis glabris brachiis robustis subaequalibus 10-12 mm. longis apice tumidis obtusis, stylis alte bifidis, distincta. Holotypus: Cult. Hort. Bot. Reg. Kew. (accn.no. 291-70.02846), orig. coll. Kenya, Cent. Prov., Kitui Distr., Matomo (Mutomo) Hill (1°51'S, 38°12'E), sandy soil on granite outcrops, 900-1000 m., coll. *Renney* s.n., comm. Gillett (K).

DESCRIPTION. An erect glabrous perennial succulent herb, sparsely branched above, arising from a globose to discoid tuber 3-4 cm. diam. Stem 20-40 cm. tall, terete, 3-7 mm. diam., bare and purplish in the lower portion at maturity (not scaly), containing milky latex. Leaves spatulate, 6-8 cm. long including the 1 cm. long, often purplish petiole, 2-3 cm. wide, long-attenuate at base, broadly ± rounded to obtuse or subacute at apex, margin entire toward base, irregularly lobulate-denticulate toward apex, midrib and main nerves impressed above, prominent beneath, stipules minute, dentiform. Hypanthodia arising singly or in pairs in the leaf-axils, nodding, on short decurved peduncles 5 mm. long, mostly ± quadrate in outline, 8-15 mm. diam., light green; marginal appendages (arms) (2-)4(-5), stout, smooth, ± porrect or spreading when old, with an obtuse oblong thickening at the apex and there flattened on the adaxial surface, hypanthodium sometimes with three appendages closer together above and one remote below, adjacent to which are two pocket-like cavities near the margin; disc of hypanthodium slightly convex, margin smooth, glabrous. Male flowers numerous, size and shape irregular and ill-defined, (?) 1-3-androus; females fewer, emergent part of style deeply bifid with divaricate lobes. Fruit (achene) c. 2.5 mm. diam. prior to dehiscence; ejected endocarp (containing seed) 1 mm. diam., trigonous, pale brown, marked with three raised lines separating flattened areas ornamented with small conical tubercles truncate at apex. (See plate for further details of flowers and diaspore.)

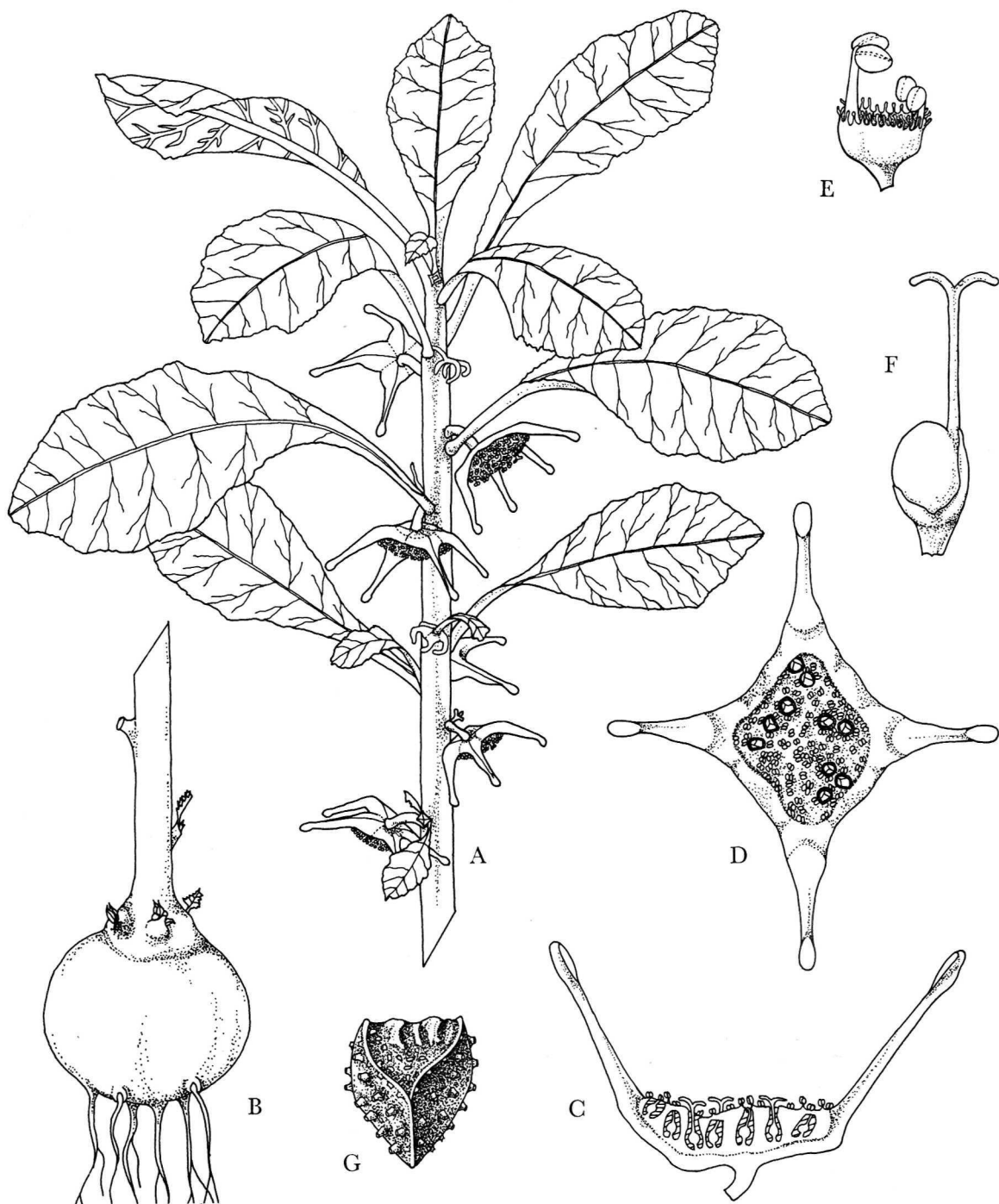
While walking through the glasshouses of the Lower Nursery at Kew during a lunch-break, we noticed a plant that seemed to be flourishing as a weed beneath the staging, having escaped from its pot on the bench above. Looking at it more carefully, we realised that it belonged to a very curious and interesting genus, namely, *Dorstenia*, a member of the family *Moraceae*, and closely related to *Ficus*, the fig genus. The inflorescence of *Dorstenia* is a remarkable structure, rather like a fig turned inside out, and usually fringed with tentacle-like appendages ('arms'). The technical term for this highly specialised inflorescence is a *hypanthodium*, and

like the inside surface of a fig, the *Dorstenia* hypanthodium is made up of a dense layer of almost microscopic male and female flowers, each reduced to the 'bare essentials' and imbedded in receptacular tissue.

Further enquiry concerning this *Dorstenia* elicited the fact that it had been sent to the Herbarium for naming some few years previously, and had been determined by two colleagues of ours as *Dorstenia* sp. nov., aff. *D. zanzibarica* Oliv. Our colleagues had, however, taken the matter no further, and had not ventured to describe the plant with a new name. We felt therefore, as the plant obviously succeeded well under cultivation and was quite an attractive subject, that it would be worth looking into further, especially in order to discover whether it really did represent an undescribed entity, and if so, to describe it and give it a name.

Dorstenia is a group that occurs in almost all tropical countries, but of the species seen in succulent plant collections, most are natives of NE. Africa and S. Arabia. Reference to the Kew plant records system indicated that our unidentified specimen also came from this region, having been collected at Matomo in Kenya. Probably well over 100 species of *Dorstenia* are now known from tropical Africa, where the genus is in need of considerable study, particularly in the hope that a sound infrageneric classification can be developed. In the famous floristic-taxonomic work, *The Flora of Tropical Africa*, vol. 6 pt. 2 (1917), the botanist Rendle listed no fewer than 94 species of this genus. We turned to this account in order to discover whether our plant could be fitted in anywhere. Rendle provided an elaborate dichotomous key to the African species, arranging them in groups according to various characters.

His first main dichotomy was based on whether the two styles of the female flower were joined to the top as one, or were divided and free, at least near the apex. If they were joined together, this group represented Forsskal's old genus *Kosaria*, which Engler had used some years previously as a subgenus of *Dorstenia*; and Rendle still kept this small group of species together. Now *D. zanzibarica* belongs to the *Kosaria* group having a ± fused style, but our new species clearly had two free styles above the level of the hypanthodium, and so on this character it did not seem to belong with its supposed ally. We therefore started to look laboriously through the complicated key to the remaining groups, totalling 80 or more species. Some of the groups were



Dorstenia renneyi Airy Shaw & Taylor. **A**, flowering shoot, x1; **B**, base of shoot with tuber, x1; **C**, hypanthodium in vertical section, showing female flowers enclosed in pits, x2; **D**, hypanthodium from above, showing fruits, x2; **E**, male flower, x24; **F**, female flower, x14; **G**, seed, x22.
 Drawn from living material by Jackie Panter.

clearly unsuitable for our plant, but others seemed 'possible'. However, examination of herbarium material at Kew showed that none of these were closely related, leaving only the *Kosaria* group for consideration. Here, despite the stylar difference, *D. zanzibarica* Oliv. is obviously the true affinity for the plant we are now describing as *D. renneyi*. It seems that too much weight has been laid on the stylar structure, to the extent of obscuring the more natural relationships of habit, foliage, tubers, etc.

Apart from the divided style *D. renneyi* is distinguished from *D. zanzibarica* on account of the short (5 mm.) hypanthodium peduncle, and much longer (8–10 mm.), correct hypanthodial appendages.

The accompanying plate has been drawn for us by our colleague Miss Jackie Panter. The specimen figured (the holotype) was raised from self-sown seed at Kew,

from plants originally sent by Mr. J. Gillett of Nairobi, in 1970. The plant was discovered at Matomo Hill, Kenya, by Mr. C. A. Renney, a keen horticulturist and member of CSSGB, for whom it is named. Mr. F. Horwood has briefly mentioned and figured this species in *Cact. Succ. J. Amer.* 46: 225–6, figs. 8 & 9 (1974), but, so far as we know, has not attempted to formally describe it himself.

D. renneyi has been at Kew for the past ten years and seems easy to grow. The forcibly ejected 'seeds' (endocarp diaspores) readily germinate in the pots of adjacent plants, and so propagation results from the weeding that then becomes necessary. The plant does well under the bench in partial shade and requires liberal watering. A minimum winter temperature of 10°C (50°F) is probably advisable, but further experimentation is required to ascertain the species' tolerance of cold.

Literature Notes

Excelsa

Excelsa No. 8, dated 'October 1979', arrived for review in May 1980 and as always brings a feast of meaty articles, well presented and generously illustrated. It is priced at ZR 5.00 (about £1.70) or ZR 10.50 (£3.50) for the De Luxe edition and has 95 pages, four of which are in full colour.

Bruce Bayer has been analyzing the *Haworthia* herbarium of G. G. Smith and presents a critical account of those specimens referable to *H. mutica* and *H. retusa*. D. C. H. Plowes reviews 'The *Huernia guttata* Complex', with the aid of 16 of his superb coloured photographs. Brian Fearn takes up the distribution of the Mesembryanthemaceae, presented in the form of numerous maps and tables, and Prof. Desmond Cole leads us enchanted to the richest gem of the diamond areas: *Lithops optica*.

The account of 'Fascinating Cacti of Baja California' by Larry Mitich strangely omits mention of Reid Moran's work—notably his interpretation of *Pachycereus orcuttii* as an intergeneric hybrid, x *Pachycereus orcuttii*. The inexhaustible editor, Mike Kimberley, contributes a valuable 23-page register of all new aloes—32 names—from Tropical Africa published since Reynold's book of 1966. He also partners T. Gane in a note on Zimbabwe's two cacti listed as noxious weeds: *Opuntia aurantiaca* and *Harrisia martinii*, and reviews 13 new books—too leniently, in my opinion, to be of help since some contain awful errors.

Further aloe papers deal with *A. globuligemma* (by A. Ewbank) and the current vogue for using *A. vera* in cosmetics (by A. Leung). Off the beaten track is a well-written and fascinating introduction to 'Gregor Mendel—from oblivion to immortality' by V. Popiel.

G. D. ROWLEY

Asclepiadaceae No. 20

The journal of the International Asclepiadaceae Society goes from strength to strength under the editorship of Colin C. Walker and a reprint of the first eight issues is now available (price £6.50 or \$15 US from P. J. Mitchell, 11 Wingle Tye Road, Burgess Hill, West Sussex RH15 9HR). The latest issue, 40 pages plus introductory matter, is a very wide-ranging amalgam of original and reprinted texts, and includes a three-cornered exchange between Larry Leach, Frank Horwood and Gordon Rowley on the naming of intergeneric hybrids, articles on particular genera and species, pollination, cultivation, letters and so on. A literature survey by the editor covers a dozen recent contributions on the family and gives some idea of the current high level of interest in the family. Illustrations include two original colour prints, several half-tones and numerous line drawings. (Publisher: International Asclepiadaceae Society, c/o Dr. C. C. Walker, Dept. of Microbiology, School of Agriculture, University of Edinburgh, West Mains Road, Edinburgh EH9 3JG. Subscription: £4 per annum.)

More Asclepiadaceae

The latest part of the *Flora of Southern Africa* to be published (numbered Vol. 27 part 4, but the volumes are not issued in numerical sequence), contains R. A. Dyer's treatment for this area of the genera *Brachystelma* (69 spp.), *Ceropegia* (53 spp.) and *Riocrexia* (6 spp.), the last-named being restored to generic rank. My colleague David Field says 'keys dealing with such complicated plants cannot be simple, but those provided in this work should enable us to identify the species occurring in this part of the African continent. Dyer gives due emphasis to the important character of the rootstock, which is often frustratingly absent from preserved herbarium material because of the difficulties of digging it out from between boulders or the roots of trees.' All the

species enumerated by Dyer have full descriptions in English and there are some illustrations. The work is available from: Division of Agricultural Information, Dept. of Agricultural Technical Services, Private Bag X144, Pretoria 0001, South Africa, price 6 Rand (about £2.50), post free.

Dyer's recognition of *Riocreuxia* Dcne., which had been included in *Ceropegia* by Huber, is symptomatic of the current fashion for generic splitting amongst asclepiadologists. *Caralluma* is one of the principal targets, not without justification, of course, but some of the more problematical species are gathering generic synonyms like South American cephalocereii. Latest group promoted to genus is one from North Africa, Arabia and India with flowers in umbels, for which Gilbert & Raynal have reintroduced the old name *Desmidorchis* Ehrenb. (Gilbert, M. G., & Raynal, J., The Status and Typification of *Desmidorchis* Ehrenb. and *D. retrospiciens*. In *Adansonia* 19: 319-323. 1980).

Typification of *Stapelia*

In my review 'Orbea back in Orbit' (CSJGB 41(1): 10. 1979), I stated that *S. variegata* is cited as the type of the genus by the International Code of Botanical Nomenclature. This is not so. *S. variegata* was the lectotype of the genus proposed by Hitchcock & Green in a supplement to the International Rules of Nomenclature (ed. 3, 1935). It is also accepted as lectotype by Index Nominum Genericorum, a publication of the International Bureau for Plant Taxonomy (Utrecht, 1955-), but neither of these citations has a mandatory effect.

The typification of *Stapelia* is a tricky nomenclatural teaser. *S. variegata* was the 'original' species, but may Linnaeus be deemed to have designated it as the type? If 'yes', then Haworth was out of order in transferring it to *Orbea*. If 'no', then the choice of lectotype is between *S. variegata* and *S. hirsuta*. As Leach has argued, Haworth placed *S. variegata* in *Orbea*, leaving *S. hirsuta* as the only Linnaean species in *Stapelia*. But the rules do not make it clear whether such implied residual typification is procedurally acceptable, and it could be argued that Haworth's choice was arbitrary within the meaning of ICBN Article 8.

Proposals to clarify the rules concerning lectotypification will be submitted to the next International Botanical Congress in 1981.

The name of one of Leach's new genera was also mis-spelt in my article. For '*Paracymbium*' read *Pachycymbium*.

D. R. HUNT

Wanted: Hybrid *Echeverias*

Member John Collins wants to buy or exchange American hybrid *Echeverias*: 'top prices given or good quality swaps of same'. Write to him at 15 Woodstock Crescent, Blackburn, Lancs. BB2 5AZ or tel. Blackburn 28479.

Forthcoming Events

Society's Pimlico Show, Saturday, 4 October, 2 p.m.

Details of the Show Schedule for our autumn show at St. Saviours Church Hall, St. Georges Square, Pimlico, were in the last issue. If you have not yet obtained your schedule please send a stamped-addressed foolscap envelope to Mr. Derek Bowdery, the Show Secretary, as soon as possible, or ask your Branch Secretary for one. Please help the Show Secretary by sending in your entry form and due fees as soon as possible. All those entering five or more classes will have a free entry ticket for the Show, otherwise charges are 20p adults and 10p children and Senior Citizens.

Pine Ridge Cacti (Mr. and Mrs. Smeaton) will have plants for sale on the platform and there will be the usual range of Society goods, seeds, etc. available on the Society stand. Tickets for the Grand Draw are now available and can be obtained from Mrs. Maddams or from Branch Secretaries. There will also be a tombola and it is hoped that members will bring along suitable prizes for this or send them to Mr. Bowdery or Mrs. Maddams beforehand. Mrs. J. Ellis, 6 Buxton Crescent, North Cheam, Surrey, would like to know of any members willing to help with refreshments and also those willing to supply cakes, savouries etc. on the day. Anyone else willing to help on the various stalls or on the door should contact Mr. Bowdery or Mrs. Maddams.

Annual Dinner, 22 November, 1980

Venue: Caprini Restaurant, 77 Waterloo Road, London S.E.1.

Time: 6.30 p.m. for 7 p.m.

Cost: £6.00 (includes VAT and service, but not drinks).

Booking: Please inform the Secretary, Mr. R. H. I. Read, 5 Wilbury Avenue, Cheam, Surrey SM2 7DU, as soon as possible if you wish to attend, enclosing your remittance for £6 per person. **Please note that a special booking form is not being sent with the Journal this year.** When writing to Bob Read, please give the names of members and guests in your party.

After dinner, Mr. W. L. Tjaden will give an illustrated talk about his visit to Mexico.

Meritorious *Mammillarias*

Following the success of his earlier booklet, 'Interesting New *Mammillarias*', our Chairman has penned another, dealing with forty *Mammillaria* species which deserve to be more widely grown. 'Meritorious *Mammillarias*' is available from GB Society Branches, price £1, or price £1.20 by post from the author at 26 Glenfield Road, Banstead, Surrey, SM7 2DG.

Branch Activities

Items for inclusion in the next Issue must reach the Editors no later than 3 October.

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 E12.

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

Future events:

- | | |
|------------|--|
| 4 October | Euphorbia Study Evening (please bring plants, photos and slides) |
| 1 November | South America Part 1 (Paul Sherville) |
| 6 December | Christmas Social Evening |

North London

Secretary: Roger Day, 50 Admiral's Walk, Hoddesdon, Herts. tel. no. Hoddesdon (STD Code from London: 61) 69521.

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

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

Future Events:

- | | |
|--------------|-----------------------|
| 19 September | Mini Show |
| 17 October | Branch A.G.M. |
| 21 November | Morocco (Alan Gibson) |
| 19 December | Christmas Meeting |

The Annual Branch Show on 31 May/1 June was once again well-supported despite threatening weather on the Saturday. Overall winner was Jean Pearson of Waltham Abbey.

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 Restricted Branch Competition on 3 June brought the usual good number of high standard entries and the judges, Terry and Jennifer Smale, had quite a difficult task. No doubt those who did not win at least benefited from Terry's helpful comments afterwards. Len Jeffries amassed the highest total of points and will be awarded the Mellins Cup, the runner-up was Nigel Bentley.

Future events:

- | | |
|-------------|---------------------------------------|
| 2 September | Mesem Study Meeting with Suzanne Mace |
| 7 October | Overcoming inflation (George Hollis) |
| 4 November | Borziactinae (Paul Sherville) |
| 2 December | Members' Slides |

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.

Future events:

- | | |
|--------------|--|
| 24 September | Visit to Mexico, 1980 (Heinz Klein, Troisdorf, W. Germany) |
| 8 October | Aloes (A. Hart) |
| 12 October | Special Event: see below |
| 12 November | Mexican Evening |

A Special Event will be held at Padgate Community Centre, Warrington, on 12 October, when Mr Tom Jenkins will present two talks on his recent visit to Kenya and there will be a third lecture (to be announced later). Lunches and teas will be available. For further details, contact Branch Secretary.

Wirral

Secretary: Mrs. I. Boote, 110 Mount Pleasant Road, Wallasey, Merseyside L45 5HU, tel. no. Wallasey (051639) 4305.

Meeting Place: The Grange, Grove Road, Wallasey.

Time: 3rd Thursday in month, 7.45-10.30 p.m.

The Cactus and Succulent Journal of America

Six issues per year, fully illustrated, total on average 300 pages and catering for all levels of interest. Subscription: \$16.00. Apply direct to Box 3010, Santa Barbara, California 93105, USA.

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, Wretton, 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 4x8p 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. Penrhyneddurath (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, 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.

Gloucestershire

W. G. Geissler, 1 Lyefield Road, Charlton Kings, Cheltenham GL53 8BA. Tel. no. Cheltenham (0242) 517846. Open weekends and evenings. No list, no orders by post, but visitors very welcome in Cotswold country.

P. Strong, Green Mead, Green Lane, Chedworth, Cheltenham GL54 4AR. Tel. no. Fossebridge (028572) 581. Surplus seed-raised plants.

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 Buttondene 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, Telscombe Cliffs, Sussex BN9 7LG. Tel. no. Peacehaven (07914) 3260. Open by appointment; closed Sundays. Send 12p 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. Send 25p for current catalogue of plants and seeds. 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. Sargent) Hamptreston Village, Wimborne, Dorset BH21 7LX. Tel. no. Northbourne (02016) 3829. Not open Sundays and Mondays. List 12p. Plants and seeds.

Devon

Phil Goodson, 1 Marsh Lane, Chudleigh, Newton Abbot, Devon. Tel. no. Chudleigh (0626) 852309. Collection open, plants usually for sale. Between the scenic Teign Valley and Haldon Hills, five miles from M5. 'Phone for directions and convenient times.

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 Devonian Collection of Cacti & Succulents; over 4000 species. Surplus plants for sale or exchange.

Westfield Cacti (Ralph Northcott), 10 Shillingford Road, Alphington, Exeter, Devon. Tel. no. Exeter (0392) 56925. Nursery grown cacti and other succulents. S.A.E. for list. Open to visitors from 1 January 1981, 9.00 a.m. till dusk, by appointment.

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 12p. Large selection succulents. Cornish cream teas June-Sept. incl.

Christmas Cactus Colour Break!

BRISTOL BELLE

This new seedling has typical Christmas cactus pendant and symmetrical flowers but the petals are rose pink shading to orange-red. The whole effect, especially with the bright orange-red buds, is most striking and unusual. Send stamp for details of this and other choice Schlumbergera (Zygocactus) cultivars including Award of Merit 'Bristol Princess'.

**A. J. McMillan, 18 Torridge Road, Keynsham
Bristol BS18 1QQ**

Hoyas - Senecio - Crassula - Ceropegia

Please write for price-list

MARIN CACTUS PATCH

**61 Granada Drive
Corte Madera, California 94925, U.S.A.**

H. GUIRL

Grower of Cacti and Succulent Plants

**'Glenholme' Nursery Road
Nazeing, Essex**

Telephone: Hoddesdon 62291

Sorry - No Lists

● VISITORS AND PARTIES WELCOME ●

A prior telephone call would be appreciated

Whitestone

Whitestone Gardens has everything for succulent fanatics and beginners. A large stock of plants, seeds, books and sundries is constantly on view, and the nursery is open to visitors every day.

Our plants are primarily nursery-grown seedlings, but we also stock a range of larger plants. The nursery shop carries almost everything ever likely to be needed by the cactus enthusiast, including a range of books and other publications which is the most comprehensive in the world. We stock every book in print and many that aren't—why be kept waiting by your local bookseller when you can ring or write to us and get your needs by return of post.

Most of the Whitestone Collection is permanently on view to visitors—free of charge. This is constantly expanding, and now represents one of the best displays in the country. It is of special interest to serious students by virtue of the logical arrangement and the high proportion of authenticated reference material.

Anyone who hasn't been before can find us about 3½ miles from Thirsk on the A170 Scarborough road in the heart of North Yorkshire's most attractive tourist countryside.

1980 Whitestone Price List 45 pages of plants, books, seeds, and sundries, illustrated in full colour and monochrome. Free to existing clients (sent automatically). New UK customers please send *four 8p stamps*, and overseas customers *three International Postal Reply Coupons*.

A few popular book titles from our extensive range:

Cactus Lexicon (Backeberg) £25 plus 86p post

Illustrated Encyclopaedia of Succulents (Rowley) £7.95 + 80p post

Cacti: Botanical Aspects, Descriptions & Cultivation (Barthlott)
£7.95 + 50p post

Illustrated Reference on Cacti & Other Succulents (Lamb)

Vols. 1, 2, 3, 4 £7.50 per Vol. + 50p post each

Vol. 5 £8.50 + 50p post

The Cactaceae (Britton & Rose) 2 Vols. £25 + £1.25 post per set

Cacti & Succulents—A Concise Guide in Colour (Subik & Kaplicka)
£1.50 + 40p post

Post indicated above applies to UK and surface mail overseas

STILL WANTED!

Obsolete publications, especially American journals (we pay 50p per issue), NCSS and GB Society journals (we pay 15p per issue) and all kinds of books for our second-hand trade.



Whitestone Gardens Ltd
The Cactus Houses
Sutton-under-Whitestonecliffe
Thirsk
North Yorkshire YO7 2PZ

Telephone: Sutton 467

You will find a warm welcome
and a good selection of
cacti and succulent plants
at

THE CACTUS PLACE

(DAVID & BARBARA
BREWERTON)

33 BRIDGE AVENUE, UPMINSTER,
ESSEX, RM14 2LX

*"The Cactus Place" is almost
always open, but please phone
Upminster 29911*

Collections Bought — No Lists Issued
BRANCH VISITS BY APPOINTMENT

CACTUS and SUCCULENT PLANT SEEDS

from the deserts
of the world

s.a.e. for latest list.

SOUTHWEST SEEDS
200 SPRING ROAD
KEMPSTON
BEDFORD
ENGLAND

*Seeds despatched Air Mail
to all parts of the World.*

The National Cactus & Succulent Society

has over 100 Branches meeting
regularly in all parts of the British
Isles. The quarterly journal re-
plete with scientific and cultural
information, news and views, has
the largest circulation in the
English-speaking world, and is
amply illustrated on art-paper.
Seed-list with December issue.

Annual subscription £3.00 or \$7.50 U.S.

Further details from the Membership
Secretary, Miss W. E. Dunn, 43 Dewar
Drive, Sheffield, England S7 2GR, to
whom applications for membership
should also be sent.

WHELDON & WESLEY LTD.

Buy and Sell

BOOKS

on all branches of

NATURAL HISTORY

especially

Botany & Horticulture

in all languages

LYTTON LODGE,
CODICOTE, Nr. HITCHIN,
HERTS.

Telephone: Stevenage (0438) 820370
Telegrams: Wheldwesly, Codicote, Hitchin

Volume 42/Number 4
November 1980

The Cactus and Succulent Journal of Great Britain



President: A. BOARDER

Vice-Presidents: H. A. AUGER, Mrs H. HODGSON
Mrs. M. STILLWELL, J. E. TAYLOR

Chairman: W. F. MADDAMS, M.SC., M.INST.P.

Hon. Secretary: R. H. I. READ, 5 Wilbury Avenue, Cheam,
Surrey, SM2 7DU.

Hon. Treasurer: D. R. HUNT, M.A.

Council: Dr. C. W. BIRD, D. BOWDERY, K. GRANTHAM,
L. HURLEY, Miss M. A. T. JOHNSON, Mrs. B. MADDAMS,
J. W. PILBEAM, Mrs. D. PRITCHARD, P. SHERVILLE



Editor: D. R. Hunt, M.A., 67 Gloucester Court, Kew Road, Richmond, Surrey, TW9 3EA.

Assistant Editor/Librarian: N. P. Taylor, B.Sc., c/o Editorial Office.

Show Secretary: D. Bowdery, 14 Callander Road, Catford, London, SE6 2QD.

Publicity Officer: Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey, SM7 2DG.

Seed Purchasing Officer: Dr. T. C. Smale, 28 St. Leonard's Road, Epsom Downs, Surrey.

SUBSCRIPTION RATES 1981

Full Membership		£6.50
Joint Membership		£7.50
Junior Membership (under 18 years)		£4.00
Senior Citizens' who joined in 1975 or earlier		£4.00
Joint members (two in family) receive one journal but are entitled to free seeds and voting rights.		

BACK VOLUMES

Vol. 24 (1962)—Vol. 36 (1974), per volume	£2.50
Vol. 37 (1975), nos. 3—4 only	£1.00
Vol. 38 (1976)—Vol. 41 (1979), per volume	£5.00

Prices include postage by surface mail.

INDEXES

Vol. 26-30 (1964-68)		0.90p
Vol. 31-37 (1969-75)		0.90p

Applications for membership, advertising, back volumes and indexes should be made to the following address:

Cactus & Succulent Society of Great Britain
67 Gloucester Court
Kew Road
RICHMOND
Surrey TW9 3EA
England

SOCIETY SALES ITEMS

All items post-paid inland. Overseas extra.

Journal Binders (to hold 4 vols.)		£4.00
Society badge		£1.00
Car sticker		0.30p
Booklet on cultivation		0.30p
Key fobs (mixed colours)		0.25p
Ballpoint pens (black, blue or red)		10 for 0.60p
T-Shirts and Sweatshirts		write for details

Order from: **Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG, England.**

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 illustration: *Rebutia pseudominuscula* flowering in the collection of Walter Rausch, near Vienna. See page 104. (Photo: 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 42 Number 4 November 1980

edited by David Hunt and Nigel Taylor

In this issue

Pollination Syndromes and Cactus Taxonomy	95
<i>Duvallandra</i> : a new genus of stapeliad	99
Choice Liliaceae	102
Connoisseur's Cacti	104
Decent re-burial for <i>Echinofossulocactus</i>	105
<i>Ferocactus</i> and <i>Stenocactus</i> united	108
The identity of <i>Austrocylindropuntia weingartiana</i>	109
A new variety of <i>Ceropegia rupicola</i>	111
The Society's 1980 Seed Distribution:	
A germination report (cacti only)	113
Notes from Members	117
Branch Activities	118

Shurly Award

We are pleased to announce that the first Shurly Award—a silver cup and a cheque for £20—has been won by JONATHAN CLARK, a student at Reading University, for his paper on 'The Stem Anatomy of *Opuntia fragilis* (Nutt.) Haw.'. The winning entry will be printed in our next issue.

For this first competition, the only restrictions placed on entrants were that their chosen topic should relate to the cultivation or study of succulent plants and should incorporate original ideas, observations or research. Not surprisingly, therefore, the six entries received were very diverse in content, ranging from seedling morphology, problems of classification and *Calandrinia* to bacterial infection and that other common disease, Succulentomania.

The five judges—Bill Keen, Bill Maddams, John Pilbeam, Terry Smale and David Hunt—were a little disappointed that the overall content of the entries was not more substantial or original, though recognizing the limited time and facilities available to most members who might like to enter.

Details of the next competition will be announced in the February 1981 issue of the journal.

Colour quality variable

When sending out the last issue, we rejected a number of copies where the colour printing was faulty: out of register (fuzzy) or with an overall bluish cast. Most of

the copies were very good (and the printers have made an allowance for the rejected ones), but if you think you got one that is substandard and would like a replacement, please return it to us.

We must also apologize for the late publication and distribution of the August issue, due partly to our running behind schedule and partly to the non-arrival of the address labels. Understandably, several members wrote to enquire if their copy had gone astray, but in our experience the Post Office does not lose many (if any), so 'not yet received' normally means 'not yet published'.

We hope to be back on schedule with the first issue of next year. Then, for the second issue, we have a number of longer articles to publish. For these, we plan to combine the May and August issues in one double issue, to appear in late May or June. The final issue of 1981 will be a special issue to commemorate the Society's 50th Anniversary.

Higher subscription rates

In addition to the 27½% increase last year, the basic cost of printing the journal has gone up another 15% this year, and will rise a further 22½% next year. Another increase in postal charges has also been announced which will affect all next year's issues. Consequently, we are obliged to raise subscription rates yet again. The new ordinary rate will be £6.50, joint membership £1 extra, junior and senior rates £4. Please send your renewal remittance as soon as possible to minimize our clerical work. A National Giro ('Postcheck') Account has now been opened for the convenience of our members in Europe and Japan. All members in the USA and Australia should send their renewals to the local agent. Full instructions are on the renewal invitation form.

FOR YOUR 1981 DIARY

28 March	Annual General Meeting
26 September	Pimlico Show
24-25 October	Warrington Weekend

Improved Free Seed Offer

As a result of a report on the 1980 seed distribution (printed on pages 113–116) the Society's Council have agreed that this service should be improved. It is not practicable to increase the number of seeds per packet yet, as most of the packeting is already done, but members will be entitled to receive up to 20 packets (instead of 10) free of charge (apart from postage) from the list to be published in the February 1981 Journal.

Merger talks continuing

Representatives of the GB and National Societies will be meeting on 22 November to discuss procedure for a ballot of members. Now that the idea of a journal merger has been widely aired and several viewpoints established, it seems desirable to use the ballot to determine members' attitude to the principle of a full merger of the Societies, which, for many seems the inevitable if not the *desirable* eventual outcome of a journal merger. The strengthened financial and administrative resources of a united Society would certainly have many advantages and might make possible a wider range of publications than is feasible at present.

50th Anniversary Celebrations

Although our Society was not formally set up until 8 March 1932, the 'birthday' of the Society has always been considered to be the date of the founding meeting at St. Brides's Institute on 28 November 1931, and on this basis we are now entering our 50th Anniversary Year. The first meeting of the year will be the AGM in March 1981, and plans are afoot for a display at the Royal Horticultural Society's Hall a month or two later. There will be another Pimlico Show in September and a special Anniversary Weekend at Warrington in late October. More details in the next issue.

Spirited efforts in Warrington

Is it the local Vodka distillery that gives Warrington Branch its vigour and *joie de vivre*? They *seem* sober enough (though the Asst. Editor received a can of beer as well as a warm welcome when he attended their September meeting unannounced—perhaps other branches could introduce this custom?), and we believe their success owes much to the untiring efforts of Hon. Sec. and founder member Daphne Pritchard and her stalwart committee colleagues. Those who attended the packed September meeting were treated to a fascinating lecture on Mexico by Heinz Klein. In August, the Branch staged an award-winning exhibit at the Southport Flower Show (Chelsea of the North). And now they are busy with plans for the Society's 50th Anniversary Weekend next October, when they are to be our hosts.

Pimlico Show

Exhibits at the Show on 4 October were again down on the previous year, but the quality of plants very good.

The Judges were Mr. and Mrs. Dick Smeaton and principal award winners included Graham Cryer (Banksian Medal, Sir Wm. Lawrence Cup, Shurly Cup and Pullen Cup), Mrs. Edmonds (Evelyn Theobald Cup, P. V. Collings Cup and Joan Farrow Memorial Cup), Len Jeffries (Ibbotson Cup), John Pilbeam (Sarah Cutler Cup and Luty Wells Cup), David Hooker (Mrs. Pryke-Howard Cup), Peter Bent (Denton Medal) and Jean Ellis (Denton Memorial Trophy). Both Novice Awards and the Pryor Award were won by Miss Best, 'Best Cactus in Show' was Len Jeffries's *Lophophora williamsii* and 'Best Succulent' was Don Best's *Euphorbia bupleurifolia* even larger and better than when illustrated on p. 112 of our November 1978 issue.

A list of lucky winners in the Grand Draw can be obtained from the Editors. The Committee thank those who sold draw tickets and everyone who exhibited or helped at the Show.

Seedling *Cochemiea* flowers

Mammillaria poseelgeri is notoriously a shy flowerer, but as with many species, some strains can be more obliging than others. There is some evidence that the form figured on the front cover of our last February issue is easier to flower than most. The plant illustrated was Gordon Rowley's; ours from the same population also flowered last year (but not this), and now seedlings raised from seed collected from plants in the population (which had obviously flowered fairly copiously) are beginning to flower at five years old. We had one at Chobham and Dick Smeaton reports another. The seed was distributed by the Mammillaria Society in 1975 (H.8738).

Non Arbores sed Arborum . . .

. . . as Pope Gregory might have said had he turned to page 102, where we have a welcome contribution from leading Kentish enthusiasts, Bill and Yvonne Tree. We have wishfully numbered their 'Choice Liliaceae' 1–3, hoping that they (or you) will send further illustrated notes to continue the series. We are keen to have illustrated notes on other 'other' succulents for publication, too, to complement our occasional series *Connoisseurs' Cacti*.

In addition to all their other work for the hobby, Bill and Yvonne Tree have recently taken over responsibility for handling NCSS membership renewals, Bill acting as NCSS Asst. Treasurer. And we are pleased to say Bill and Yvonne have agreed to present an illustrated programme at our AGM at Burgh Heath in March (see p. 118). These days, so much is done for so many by so few . . .!

Glossary

Syndrome (see next page): A place where geneticists go for a naughty weekend. (Prof. N. Yelwor).

Pollination Syndromes and Cactus Taxonomy

by Gordon Rowley

Plant Sciences
The University, Reading, Berks.

Introduction

Some plants achieve cross-pollination and seed dispersal independently of outside help from the animal kingdom. Many common deciduous trees make use of the wind (Faegri & van der Pijl, 1979), and would continue to flourish even if all the animals disappeared. Other plants, including probably all those we call succulents, are more or less dependent upon animals for the transfer of pollen, or of seed, or both. The relation may be rather haphazard, or so highly linked that the absence of either partner would lead to the death of the other, as in *Yucca* and its moth pollinator. Saguaro flowers are visited by bats, moths, birds and bees and other insects in search of pollen or nectar or both, although the bat has been shown to be the most characteristic pollen vector, and the fleshy fruits provide food for some twenty species of bird (Steenbergh & Lowe, 1977).

The co-evolution of flowering plants and animals—insects in particular—associated with pollination has been the subject of much study and controversy since Darwin's day. Initially, chewing insects in search of food would have found protein-rich pollen and seeds attractive, and by crawling or flying from bloom to bloom accidentally carried pollen with them. *Magnolia*, a primitive survivor of early days, produces a large open flower with many stamens and pollen accessible to everything from the tiniest beetle to quite large animals. Its equivalent in Cactaceae is the flower of *Pereskia*, also considered as the least specialized genus of its family on morphological grounds. These open, unselective blooms are wasteful of pollen and limit the plant to favourable environments like tropical forests. From them, we assume that other types evolved that excluded certain types of visitor—notably the pollen robbers—and in the final stage admitted one only, the 'right' one ensuring cross-fertilization. Sometimes the lock-and-key relationship has developed to a high degree: a flower tailor-made to fit a bee, and an insect able to perceive and memorize that flower from its colour, patterning and shape in three dimensions. However, even in these most specialized cases one often finds other insects, such as ants, flies, beetles, etc., occasionally present on the bloom, and the first lesson to be learnt is that presence of an insect in a flower does not necessarily mean that it is a reliable or even a potential pollen carrier from one bloom to another of the same species.

Syndromes and taxonomy

Many of the characters beloved of botanists in defining taxa are adaptive—that is, directly related in some way to the functioning and survival of the plants. This is especially true of features of the flowers and fruits, collectively serving to ensure cross-pollination and dispersal of the seeds. Thus we speak of the pollination syndrome for bees, for birds or for other vectors. A syndrome originally meant 'a group of symptoms characteristic of the same infection or abnormal genetic condition, but not necessarily all appearing together' (Darlington & Mather, 1949). From medicine this useful term has been expanded for use in general biology, so that a flower showing the 'bee syndrome' possesses most of a series of characters that collectively pre-adapt it for bee pollination.

Classifiers are especially interested in the syndrome rather than the single character, because it provides a stronger foundation for their units of classification. The presence of several associated characters, kept together by natural selection, gives a good basis by which to separate two taxa, and makes their identification easier than reliance on a single feature. In a sense, taxonomy is largely a search for syndromes. I shall return to this later after a brief look at the different syndromes manifest in one family, the Cactaceae.

Predicting the pollinator

The first person to make a thorough investigation of pollination mechanisms in the cactus family was Porsch (1938–9). A recent revival of interest in the subject has led to a series of studies by Grant and his co-workers, summarized in Grant & Grant (1979). However, in total we still have very few first-hand observations in the field of animal visitations to flowers, and still fewer actually confirming any one species as the only, or the most important, agent of cross-pollination. The sightings that have been made confirm that, at least in Cactaceae, no flower is visited exclusively by one species alone, but that usually among the various animal arrivals one stands out as adapted by its size, form and constancy as the principal pollinator. This must be clearly understood when speaking of 'bat flowers' or 'bee flowers', for example.

Since the often cited example when Darwin predicted that a Madagascan orchid with a long narrow spur was pollinated by a hawkmoth, then unknown, it has become common practice to predict the agency of

pollination from the general form, symmetry, colour, scent, time of opening and other floral features. Vogel (1954) gave colour plates of flowers from the South African flora illustrating the different syndromes.

From the publications cited above, from scattered clues in the literature, and from some original observations of my own, I offer the summary presented in Table 1, and a key to syndromes based on floral characters. So far as possible the examples cited are limited to actual proven cases. The phylogeny showing probable directions of evolution has its model in the Grants' review of the family Polemoniaceae (Grant & Grant, 1965). Of the five pollination types here recognized, the bird flowers, with their long, almost closed tubes and concealed nectar probably come nearest to attracting a single type of visitor alone.

Another point of interest is the occurrence in four out of the five floral groups of secondary derivatives where a pollinator is no longer necessary: reversions to self-pollination (autogamy). Although in most cases the full syndrome is still apparent, seed sets largely or wholly by selfing, and outcrossing rarely or never takes place. In certain cases this may be interpreted as a response to shortage of available winged pollen vectors, as in the high mountain *Melocactus* species, for instance. One exceptional type is found in the cylindrical-stemmed opuntias where the fruit sets but the seeds never mature, the whole dropping and growing into a new plant direct as from a vegetative cutting. The most advanced type of cleistogamy ('closed flowers') occurs in *Frailea*, where properly formed open blooms are rarely seen, most of the furry buds changing directly into seed-packed fruits.

Autogamy and these related phenomena are interpreted as evolutionary retrogressions. All the long-term genetic advantages of cross fertilization have been forsaken. For a limited period, autogamous plants can be, and often are, enormously successful, dispensing with the need for outside assistance and able to perpetuate a successful genotype *ad libitum*. Many of our most persistent annual weeds are autogamous. Their tiny, inconspicuous flowers attract no visitors but are very economical. However, autogamous plants can evolve only by mutation: having forsaken the full benefits of sexual reproduction they are less able to keep pace with changes in climate and environment. For this reason they are treated as evolutionary dead ends: the point of no return in the life-span of a species.

Autogamous plants tend to produce large populations of identical specimens, punctuated here and there by an odd example that looks slightly different—the outcome of a rare outcrossing. This easily beguiles the field collector into considering these minor variants as separate species, and commencing a string of new binomials that knows no end. The situation has a long precedent, going back to Alexis Jordan and his hundreds of 'microspecies' of whitlow grass (*Erophila*, an in-breeder) (Jordan, 1864). It explains the proliferation of

names in the genera *Melocactus* and *Frailea*, and emphasizes the importance of understanding the breeding system before plunging into taxonomic revisions (explosions?) of this type.

Cactus Classification by Syndrome

At first sight the recognition of pollination syndromes would seem to be an answer to prayer in the vexed subject of cactus classification. Let the birds and the bees be our taxonomists! Separation by syndrome has obvious advantages: many, macroscopic characters inherited together, and the natural barrier to intercrossing set up by two taxa having different pollinators. Any intermediates would be eliminated as unsuitable to either pollinator: a systematist's dream come true! To some extent our current classifications do reflect (though usually unconsciously) modes of pollination. *Borzacactus* sensu Kimnach (bird pollinated) is a good example, and *Echinopsis* sensu Friedrich & Rowley (moth pollinated) another. But Nature is never as simple as we would like her to be, and the fatal setback here has already been mentioned: convergent evolution. The same syndrome can evolve many times over in unrelated lines of evolution. So just imagine trying to include all the bird-pollinated cacti (as listed in Table 1) in one genus!

The opposite is also true: it would be just as nonsensical to insist on separate genera in every case where two similar taxa have different pollinators. Vogel (1954) found five different pollinators for species within the genus *Pelargonium*, and the Grants even found four races of a single species, *Gilia splendens*, with different pollinators and visibly different flowers (Grant & Grant, 1965).

Discussion

Although I have often seen small beetles, hoverflies, flies and other insects in cactus blossoms, there is no evidence that these are the main or reliable agents of cross-pollination. Grant & Connell (1979) dispose of the idea of beetle-pollination: the beetles feed on pollen, filaments and petals but rarely ascend the style, and use the bottom of the saucer- to bowl-shaped blooms as a convenient nest for breeding. Nor have I seen butterflies show much interest in cactus flowers, despite the frequency of bright red colours, and there seems little evidence for butterfly-pollination. The most obvious features of butterfly flowers (Faegri & van der Pijl, 1979) are that they are large, vivid red or yellow, often with radiating nectar guides of contrasting colour, faintly scented and salverform—that is, with a flat dish-like landing stage and very long, narrow tube in the centre down which the proboscis goes to seek nectar at the base. From bird flowers they differ in being less stiffly robust, the tube is narrower and there is less nectar. From moth blooms the most obvious distinctions are the colour, lack of scent and diurnal opening. The tube length in moth flowers can exceed

	Unselective, various	Bees*	Birds	Bats	Hawkmoths
Examples	<i>Pereskia</i> <i>Opuntia</i> (some) <i>Rhipsalis</i> (most)	<i>Opuntia</i> (most) <i>Echinocactus</i> <i>Ferocactus</i> <i>Mammillaria</i> (most)	<i>Schlumbergera</i> <i>Nopalea</i> <i>Aporocactus</i> <i>Mammillaria</i> <i>Cochemiea</i> <i>Mamillopsis</i> <i>Cleistocactus</i> <i>Borzicactus</i> <i>Denmoza</i>	<i>Carnegiea</i> <i>Pachycereus</i> <i>Lophocereus</i> <i>Cephalocereus</i> <i>Stenocereus</i> (?all)	<i>Epiphyllum</i> <i>Cereus</i> <i>Peniocereus</i> <i>Echinopsis</i> <i>Discocactus</i>
Syndrome					
Time of opening	Diurnal	Diurnal	Diurnal	Nocturnal	Nocturnal
Colour	Various	Bright colours, especially yellow	Vivid, especially red	White or drab	White or pale
Scent	None or faint	None or faint	None	Unpleasant, fermented, at night only	Intensely sweet, at night only
Pollen	Abundant, freely exposed	Least abundant	Moderately abundant	Very abundant, in a brush	Moderately abundant
Nectar	Absent or freely exposed	Often present, hidden, concentrated	Abundant, dilute, at base of tube	Abundant, dilute	At base of long narrow tube, dilute
Size and form	Various, flat	Small to medium, half to full open	Narrow, oblique, stiff, not or only partially open	Large, robust	Large, tubular
Profile	Flat	Campanulate	Cylindric, sometimes oblique and/or S-shaped	Funnelform	Narrow cylindric to salverform
Retrogressions: No outside pollinator needed	± Barren; vegetative propagation only: <i>Opuntia</i> (few)	Autogamy: <i>Lophophora</i> Cleistogamy: <i>Frailea</i>	Autogamy and Cleistogamy: <i>Melocactus</i>		Autogamy: <i>Arthrocereus</i>

TABLE 1. Pollinators and floral syndromes in the Cactaceae. *No cactus flower is especially adapted to bee pollination as are those of, for example, Labiatae and Scrophulariaceae. Here bees are the only of several visitors that regularly contact stigmas as well as anthers. Arrows indicate presumed directions of evolution.

KEY TO POLLINATION SYNDROMES IN CACTACEAE

- A Flowers diurnal, medium to small, in general brightly coloured, scent faint or none
 - B Flowers flat, with abundant pollen and nectar (if present) freely exposed
 - BB Flowers not flat, with nectar ± hidden at the base of the tubular perianth
 - C Flowers bell-shaped, actinomorphic, half to wide opening, yellow or other mostly bright colours, with little, concentrated nectar
 - CC Flowers tubular, never opening flat, red mostly; stiff and unyielding, limb often oblique, tube often with a faint S-bend with much watery nectar, often in a special nectar chamber at the base of the long, narrow tube
 - AA Flowers nocturnal, medium to large, white, pale or drab, scent if present then at night only
 - D Flowers stout, funnel-shaped, presenting a large brush of stamens, scent usually unpleasant, like over-ripe fruit; tree-like genera
 - DD Flowers narrow funnel-shaped to cylindrical with a flat limb and narrow tube, scent intensely sweet
- I UNSELECTIVE
- II BEE FLOWERS
- III BIRD FLOWERS
- IV BAT FLOWERS
- V HAWKMOTH FLOWERS

FLOWER TYPE/POLLINATOR				
UNSELECTIVE	BEES	BIRDS	BATS	HAWKMOTHS
Opuntia		Nopalea		
Cylindropuntia		Tacinga		
Rhipsalis		Schlumbergera		
Mamillaria		Cochemiea Mamilloopsis		
Melocactus			Discocactus	
Disocactus			Epiphyllum	
Denmoza			Echinopsis	
Cephalocereus			Cereus	

TABLE 2. Examples of vegetatively similar taxa differing in pollination syndrome. A change in pollinator can lead to genetic isolation and the evolution of two distinct taxa. But does this also imply the birth of a new genus?

that of any others—30 cm. or more in *Epiphyllum phyllanthus*, for example.

It will be noted that bat flowers are found mainly in the taller tree-like cacti, as would be expected from the high flights of bats. But bird and moth flower syndromes occur in often unrelated genera of widely dissimilar life form and habitat preference. This points to reticulate evolution: the independent development of the same syndrome in unrelated lines in response to the needs of the day. More of this anon.

Some instances of similar-looking cacti with contrasted pollination syndromes are shown in Table 2, using a narrow, Backebergian generic concept to emphasize differences.

As always, enthusiasm for the value of anthecology (pollination biology) in taxonomy must be tempered with reserve. We should strive to understand the pollination mechanisms and their significance as far as we can, but avoid over-weighting them in defining taxa. Each case has to be judged on its merits. The fieldwork of V. Grant and his co-workers in North America is an inspiring start: it is demanding of time and patience, and so much more needs to be done. Dare I suggest that some of the field botanists of today would be better employed in anthecological pursuits in the habitats than in the never-ending obsessive search for new species?

References

- DARLINGTON, C. D. & MATHER, K. (1949). The Elements of Genetics. London.
- FAEGRI, K. & VAN DER PIJL, L. (1979). The Principles of Pollination Ecology. Edn. 3.
- GRANT, V. & K. A. (1965). Flower Pollination in the Phlox Family. 180 pp. New York and London.
- (1979). The Pollination Spectrum in the Southwestern American Cactus Flora. In *Pl. Syst. & Evol.* 133: 29–37.
- GRANT, V. & CONNELL, W. A. (1979). The Association between *Carpophilus* Beetles and Cactus Flowers. In *Pl. Syst. & Evol.* 133: 99–102.
- JORDAN, A. (1864). Diagnoses d'Espèces nouvelles ou mènconnues. 355 pp. Paris.
- PORSCH, O. (1938–9). Das Bestäubungsleben der Kakteenblüte. In *Jahrb. Deutsche Kakt.-Ges.* 142 pp.
- STEENBERGH, W. F. & LOWE, C. H. (1977). Ecology of the Saguaro II. Washington D.C.
- VOGEL, S. (1954). Blütenbiologische Typen als Elemente der Sippengliederung dargestellt anhand der Flora Südafrikas. Jena.

Duvaliandra: A new genus of stapeliad

by M. G. Gilbert

East African Herbarium
PO Box 45166, Nairobi, Kenya

Caralluma dioscoridis is a Socotran endemic that shows a unique combination of *Caralluma* sect. *Boucerosia* (*Desmidorchis*) and *Orbea*/*Duvalia*-like features. It is believed that the similarity to *Caralluma* is through convergence and that its true relationships are nearer *Orbea prognatha* or *Duvalia sulcata*. A more detailed consideration of the comparative morphology of this interesting species follows.

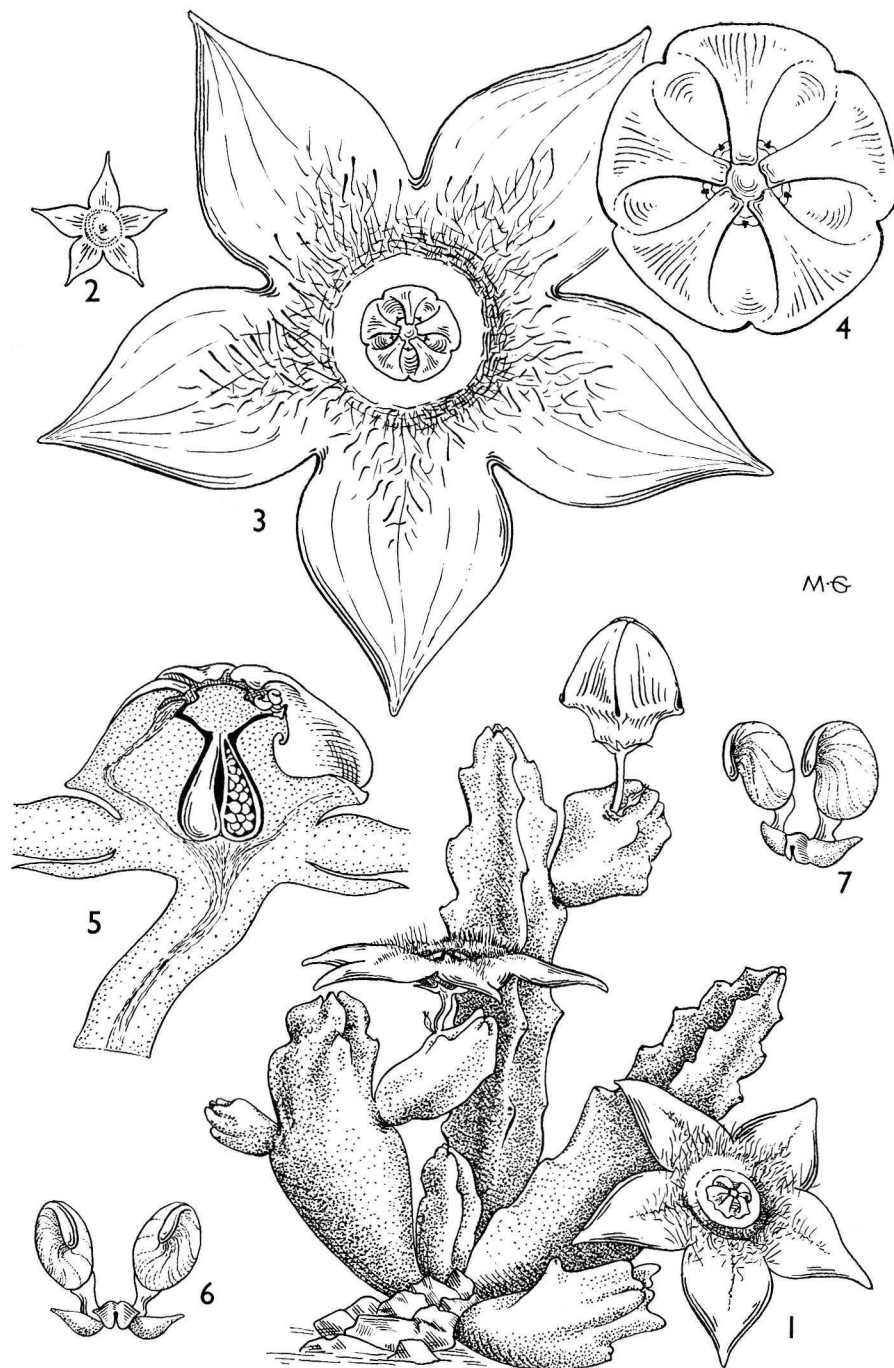
Vegetatively the resemblance to certain species within the 'umbellata-europaea group' of *Caralluma* (White & Sloane, 1937) is, superficially, very strong though its exact affinities (on the basis of stem form only) are significantly vague. In habit the greatest similarity is probably with the complex of Arabian species allied to *C. hexagona* and *C. foulcers-delboschii*. However, these species have distinct leaves, unlike *C. dioscoridis*. Those species lacking leaves are all very robust species with erect, non-articulated branches quite different in habit. Quadrangular stems are also known in *Stapeliopsis* and certain species of *Pectinaria*, genera otherwise very far removed from *Caralluma* in all other features, which does suggest the possibility of convergent evolution of such a feature.

Two aspects of the inflorescence must be considered: position and structure. With regard to position, most genera of stapeliads fall into one of two very distinct groups. The first, including *Duvalia*, *Stapelia*, *Orbeopsis*, etc., has the inflorescence at the base of the stem, never more than a few axils up. In the other, including genera such as *Caralluma* (taken here to exclude the species transferred to *Orbea*, *Orbeopsis* and *Tridentea* by Leach (1975, 1978a, 1978b)), *Echidnopsis*, *Hoodia* and *Trichocaulon*, the inflorescences are close to or at the apex. Sometimes these are active for quite a long time and may produce flowers far from the apex but new inflorescences are apparently always initiated near the apex. *Duvaliandra* is unusual in that the inflorescences are neither clearly basal nor apical, varying considerably even within a single plant. See, for example, the original plate of *C. dioscoridis* (Lavranos, 1972). Rather similar behaviour has been seen in *Orbea prognatha* and some species of *Tridentea* but not in other genera.

Inflorescence structure is another feature that generally falls into two main types, the sessile pulvinate fascicles of genera such as *Caralluma*, *Echidnopsis*, *Trichocaulon*, *Orbeopsis* and *Piранthus*, often umbelliform and never elongating with age, and the cymose inflorescences of *Duvalia*, *Huernia*, *Stapelia*, *Stapeliopsis*

and *Orbea* which produce a sequence of flowers, one at a time with the inflorescence elongating with each one. This latter type of inflorescence is almost always basal. Exceptions to these two types are very few. One is the basal umbel of *Pseudolithos migiurtinus* and *P. cubiforme* which is probably a highly modified lateral branch as suggested by the subterminal flowers of the much branched *P. caput-viperae*. Another is in certain species, including *C. dioscoridis*, where the flowers are effectively solitary, presumably by the reduction of a more complex inflorescence as there is often a clear indication of an abortive bud at the base. Most of the species with routinely solitary flowers belong to apical-flowered genera, notably *Pseudoplectinaria*, *Edithecolea* and *Caralluma* (i.e. *C. frerei*, *C. quadrangula*, *C. lavrani* and *C. pauciflora*) thus encouraging the presumption that *C. dioscoridis* is in the same alliance. However, it should be pointed out that a cymose inflorescence if reduced to a single flower would show little evidence of its true nature. Moreover, *Orbea prognatha*, apparently correctly placed with *Orbea* (Leach 1978a), often has very reduced inflorescences borne in rather irregular positions on the stem and is thus apparently nearest in inflorescence form and position to *C. dioscoridis*. This is here taken to support the view that the affinities of this latter species lie with the genera with basal cymose inflorescences.

Corolla form and size are anomalous in *Caralluma* especially following Leach's removal of some of the atypical southern species. Reflexed corollas are unusual in the 'umbellata-europaea group' and the 'pauciflora-quadrangula groups' being observed only in some forms of *C. europaea*, *C. penicillata* and *C. lavrani*, all species with much smaller flowers. Somewhat similar corollas are met with in members of the 'ango group' but these have very different stem forms and, moreover, it is felt, also have affinities with *Orbea* rather than *Caralluma* proper and as such will be the subject of another paper. The most comparable corolla is perhaps to be found in the Arabian *Duvalia sulcata*, matching in form, size and, more or less, colour. It also matches in the presence of long ciliate hairs on the limb, a most unusual feature amongst northern stapeliads, but differs by the presence of vibratile hairs on the margin, a more pronounced annulus and the longitudinal grooves of the lobes to which it owes its specific epithet. These similarities seem sufficient that when the corolla is taken in isolation, *C. dioscoridis* should be placed very near *Duvalia* or *Orbea* and nowhere near the typical



***Duvaliandra dioscoridis*.** 1, habit, *natural size*; 2, calyx, $\times 2$; 3, corolla, $\times 2$; 4, corona, $\times 6$; 5, vertical section of corona and gynoecium, $\times 6$; 6, pollinia, face view, $\times 25$; 7, pollinia, $\frac{3}{4}$ view, $\times 25$. All from *Smith and Lavarinos* 438. Reproduced from the drawing by Mary Grierson for Hooker's *Icones Plantarum*, t.3687 (1972) by permission of the Bentham-Moxon Trust, Royal Botanic Gardens, Kew.

members of *Caralluma* sect. *Boucerosia*.

Corona form was probably one of the main reasons for discarding initial plans to describe *C. dioscoridis* in a new genus as both *Caralluma quadrangula* and *C. penicillata* have almost identical coronas. However, similar coronas are met with in other groups of stapeliads otherwise not at all closely related, namely *Echidnopsis cereiformis* and *C. nubica*, *Orbea maculata* and *O. rangeana* and *Huerniopsis decipiens*. It thus seems possible that evolutionary processes by which the outer corona lobes can be lost to give rise to a uniseriate corona are not excessively unusual and have been active on at least three separate occasions. The loss or reduction of parts is one of the commonest features of evolutionary change and it does not seem unreasonable to suggest that *Duvaliandra* represents a fourth line of evolution of a uniseriate corona. Certainly there is evidence of parallel evolution in corolla form within the stapeliads, witness the quite remarkable series of parallels in corolla form between *Huernia* and *Stapelianthus* or the corolla tube of *Caralluma solonophora* and that of *Ceropegia ampliata*. The corona must also be of considerable adaptive significance and thus have the potential to give rise to similar cases of convergent evolution.

Two types of translator structure have been observed in stapeliads. In the *Caralluma/Ceropegia* type the translator wings are poorly developed and the pollen masses are attached directly to the corpusculum or clip gland by simple caudicles. In the *Stapelia/Huernia* type, the translators have well defined wings and the caudicles are attached to these rather than the clip-gland itself. It can be shown that there is a good correlation between pollinium form and the major features of stem and inflorescence morphology such that, with the major and significant exception of *Caralluma* as currently understood, the pollinia are fairly constant within genera and apparently good indicators of intergeneric relationships. Thus when it was realized that those of *C. dioscoridis* matched closely those of *Duvalia sulcata* and *D. somalica*, a major reconsideration of other features of this '*Caralluma*' was felt to be essential.

The evidence strongly suggests that any similarities between *C. dioscoridis* and any other members of *Caralluma* sensu latissimo are due to convergence and that in fact its affinities are with quite another genus. It must therefore be transferred to another genus, but which one? Two possible closest relatives should be considered, *Duvalia sulcata*, with which it shares corolla form, colour and, to some extent, indumentum and which also has similar translators and pollen masses, and *Orbea prognatha* which also has a rather similar corolla and translators and is rather more similar in inflorescence form and position. However, both these species differ very markedly indeed in stem colouring and morphology and corona form. *D. sulcata* is a very typical *Duvalia* in almost all features and the inclusion of *C. dioscoridis* into the same genus would make it

unacceptably heterogeneous. *O. prognatha* is more isolated within *Orbea* and this, coupled with the geographical proximity to the Socotran species, does suggest the possibility of removing *O. prognatha* from that genus and erecting a new one for *O. prognatha* and *C. dioscoridis*. The main objection to this is practical as the main points of similarity between the two are not very striking, being far outweighed by the clear cut differences which would make the writing of a key to genera very difficult. The alternative of trying to include *C. dioscoridis* in *Orbea* must be rejected for the same basic reasons as for its exclusion from *Duvalia*. In these circumstances there seems no choice but to erect a new monotypic genus. The name chosen reflects the similarity of the translators and pollen masses to those of *Duvalia*.

Duvaliandra M. G. Gilbert, **genus novum**; *Duvaliae* Haworth et *Orbeae* Haworth affine, a quibus caulibus quadrangulatis tuberculis obsoletis, inflorescentiis sessilibus plerumque unifloris, corona uniseriata differt. Species typica: *Caralluma dioscoridis* Lavranos.

Caules quadrangulati, procumbentes vel adscendentes, copiose ramificantes; folia et tubercula obsoleta; inflorescentiae extra-axillares, sessiles, a basi usque fere ad apicem caulium sitae, saepius abortu uniflorae, corolla pro rata grandis, rotata plana vel reflexa, limbo crassiusculo sparse longe piloso, corona uniseriata lobis exterioribus obsoletis, lobis interioribus complanatis super antheras incumbentes; corpusculum alis prominentibus instructum retinaculis pro rata longis, pollinia ad 'stigma' per cristam brevem subterminalem hyalinam affixa.

Stems 4-angled, procumbent to ascending, branching freely; tubercles and leaves obsolete; inflorescence extra axillary, from the base to just below the tips of the stems, sessile, often 1-flowered by abortion; corolla relatively large, rotate to reflexed, limb somewhat thickened, with long sparse hairs; corona 1-seriate, the outer lobes absent, the inner lobes rather flat and incumbent over the anthers; clip-gland (corpusculum) with prominent wings and relatively long translator arms (retinacula), pollinia attached to the 'stigma' by a short sub-terminal hyaline 'anchor-crest'.

Only species:

Duvaliandra dioscoridis (Lavr.) M. G. Gilbert
comb. nov. Basionym: *Caralluma dioscoridis* Lavranos, Hookers Icones Plantarum 37: sub t. 3687, in textu (1971, published 1972).

References

- LAVRANOS, J. J. (1972). In Hooker's Icones Plantarum 37: sub t. 3687.
LEACH, L. C. (1975). The Lectotype species of *Stapelia* L. and the reinstatement of *Orbea* Haw. In Kirkia 10: 287-291.
——— (1978a). A contribution towards a new classification of *Stapeliaceae* (*Asclepiadaceae*) with a preliminary review of *Orbea* Haw. and descriptions of three new genera. Excelsa Taxonomic Series No. 1.
——— (1978b). On the classification of *Stapeliaceae* and the reinstatement of *Tridentea* Haw. (*Asclepiadaceae*). In Trans. Rhodesia Scient. Assoc. 59: 1-5.
WHITE, A. & SLOANE, B. L. (1937). The *Stapeliaceae* ed. 2, Vols. 1-3. Pasadena.

Choice Liliaceae

described and photographed
by Bill and Yvonne Tree

1. *Aloe antandroy* (below)

A. antandroy comes from south-west Madagascar. We have two plants under this name of which the less attractive seems to fit Jacobsen's description and photograph in the 'Handbook of Succulent Plants', vol. 1: 146, fig. 146. The one illustrated here is the much more desirable form with compact rather than spindly growth, which conforms to Jacobsen's description in having curved leaves. The plant was purchased in 1969 as a single head, when it fitted well into a 2½ inch plastic pot. Now, eleven years later it has made three offsets, two at the base and one on the stem, and has graduated into a 3½ inch pot. In 1978 it flowered for the first time and has flowered every year since then, the attractive buds appearing in February and opening in late May. These are red with green on the tip, and then open to reveal golden yellow stamens.

This *Aloe* has not been difficult to cultivate in a medium of 50% soil-less compost and 50% sharp sand, and appreciates plenty of water from spring to early autumn, a little in late autumn and just a few drops

can be given on sunny days in winter. We try not to allow the winter temperature to drop below 5°C (40°F). Our plant grows under the bench on the south side of the greenhouse where it receives adequate light in summer, and then when the sun is low during the winter the plants are in sunshine for several hours each day.

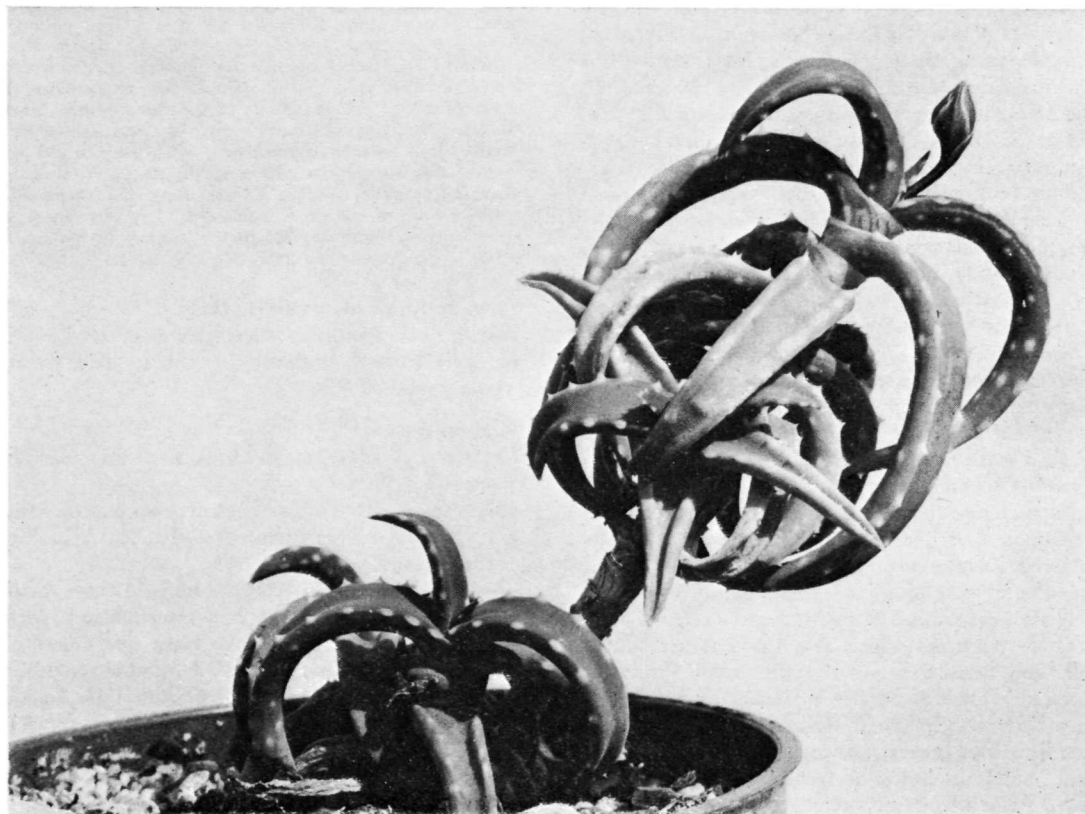
2. *Gasteria armstrongii* (upper right)

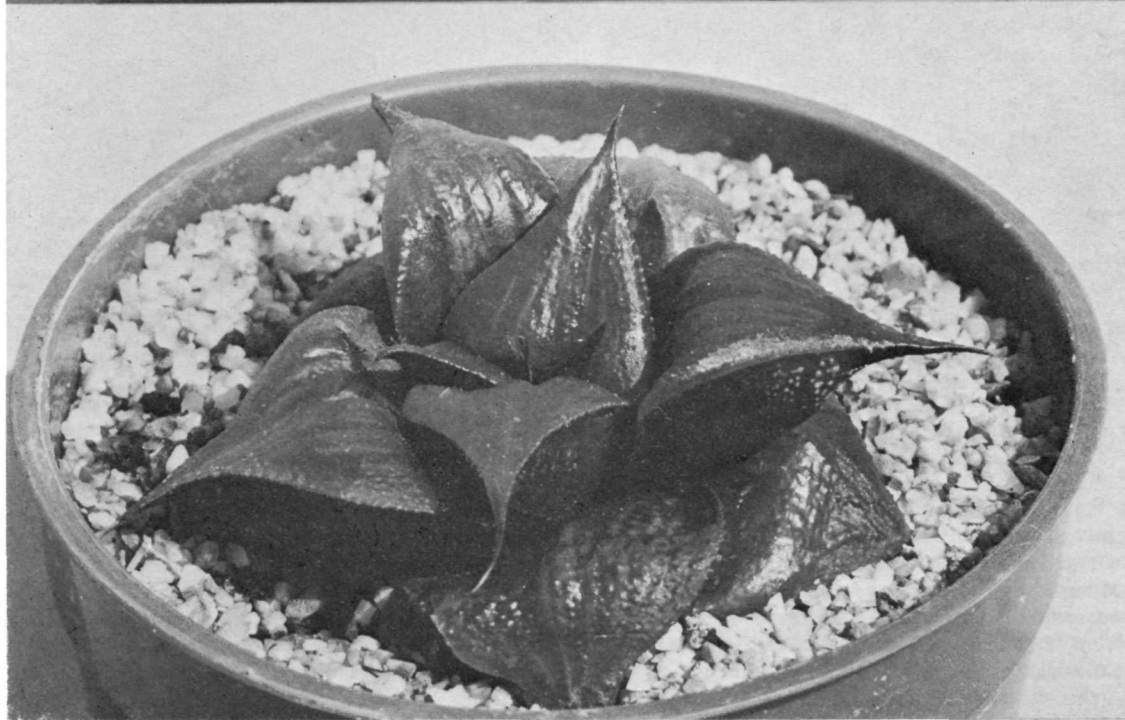
G. armstrongii comes from the Cape Province region of South Africa, and as you can see from the photograph it is a fine-looking plant, whose thick leaves are a very dark green. In time this plant makes a nice clump and in our travels we have seen many fine clumping specimens on the show bench.

It was one inch across in 1969 when received from the late Wilfred Austin-Smith. For a species of *Gasteria* this is a fairly slow-growing plant, for in all these years it has only produced two offsets and still fits well into an 8 inch pan. It is not difficult to cultivate when treated the same as *A. antandroy*.

3. *Haworthia badia* (lower right)

The cultivation of *H. badia* (*badia* means chestnut brown) is more difficult than *A. antandroy* and *G. armstrongii*, and for that reason we keep our plant on

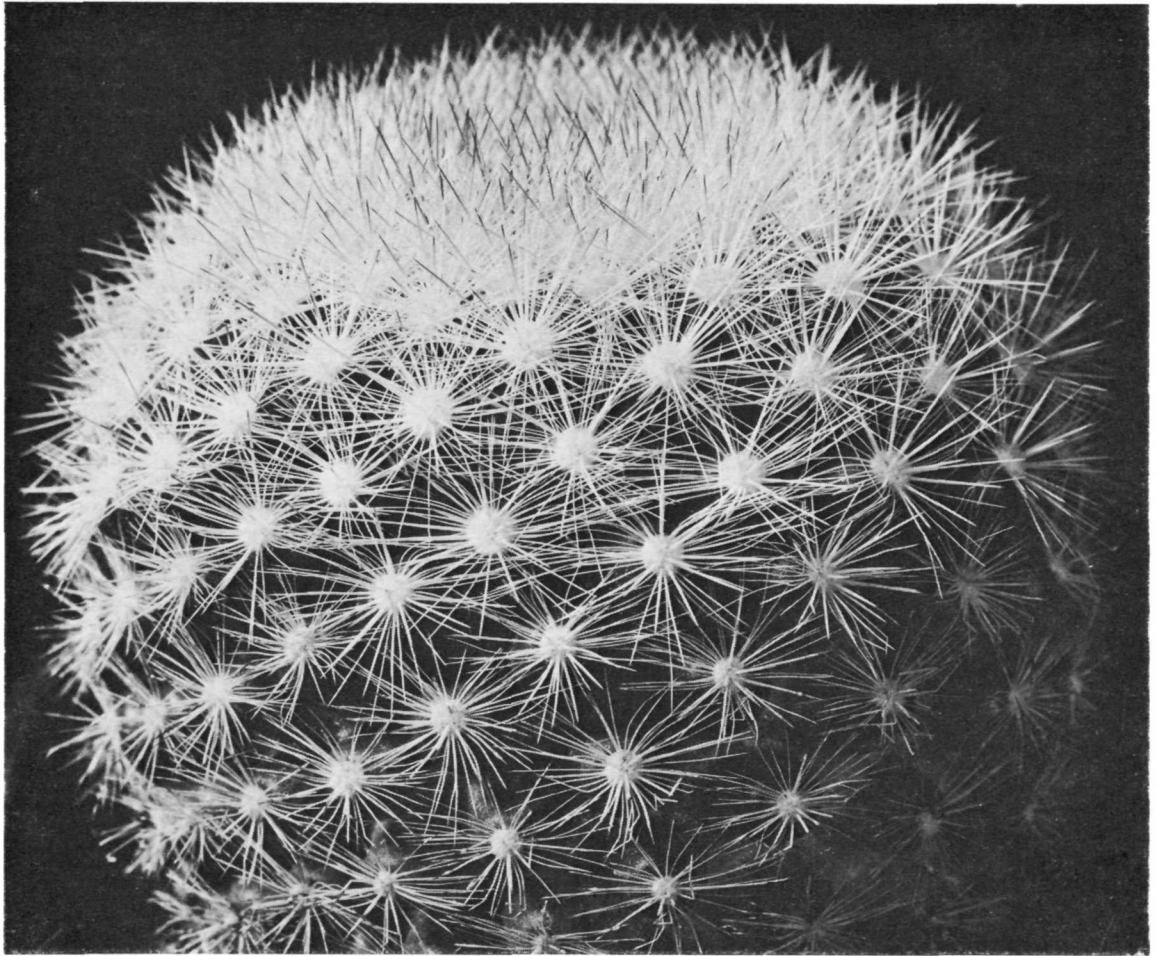




the main bench on the south side of the greenhouse, where it receives our full attention. When we purchased this plant in 1968 it was freshly imported, and still covered in the red dust of its habitat in the Cape Province, or to be more specific Bayer in his 'Haworthia Handbook' gives a restricted area west of Napier. He reduces *H. badia* along with *H. mundula* to subspecies of *H. mirabilis*.

In the twelve years we have had this plant it has gone

off its roots three times. We managed to save it each time, but the formation of a new root system is a long business, and meanwhile the plant shrivels and loses some of its leaves. For this reason it is still roughly the same size as when it was imported, having remained in a 4½ inch half-pot. Although most difficult to cultivate it is a very good plant to take to a show when in good condition, and certainly rates as one of our favourites.



Connoisseurs' Cacti

chosen by David Hunt

12. *Rebutia pseudominuscula* (front cover)

It is 25 years since I was given a plant of *Rebutia minuscula* in bud and promptly won a prize with it in flower in the school hobbies competition (no rule about plants being in the possession of the owner for six months beforehand!), yet the genus is not one I have often been tempted to collect. They are relatively unvaried, despite all the names, compared with my pet genus, and though generally quite easy to grow and propagate they seem prone to red spider and other disfiguring drawbacks. But the sight of Walter Rausch's magnificent pans of absurdly healthy plants with masses of flowers in vivid colours would convert the meanest Mammillariophile visiting his collection outside Vienna, where the cover photo was taken.

If, as Prof. Nodrog Yelwor maintains, there are only five (or is it seven?) species of *Mammillaria*, there can hardly be more than two of *Rebutia*! The type of the genus is *R. minuscula*, which has a relatively wide, more

or less open receptacle-tube. Contrasting with it is *R. pseudominuscula*, which is the type of sect. *Aylostera*, characterized by the slim, solid receptacle-tube.

13. *Mammillaria candida* (above)

If *Rebutia* taxonomy is a nightmare, what can be said of *Mammillaria*? Only that if there are just five species of *Mammillaria* this must be one of them—unless, like Prof. Buxbaum, you put it in another genus on its own, *Mammilloidia*. The reasons for adhering to Buxbaum's idea are, in fact, quite strong: the unique seed and fruit structure, not found elsewhere in the genus, and a geographical distribution which does not 'fit'—these more than hint that the plant only looks like a *Mammillaria*, and is not one, anymore than Janet Brown is Prime Minister.

Less questionable is the status of plants commonly grown as *M. ortizrubiona*. These neither fit the description given for that name, nor differ from 'ordinary' *M. candida*, though *M. candida* is no ordinary plant, as can be seen from Margaret Martin's excellent photo. It has class and pedigree, even though we poor botanists aren't sure what that pedigree is!

Decent re-burial for *Echinofossulocactus* Lawr.

by D. R. Hunt

Royal Botanic Gardens
Kew, Richmond, Surrey

Summary. Britton & Rose's lectotypification of *Echinofossulocactus* Lawr. is rejected as mechanical, and hence arbitrary under the terms of ICBN Art. 8.1. Both the generic description and the generic name imply that the areolar groove was Lawrence's diagnostic character. One of the species demonstrating this feature, *E. helophorus* (Lem.) Lawr., is selected as lectotype to supersede Britton & Rose's choice of *E. coptonogonus* (Lem.) Lawr. *E. helophorus* is a taxonomic synonym of *Echinocactus platyacanthus* Link & Otto sensu lato, the accepted lectotype species of *Echinocactus* Link & Otto. *Echinofossulocactus* Lawr. is thus reduced to synonymy under *Echinocactus*. Implications for the classification of *E. coptonogonus* and allied species are briefly discussed.

The 19-letter polysyllabic generic name *Echinofossulocactus* was invented by George Lawrence, gardener to the Rev. Theodore Williams, in a catalogue of the cacti in his employer's collection at Hendon Vicarage published in Loudon's *Gardeners' Magazine* 17: 313–321 (1841). From the nomenclature Lawrence used, it is clear he had access to, and was no doubt influenced by, the publications of Chas. Lemaire on the cacti of the Hortus Monvillianus (usually abbreviated as Cact. Aliq. Nov. 1838 and Cact. Gen. Nov. 1839) where Lemaire introduced several tribal, generic and infra-generic names adopted by Lawrence. Lawrence seems to have shared Lemaire's penchant for obscure and elongate names, and probably took the term *fossula*, incorporated in *Echinofossulocactus*, from Lemaire, who had used it in descriptions of species included in *Echinofossulocactus* by Lawrence.

In his new genus Lawrence enumerated some 26 species, several with varieties, grouped in three sections, and with measurements of the individual specimens which indicate that many were of flowering size. The species are now considered to belong to five or more genera, including *Echinocactus* Link & Otto, *Ferocactus* B. & R., *Astrophytum* Lem., *Thelocactus* B. & R., and *Echinofossulocactus* sensu B. & R.

Lawrence's paper seems to have been overlooked or ignored, except by James Britten (*J. Bot.* 54: 338.1916), until it came to the attention of Britton & Rose 'while looking through Loudon's Magazine of Gardening for new Cactus names' (*The Cactaceae* 3: 109. 1922). Britton & Rose duly exhumed *Echinofossulocactus*, taking *E. coptonogonus* (Lem.) Lawr. (*Echinocactus coptonogonus* Lem.), the first species listed by Lawrence, as the type (lectotype) for a group of species corresponding to *Echinocactus* subg. *Stenocactus* K. Schum., *Gesamt. Kakt.*, 292 (1898).

Recognition and surgery by the American monographers did not immediately revive their dismembered

dinosaur. Spegazzini (in *An. Soc. Ci. Argent.* 96: 69. 1923) rejected the name *Echinofossulocactus* out of hand as 'hybridum et sesquipedale, prorsus exlex ideo rejiciendum', and diplomatically substituted *Brittonrosea* Speg. The more pragmatic Orcutt (*Cactography*, 5. 1926) suggested *Efossus* Orcutt for the sake of brevity. Both Spegazzini and Orcutt also transferred the numerous putative species listed by Britton & Rose, but neither of the substitute names has been accepted. The only serious contender has been Schumann's subgeneric name *Stenocactus*, still widely favoured by hobbyists. At generic rank the publication of *Stenocactus* is usually credited to Berger (*Kakteen*, 244. 1929). Throughout his handbook Berger was equivocal in his use of genera and subgenera, however, grouping species under the generic names proposed by Britton & Rose and others but retaining the more conservative usage of *Echinocactus*, *Cereus*, etc., for binomials in the body of the text. In the index he listed the species names under both the wider and narrower genera without any typographical distinction, as if they were alternatives. The first authors to use *Stenocactus* as a generic name unequivocally appear to have been Backeberg & F. M. Knuth (*Kaktus ABC*, 353. 1935). They were followed by Bravo, *Las Cactaceas de Mexico* (1937), this being the standard treatment for Mexico, to which *Stenocactus* is endemic, and by Borg, *Cacti* (1937), for many years a standard handbook for amateur collectors, and by Marshall in Marshall & Bock, *Cactaceae*, 146 (1941). Both Bravo and Borg rejected *Echinofossulocactus* Lawr. on the grounds of its mixture of contents as originally circumscribed and its excessive length, but these are not legitimate grounds for rejection under the International Code of Botanical Nomenclature. In more recent times, general acceptance of the International Code and the 'type method' have led to a grudging acceptance of *Echinofossulocactus* sensu B. & R. and its adoption by such authors as Backeberg, *Die Cactaceae* 5: 2752 et seq. (1961), Buxbaum, in Krainz (ed.), *Die Kakteen*, Lfg. 21 (1962), Bravo, in *Cact. Succ. Mex.* 14: 11–21 etc. (1969), Meyran, *ibid.* 17: 35–46 etc. (1972–77) and Taylor in *Cact. Succ. J. Gt. Brit.* 41 (2): 35–42 (1979). Surprisingly, perhaps, no attempt has been made to conserve *Stenocactus* over *Echinofossulocactus*, and it is now perhaps too late for a proposal to this effect to succeed. It is true that the older name is a mouthful to say and inconveniently long for plant labels and data-processing systems, but this is hardly enough to bring about its rejection now that its use in the literature is widespread.

In another context, the priority of *Echinofossulocactus* (1841) is an obstacle to the taxonomic union with *Ferocactus* B. & R. (1922) justified by Taylor (in Cact. Succ. J. Gt. Brit. 41(4): 89. 1979) and the preparation of a proposal for conservation of *Ferocactus* on these grounds has been given some consideration, as noted by Taylor l.c.

No one, however, seems to have questioned the propriety of Britton & Rose's lectotypification, though it is this, and nothing more, on which the modern usage of *Echinofossulocactus* ultimately rests. Britton & Rose admitted that 'the genus as [Lawrence] defines it is not a very natural one', but gave no reason for their choice of the first-named species *E. coptonogonus*, as type. The inference to be drawn is that, as in Britton & Brown's illustrated Flora (ed. 2. 1913), Britton & Rose followed the American Code of Botanical Nomenclature (Bull. Torrey Bot. Club. 34(4): 167-178. 1907), of which Britton was the leading proponent, and its Canon 15 (l.c., 172) which laid down that where no species was designated as type by the original author, 'the type is the first binomial species in order eligible', subject to various provisions none of which apply in the case of *Echinofossulocactus*. Britton & Rose did not specifically invoke the American Code in 'The Cactaceae' but, from the following examples, it is clear that their lectotypifications conform to Canon 15:

Nopalea Salm-Dyck

'Three species were included by Salm-Dyck in this genus when it was described, of which *Opuntia cochenillifera* L. was the first and is therefore considered the type' (l.c. 1: 33. 1919).

Consolea Lemaire

'*Consolea* was described by Lemaire in 1862. He described five species, of which *C. rubescens* is the first and therefore the type' (l.c. 1: 43. 1919).

Cereus Miller

'Type species: *Cactus hexagonus* Linnaeus, this being the first species cited by Miller in his Gardeners Dictionary, 8th edition, 1768, where he described 12 species of *Cereus* (in the 4th edition, abridged, 1754, he described 14 species), which we now know belong to several genera' (l.c. 2: 3. 1920).

Discocactus Pfeiffer

'Three species were described by Pfeiffer, of which the first, *Discocactus insignis*, is the type' (l.c. 3: 216. 1922).

Only in the case of *Echinocactus* Link & Otto were Britton & Rose at pains to establish the lectotype other than by the mechanical precept of 'first in order eligible'. On the basis of described characters they concluded by a process of elimination that it should be *E. platyacanthus* Link & Otto, and this is not in dispute.

Under the modern International Code of Botanical Nomenclature (1978 edition), Art. 8, the author who first designates a lectotype must normally be followed, but his choice may be superseded if it can be shown that the choice was made arbitrarily. As an example of arbitrary selection the Code cites the Britton & Brown 'Illustrated Flora', mentioned above, and 'the first

binomial species in order eligible' method followed there. This method of lectotypification is thus explicitly proscribed by the Code, and there is no obligation to follow Britton & Rose's choice of *E. coptonogonus* as lectotype of *Echinofossulocactus* (or their lectotypifications of *Consolea* etc.).

What then, are the principles on which the choice of a generic lectotype should be made? On this matter the Code recommends but does not legislate: all aspects of the protologue should be considered, as should evidence of the author's intentions; only material definitely studied by the author should be taken into account, and established usage should be maintained unless the element selected is discordant with the major elements of the protologue, etc. (ICBN, Guide for the Determination of Types and Rec. 7B).

The protologue, in this case, is Lawrence's brief description. Although, as Britton & Rose observed, *Echinofossulocactus* was not a natural genus, its author did make the principal generic character doubly clear, in the name itself (from *fossula*, Latin, a little furrow or channel), and in his generic description. Some authors, like Higgins, The Study of Cacti (ed. 2, 34. 1946) have assumed that the name was a reference to the narrowly furrowed body of the plants of Lawrence's first section of *Echinofossulocactus*, to which the genus was restricted by Britton & Rose (i.e. *Echinocactus* subg. *Stenocactus* K. Schum.). But Lawrence described the stem of both *Echinocactus* and *Echinofossulocactus* in exactly the same words: 'Surface angled or furrowed'. The 'little furrow' of the name is the groove which extends from the upper edge of the areole in various species enumerated by Lawrence and is most in evidence in those of his third section. This becomes clear by a comparison of his generic descriptions of *Echinocactus* (l.c. p. 316) and *Echinofossulocactus* (l.c. p. 317) in which the said groove or channel is the only differential feature referred to:

'GENUS III. ECHINOCACTUS

Surface angled or furrowed. *Flowers* short and broad, produced at the fascicles of spines, generally at the umbilicus at the top of the plant. *Capsule* dry, generally concealed in an especial envelope of down, or else in the tomentum of the umbilicus. *Fascicles* of spines [i.e. areoles] downy; down confined to the fascicles.'

'GENUS IV. ECHINOFOSSULOCACTUS

Surface angled or furrowed. *Flowers* and *fruit* like those of *Echinocactus*. *Fascicles* of spines downy: down extended above the fascicles in a straight or cruciform channel, sometimes confluent, or else in a circular patch from which the flowers are produced invariably in the umbilicus.'

The evidence of the name and description thus argues, in effect, that the areolar groove or furrow is essential to *Echinofossulocactus* sensu Lawrence, and that whatever species is chosen as lectotype should plainly demonstrate the character. In fact, as noted earlier, Lawrence probably took up Lemaire's usage of the

word *fossula* from the latter's descriptions in *Cactearum Genera Nova Speciesque Novae in horto Monvilliano* (1839). Here Lemaire (l.c. 12) described *Echinocactus helophorus* Lem. as having 'areolae . . . ad apicem in fossulam linearem, aliquando ad summum bifurcatam productae' and *E. helophorus* [var.] *longifossulatus* as having 'areolae sursum in fossulam longissimam pollicarem et ultra, linearem elongatae, saepe fere confluentes'. Both *E. helophorus* and *E. h.* var. *longifossulatus* were transferred to *Echinofossulocactus* by Lawrence, and are nos. 24 and 25, respectively, in his enumeration. From the description of the groove, both are positively identifiable with the earlier described *Echinocactus platyacanthus* Link & Otto. Though no type of Lemaire's species is known to exist, the identification is confirmed by his reference to the purple striping of the ribs, diagnostic to some forms of *E. platyacanthus* ('inter areolas macula purpurea, elongata, subregulariter notatus') and is consistent with description of the number of ribs and the detailed spination. Although the areoles of the species of Lawrence's section I. *Gladiatores*, including *E. coptonogonus*, are somewhat elongate, the feature is neither obvious nor remarked on elsewhere in the literature. It is more pronounced in some members of sect. II *Latispineae* now referred to *Ferocactus* B. & R. and in some of Sect. III. (unnamed) referred to *Echinocactus* sensu stricto, *Ferocactus* and *Thelocactus* B. & R.

Another character mentioned by Lawrence which needs to be taken into account is that of the fruit, which Lawrence says is like that of *Echinocactus*, 'dry, generally concealed in an especial envelope of down, or else in the tomentum of the umbilicus'. This, too, tends to restrict the choice of species eligible as lectotype, operating against the species nowadays referred to *Ferocactus* B. & R. or *Thelocactus* B. & R. which have naked, scaly fruits. *E. coptonogonus* and its allies (*Echinofossulocactus* sensu B. & R.) also have scaly rather than woolly fruits, though in some species the umbilicus of the stem is woolly.

The only species included in *Echinofossulocactus* by Lawrence which are not disadvantaged as contenders for the lectotype by the description are, it seems, those that would nowadays be referred to *Echinocactus* itself (following Britton & Rose's choice of *E. platyacanthus* Link & Otto as lectotype, which, as noted above, is not in dispute). It can be no coincidence that these species were represented in Lawrence's employer's collection by large and impressive specimens, of which any amateur collector today would be proud, whereas those of most of the other groups (some of the *Ferocactus* spp. excepted) were naturally smaller-growing and relatively insignificant. *E. coptonogonus*, for instance, was only 3 inches (7.5 cm.) high and broad, whereas *E. helophora* var. *longifossulata* mentioned above, was 1 ft. (30 cm.) high and 1½ ft. (45 cm.) in diameter, and *E. helophora* (Lem.) Lawr. itself, 11 inches high and 1¼ ft. in diamter. A specimen of *E. platyceras* (Lem.) Lawr. was 1 ft. high and 1¾ ft. in diameter, and, largest of all,

E. macracanthus (De Vriese) Lawr., 1¼ ft. (38 cm.) tall and 2 ft. (61 cm.) in diameter. Taxonomically, all these have been treated with varying degrees of certainty as synonyms of *Echinocactus ingens* Zucc. ex Pfeiff., which is itself referable to *E. platyacanthus*. This identification of *E. helophorus*, as already discussed, is not in doubt. Identification of *E. platyceras* is less certain, since Lemaire's illustrations accompanying the description were not the flower of this species (as Britton & Rose, *The Cact.* 3: 169. 1922, assumed), but that of *E. ingens*, as Lemaire stated. *E. macracanthus* is also problematical. The illustration accompanying the original description (in Hoev. & De Vriese, *Tijdschr.* 6: 49. 1839) is unequivocally of *Ferocactus hystrix* (DC.) Lindsay, but Schumann referred the species to *E. ingens* and the name may have been misapplied from an early date (cf. also Salm-Dyck, *Cact. Hort.* Dyck. 1849, 1850).

Of all the species included in *Echinofossulocactus*, *E. helophorus* thus seems the most appropriate choice as lectotype. Its characters are most in conformity with the protologue, and it was quite probably the species foremost in Lawrence's mind. It is not necessary to follow ICBN Rec. 7B and maintain established usage by re-selecting *E. coptonogonus* since *Echinofossulocactus* sensu Britton & Rose has only gained acceptance recently and reluctantly, and over the practical objections of numerous authors. Since, taxonomically, *E. helophorus* is referable to *Echinocactus platyacanthus*, the effect of its designation as lectotype will be to make *Echinofossulocactus* Lawr. a synonym of *Echinocactus* Link & Otto, sensu stricto, and thus to remove it from contention with later names. Selection of any of the species enumerated by Lawrence which are currently referred to either of the later described genera *Ferocactus* B. & R. and *Thelocactus* B. & R. would have unacceptable consequences for the nomenclature of these genera and cannot be entertained.

I therefore propose that Britton & Rose's lectotypification of *Echinofossulocactus* Lawr. by *E. coptonogonus* be superseded under ICBN Art. 8.1 and that the lectotype of this name, instead, be *Echinocactus helophorus* Lem., *Cact. Gen. Nov.*, 12 (1839).

In accordance with this revised lectotypification, *Echinofossulocactus* Lawr. becomes a synonym of *Echinocactus* Link & Otto sensu stricto. The oldest available name for *Echinofossulocactus* sensu Britton & Rose is *Brittonrosea* Spegazzini (1923), but in view of the existence of the much better-known name *Stenocactus* (K. Schum.) Backeb. & F. M. Knuth, a proposal to conserve *Stenocactus* over *Brittonrosea* would be desirable to legitimize the use of *Stenocactus* when the group is maintained as a genus. There is, however, no obstacle to the inclusion of the *Stenocactus* group in *Ferocactus* B. & R. or any other genus validly published before *Brittonrosea* Speg.

Hic iacet Echinofossulocactus, nomen genericum ignoranter generatum, diu ignoratum, denique effossum, nunc denuo infossum. R.I.P.

Ferocactus and Stenocactus united

by N. P. Taylor

Royal Botanic Gardens
Kew, Richmond, Surrey

In the November issue of this journal last year I proposed that a more conservative view of the N. American Echinocactoid genera should be taken, to bring their arrangement in line with similar treatments in other segments of the family, e.g. *Mammillaria*, *Borzicactus*, *Neoporteria*, *Stenocereus*, etc. (Taylor in CSJGB 41(4): 88–94. 1979). The infra-generic classification of *Echinocactus* (s.l.) employed by K. Schumann in 1898 was used as a guide for re-uniting the less plausible generic segregates of Britton & Rose and Backeberg. Thus *Ferocactus* B. & R. (1922) was amplified to absorb *Ancistrocactus*, *Sclerocactus*, *Hamatocactus* and *Glandulicactus*, the principal elements of which were all classified by Schumann in *Echinocactus* subg. VII *Ancistrocactus*. In my earlier paper I noted the close affinity of Schumann's next subgenus (VIII *Stenocactus*) to *Ferocactus*, and would have treated *Stenocactus* as a further synonym of the amplified *Ferocactus* but for the priority of the genus *Echinofossulocactus* Lawr. (1841). However, the relectotypification of *Echinofossulocactus*, and its placement in the synonymy of *Echinocactus* (see preceding paper by D. R. Hunt), removes this nomenclatural 'spanner in the works', and allows the combination *Ferocactus* subg. *Stenocactus* to be made here.

For those who may wish to continue regarding the orphaned Stenocacti as a genus in their own right, it should be noted that *Stenocactus* (K. Schum.) Backeb. & F. M. Knuth (1935), unless or until it is conserved, is not the correct generic name in view of the earlier, but poorly known *Brittonrosea* Speg. (1923). And whilst at first sight the 'typical' narrow-ribbed Stenocacti seem to form a distinctive group, there is, however, *E. coptonogonus* Lem. to consider, its broad ribs and areolar-glands providing a clear link with *Ferocactus* (sens. str.), and leaving little doubt that both have evolved from a common stock.

The systematic position of the Stenocacti is more easily settled than the question of how many species this group should comprise. In my 'Commentary on the genus *Echinofossulocactus* Lawr.' (CSJGB 41:35–42. 1979) I allowed six taxa to stand at specific rank while admitting that two (*E. multicosatus* and *E. sulphureus*) were very closely allied to the all-embracing *E. crispatus* complex. At present I am transferring only the four most reliable taxa to *Ferocactus* as species, preferring

to wait until the composition of the *E. crispatus* complex and the status of various unclarified names (e.g. *E. ochoterenaus*) have been resolved, before taking further steps. It is likely that the majority of these uncertain entities will find their place at infra-specific ranks within *E. crispatus*.

Ferocactus subgenus **Stenocactus** (K. Schum.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus* subg. *Stenocactus* K. Schum., Gesamtb. Kakt. 292, 359 (1898). Lectotype species: *Echinocactus crispatus* DC.

Ferocactus coptonogonus (Lem.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus coptonogonus* Lem., Cact. Aliq. Nov. 23 (1838).

Ferocactus crispatus (DC.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus crispatus* DC., Prodr. 3: 461 (1828). The following are considered to comprise a complex for which the above is the oldest name: *Echinofossulocactus arrigens*, *E. bustamantei*, *E. caespitosus*, *E. confusus*, *E. guerraiianus*, *E. hastatus*,* *E. kelleranus*, *E. lamellosus*, *E. lancifer*, *E. lexarzaei*, *E. multiareolatus*, *E. obvallatus* and *E. violaciflorus*. A distinctive northern geographical segment of this complex which may merit separate status is *E. multicosatus*, including *E. lloydii*, *E. zacatecasensis* and '*E. erectocentrus*'. *E. sulphureus* is perhaps only a yellow flowered form referable here. The poorly known *E. ochoterenaus* may belong here too (cf. CSJGB 41:40. 1979).

Ferocactus phyllacanthus (Dietrich & Otto) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus phyllacanthus* Dietrich & Otto in Allg. Gartenz. 4: 201 (1836). Includes *E. tricuspidatus*.

Ferocactus vaupelianus (Werderm.) N. P. Taylor, **comb. nov.** Basionym: *Echinocactus vaupelianus* Werderm. in Notizbl. Bot. Gart. Berlin 11: 273 (1931). Includes *E. albatius* hort. non Dietrich.

The following *Echinocactus* names were recorded as inadequately typified in my 'Commentary', and their continued use is to be strongly discouraged: *E. acroacanthus* Stieber, *E. anfractuusus* Mart. ex Pfeiff., *E. dichroacanthus* Mart. ex Pfeiff., *E. flexispinus* Salm-Dyck, *E. gladius* Link & Otto, *E. grandicornis* Lem., *E. heteracanthus* Muehlenpfordt, *E. pentacanthus* Lem., *E. wippermannii* Muehlenpfordt and *E. xiphacanthus* Miq.

*I have recently seen flowering cultivated plants that match K. Schumann's description of this taxon and suggest its placement here; it is yet to be rediscovered in the wild.

Nigel Taylor is completing a review of *Ferocactus* sens. lat. for publication in a future issue of the Journal. He would welcome good black and white photographs of any of the relevant species to illustrate his account. If you can help, please write to him c/o the Editorial Office.

The identity of *Austrocylindropuntia weingartiana*

by Roberto Kiesling

Instituto de Botanica Darwinion
San Isidro, Prov. Buenos Aires, Argentina

In general, the Cactaceae are poorly represented in herbaria. This is due on the one hand to the difficulty of drying the plants and the poor results obtained; and on the other to the failure of many authors (e.g. Backeberg, Buining, Rausch, Ritter . . .) to understand the true significance and usefulness of herbarium specimens in general and type specimens in particular. Britton, Rose and their collaborators carefully preserved this kind of documentary evidence, so that it is possible to check or amplify their descriptions and even to correct their mistakes.

The example which follows shows that a species which has remained unknown for many years can be identified by examination of the type specimen and a careful reading of the original description.

In 1919 Britton & Rose gave the first description of *Opuntia shaferi* from N. Argentina (prov. Jujuy):

'Plants in clusters of 2–4, erect, about 3 dm. high; joints terete, 2.5 to 3.5 cm. in diameter, elongated, very spiny; tubercles low, often indistinct; leaves deciduous, 6 mm. long; areoles 1 cm. apart or less, circular, white-felted; glochids numerous, whitish from the upper margin of the areole; spines about 6 at an areole, brownish, acicular, often 4 to 5 cm. long and associated with long white hairs; flowers not known; fruit globular, about 2 cm. in diameter, bearing numerous large areoles, the areoles white-felted, with glochids and hairs but no spines; seeds turgid, pointed at base, 4 mm. long.

'Collected by J. A. Shafer among stones between Purmamarca [Purmamarca] and Tumbaya, Argentina, February 6, 1917 (no. 90).

'Nearest *O. vestita* but less cespitose, taller and larger, and with fertile fruit.'

A duplicate (isotype) of *Shafer* 90 is in the Kew Herbarium (fig. 1).

In August 1935, Backeberg (Blätter für Kakteenforschung 1935 pt. 8) described another new species, *O. weingartiana*, and illustrated it with a photograph:

'Erect, candelabrum-like, young shoots conical, becoming reddish grey below and up to 5 cm. diam. New growths 1.5–2.5 cm. diam., fresh green, slightly tuberculate. Ca. 3–5 stout central spines, up to 6 cm. long, red to pale brown, usually bent sideways or upwards. Glassy white glochids from the round, white-felted areoles, glochids later yellow. Height of groups up to 50 cm. Shoots later resembling *Op. Rauppiana*, but at first white-haired. Flowers unknown. Fruit carmine. Occurrence: South Bolivia at ca. 3000 m.'

*Member of the Carrera del Investigador of the Consejo Nacional de Investigaciones Científicas y Técnicas, Republic of Argentina. Work carried out at the Royal Botanic Gardens, Kew, during the tenure of a CONICET scholarship abroad. Translated by D. R. Hunt.

Backeberg did not preserve type material, but the photograph (fig. 2) is very clear. Later, he transferred both *O. shaferi* and *O. weingartiana* to *Cylindropuntia* and finally to *Austrocylindropuntia*.

In my opinion, *A. shaferi* and *A. weingartiana* are one and the same species. I have twice collected material in the province of Jujuy which matches Britton & Rose's type and description and Backeberg's photograph. I have also collected material of another Backeberg species, *A. humahuacana* (Backeb.) Backeb., from its type locality in Jujuy, and believe it to be just an ecological form of *A. shaferi*. When the three species are united, we are able to establish the following key and synonymy, completing the description with floral data from my collection:

KEY

1. Stems completely covered with hairs; spines less than 15 mm. long ***A. vestita***
1. Stems with some hairs on the juvenile growth only; spines 10–50 mm. long:
 2. Spines up to 15, covering the stems, 3–5 cm. long, usually reddish ***A. shaferi* var. *shaferi***
 2. Spines few, weak, up to 1 cm., usually whitish ***A. shaferi* var. *humahuacana***

Austrocylindropuntia shaferi (Britton & Rose) Backeb. in Cact. Succ. J. Amer. 23:14 (1951).

Opuntia shaferi Britton & Rose, The Cact. 1: 72 (1919).

Type: Argentina, Jujuy, between Purmamarca and Tumbaya, 6 Feb. 1917, *Shafer* 90 (US, holo.; K, iso.!).

Cylindropuntia shaferi (B. & R.) Backeb., in Backeb. & F. M. Knuth, Kaktus-ABC, 119 (1935).

Opuntia weingartiana Backeb., Blätter f. Kakteenf. 1935 pt. 8, sine pag. (1935). Type (not preserved): S. Bolivia, 3000 m., collector not stated.

Cylindropuntia weingartiana (Backeb.) Backeb. in Backeb. & F. M. Knuth, Kaktus-ABC, 119 (1935).

Austrocylindropuntia weingartiana (Backeb.) Backeb., in Cact. Succ. J. Amer. 23:14 (1951).

var. *shaferi*

DESCRIPTION. Plants forming mounds up to 30 cm. high and 15 cm. diam., stems 2–20, branching near soil level, ascending cylindric, 2.5–3 cm. diam., dark green; tubercles low, frequently indistinct, irregular; areoles 1 cm. or less apart, circular, white-felted; glochids numerous, prominent, whitish, from upper edge of areole. Leaves conical, 6 mm. long, dark green, caducous. Spines numerous, 10–15, unequal, varying from 1–5 cm. long at one areole, acicular, flexible, reddish brown to whitish; hairs few to several (5–20), 0.5–2 cm. long, white, caducous.

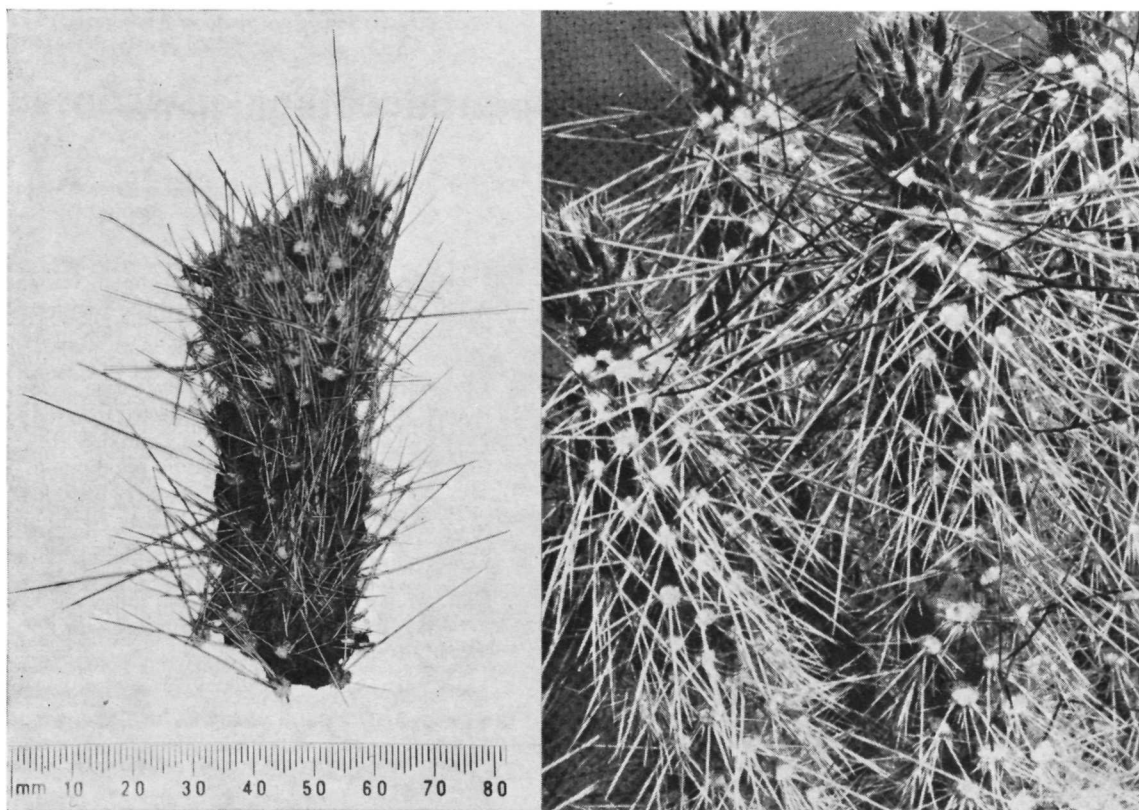


Fig. 1 (left), part of the isotype specimen of *Opuntia shaferi* (Shafer 90) in the Kew Herbarium. **Fig. 2** (right), a reproduction of the original illustration of *O. weingartiana* Backeb. in *Blätter f. Kakteenf.* 1935[8].

Flowers arising at upper areoles. Receptacle globose, 1.5–2 cm. long and in diam., green, with numerous areoles bearing hairs and glochids but no spines. Perianth rotate with few (c. 20) segments, the outer smaller, greenish red, the inner 2 cm. long, broad, shining deep red. Stamens relatively few (20–30), 1.6 cm. long, filaments and anthers yellow. Ovary globose, 0.8 cm. diam.; style cylindric, a little longer than the stamens, creamy yellow; stigma with about 4–5 short, obtuse, papillose, green lobules.

Fruits globose, 2 cm. diam., half-dry, carmine red, caducous when ripe; umbilicus flat, clear light brown; pulp white. Seeds 10–30, pyriform, 2 mm. long, 1.3 mm. diam., smooth, yellow-brown, with apical hilum and a prominent slightly paler dorsal line.

FURTHER MATERIAL STUDIED. Argentina, prov. Jujuy: Churqui Aguada, Dec. 1967, Kiesling 28 (LP); depto. Santa Catalina, Quebrada de Toqueros, Jan. 1969, Kiesling s.n. (LP).

DISTRIBUTION. In S. Bolivia and N. Argentina (Jujuy), from the Quebrada de Toqueros to Cajas in the north to Purmamarca, between 1500–3500 m.s.m.

The fruits are not dehiscent, except insofar as they break up as they rot on the ground. I have not seen the seeds carried away by ants, as is common with other fruits.

var. **humahuacana** (Backeb.) Kiesling, **comb. et stat. nov.**
Cylindropuntia humahuacana Backeb. in Backeb. &

F. M. Knuth, *Kaktus-ABC*, 119, 411 (1935). Type (not preserved): 'In regione limitanca Argentino-Boliviana, in vallibus', collector not stated.

Austrocylindropuntia humahuacana (Backeb.) Backeb. in *Cact. Succ. J. Amer.* 23:13 (1951).

Differs from var. *shaferi* only in the stems 3–4 cm. diam. and fewer (up to 5), shorter (1 cm. long) and less dense, whitish spines.

MATERIAL STUDIED. Argentina, prov. Jujuy: near Humahuaca at c. 3000 m.s.m., Feb. 1978, Kiesling 2514 (SI).

Known only from the environs of Humahuaca, usually in the shade of thickets formed by *Prosopis ferox*. In cultivation, the variety retains its character, unlike the type variety which produces somewhat smaller spines, though otherwise readily distinguishable.

Acknowledgements

I am grateful to the Director, Royal Botanic Gardens, Kew, for the use of herbarium and library facilities during 1979 and to D. R. Hunt for his assistance in the preparation of this paper.

A revision of the genus *Pterocactus* by Dr. Kiesling will be published in the *Journal* next year.

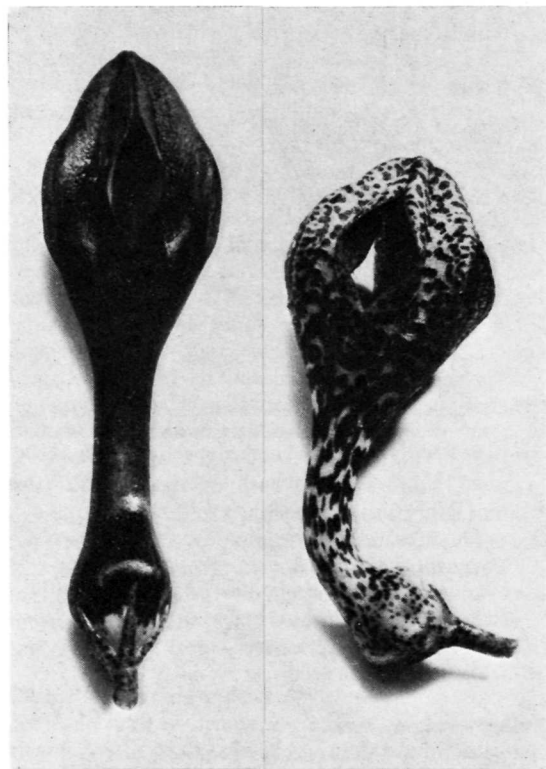
A new variety of *Ceropegia rupicola*

by N. P. Taylor

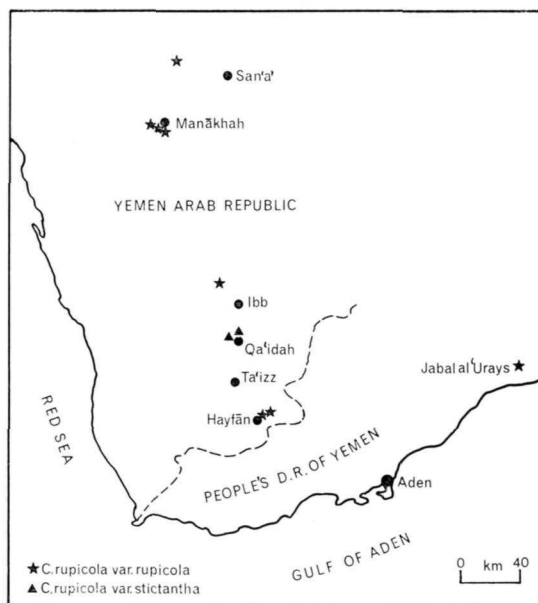
Royal Botanic Gardens
Kew, Richmond, Surrey

Ceropegia rupicola Defl. var. *stictantha* N. P. Taylor, **var. nov.**, a var. *rupicola* corolla brevior at superne latiore tubo angustiore lobis inter se latius hiantibus, colore cremeo brunneo-kermesino-maculato distincta. Typus: Cult. Hort. Bot. Reg. Kew. (accn. no. 409-77.03145), orig. coll. Yemen Arab Republic, 3 km. N. of Al Qa'idah (on road to Dhi Sufal), 1700 m., 4 August 1977, A. Radcliffe-Smith & Henchie 4437 (K, holo); the same locality, 28 August 1977, Wood 1874 (K); 32 km. N. of Ta'izz on road to Sana'a, 1976, Lavranos & Newton 13109 (K) (distributed in cultivation under I.S.I. 1134, see Walker in *Asclepiadaceae* 19: 18-21, fig. 3. 1980).

Ceropegia rupicola was discovered and named by the French botanist Defflers, who collected the type plant



Flowers of *C. rupicola* var. *rupicola* (left) and var. *stictantha* (right).



Geographical distribution of the two varieties of *Ceropegia rupicola*.

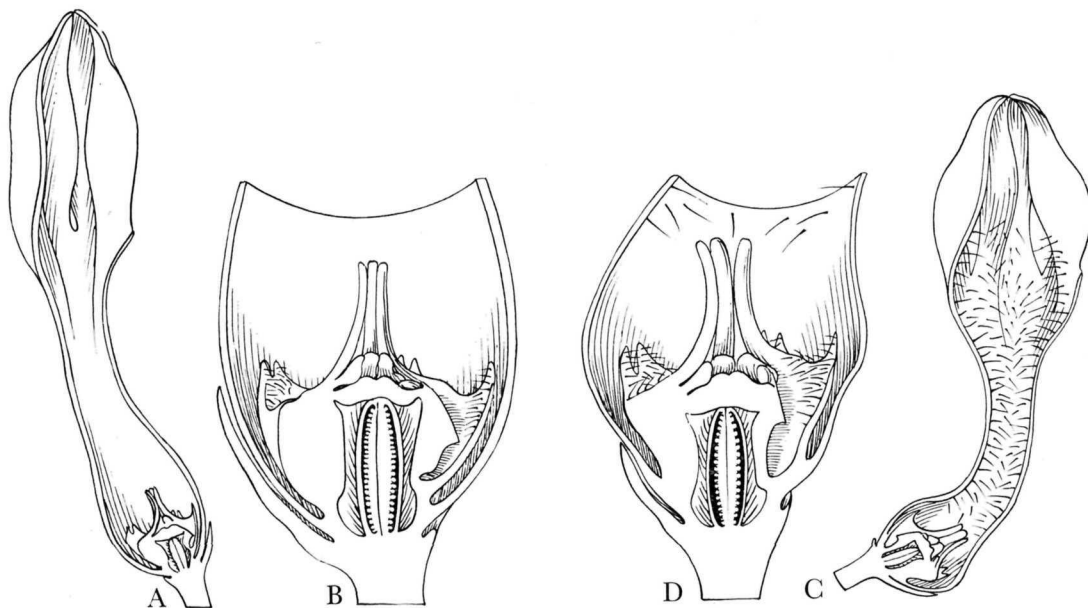
near Manakhah, N. Yemen, in May 1887. Defflers also found his new species further to the south near Hayfan, and again to the east of Aden. During the 1890's Schweinfurth collected in S. Arabia and visited the Manakhah area, where he obtained *C. rupicola* from two more localities, sending living material back to Berlin. These plants flowered and were studied and figured by Karl Schumann (see *Monatsschr. Kakteenk.* 9:168-71. 1899).

Recently J. R. I. Wood has recollected this species in the vicinity of Hayfan, and two new localities have been found: one to the northeast of Manakhah, the other northwest of Ibb (Smith & Henchie 4495). The above eight collections seem to be of the same taxon (i.e. var. *rupicola*), characterized by erect then twining succulent stems, bearing heart-shaped to lanceolate leaves and clusters of large deep brownish-crimson flowers. In cultivated material of Radcliffe-Smith & Henchie 4495 at Kew, and to judge from Schumann's figure (loc. cit.), the corolla-lobes of this plant seem to open (separate) relatively little.

The new variety named here was found near Al

Floral characters	var. <i>rupicola</i> R-S. & H. 4495	var. <i>stictantha</i> R-S. & H. 4437
corolla: colour	dark brownish-crimson, basal 2–3 mm. white, dark spotted	creamy-white (greenish at tips of lobes and base) spotted dark brownish-crimson
length	45–47 mm.	35–40 mm.
diam. at widest part of lobes	12 mm.	15 mm.
length, apical connate part of lobes	5–6 mm.	3–4 mm.
diam. of openings between lobes	c. 4–5 mm.	c. 6.5 mm.*
length, unexpanded part of tube	12 mm.	13 mm.
diam. at base	7 mm.	6.5–7 mm.
calyx-lobes:		
length	5 mm.	3 mm.
pedicels:		
length/diam.	6 × 2 mm.	4 × 1.5 mm.

Table comparing flowers of *C. rupicola* vars. *rupicola* and *stictantha*. Data from living material of A. Radcliffe-Smith & Henchie 4495 and 4437 respectively. *The illustration of *Lavranos & Newton* 13109 in Walker, loc. cit., shows the flowers of var. *stictantha* opening somewhat wider than this.



Half-flowers of *Ceropegia rupicola*: **A**, var. *rupicola*, x 2; **B**, detail of var. *rupicola*, x 6; **C**, var. *stictantha*, x 2; **D**, detail of var. *stictantha*, x 6. **A** and **B** from R-S. & H. 4495, **C** and **D** from R-S. & H. 4437. Note the hairy interior of the flowers of var. *stictantha*^d and the more robust inner corona-lobes. It is not known to what extent these features may vary in other populations. Dissection^s and drawings by Christabel King.

Qa'idah in 1976 (*Lavranos & Newton* 13109) and then at another locality a little to the west in 1977 (R-S. & H. 4437, type; *Wood* 1874). The accompanying illustrations, and that published by Walker (loc. cit.) clearly indicate the differences in flower coloration between vars. *rupicola* and *stictantha*, but perhaps this conspicuous feature is not as significant as the marked divergence in corolla shape and degree of separation of the lobes (see table). It is conceivable that this divergent pair are in the process of speciating in response to different pollinators, but examination of their coronal morphology suggests that they still belong in the same species.

Though difficult to accomplish, a study of their respective pollinators in habitat might prove very interesting.

I have named *C. rupicola* var. *stictantha* in the hope of drawing attention to its divergent characteristics, especially since it is now much more common in cultivation than the type variety—apparently the reverse of the situation in the wild.

Acknowledgements

I am grateful to Mr. David Field and Mr. J. R. I. Wood for helpful discussion, and to Mr. H. K. Airy Shaw for supplying the Latin diagnosis.

The Society's 1980 Seed Distribution: A Germination Report (Cacti only)

Compiled by David Hunt

The annual Seed Distribution is one of our principal services to members. Apart from being one of the most enjoyable ingredients of the hobby, raising from seed is something to be encouraged as a contribution to conservation. It saves importing wild plants, relieving pressure on the natural populations, and it increases the chances for threatened species surviving in cultivation.

Each year the Society distributes over 100,000 seeds and it seems desirable that we should monitor the results to see that they are satisfactory both as to germination and as to identification of species. This year, therefore, assisted by Margaret Johnson and Nigel Taylor, I sowed samples of nearly all the Cactaceae offered, omitting only the two common species of *Cereus* and the mixed *Haageocereus*. The report which follows is concerned simply with success and failure in germination under ordinary conditions, and includes observations from members who have answered editorial requests for data in the two previous Journal issues. Later, Nigel and I hope to be able to comment on the naming of the plants raised. As stated already, we sowed cacti only this year, but hope to try a similar experiment for the 'other succulents' to be offered by the Society next year.

Distribution procedure

Seed is mainly purchased by the Society in lots of 1000 from commercial sources. Choice and ordering are the responsibility of the Hon. Seed Purchasing Officer, Dr. Terry Smale. Volunteers then divide the seed into individually labelled packets. Society Chairman Bill Maddams, who for many years supervised the seed-packeting, says that as a rule each packet should contain 10 seeds which, given a satisfactory percentage germination and reasonable skill on the part of the raiser, will lead to the establishment of as many plants as most growers will have room for, if not a surplus to give away or exchange. A Seed List and Order Form are sent to members with the February issue of the Journal, which also contains descriptive notes for each species offered. It is now the Society's policy to record any field-collectors' numbers or other source data received with the seed. Seed orders are handled by the Society's Hon. Seed Distributor, Mrs. Isobel Boote.

Editor's methods and results

For this report, two packets of each of 95 varieties were obtained. One packet was sown in March and one kept for reference purposes, help in verification and potential SEM-work. As a sowing medium, we used J. Arthur

Bowers standard formula soilless sowing and potting compost in 2-inch BEF pots, with the top few mm. of compost shaken through a 2 mm. sieve. The pots were soaked in warm water and the seed pressed into the surface but not covered. The contents of one packet, minus fragments, was sown in each pot which had been pre-labelled with the order number from the list. Apart from the Society seed, some 50 other species from other sources were sown for general comparison. Plastic trays containing 28 pots each were covered with sheets of glass and remained in a centrally heated room at $\pm 68^{\circ}\text{F}$ (20°C) without additional heat (the propagator having failed!), until removed to the greenhouse in early summer.

Germination figures were recorded on several dates and the totals recorded up to 1 October are given in Table 1. The seedlings received practically no attention in the greenhouse and several have been lost through scorching or desiccation. A top dressing of fine grit was added to about half the pots to conserve moisture and prevent the growth of moss, etc., and the glass sheets have been left in place to keep up humidity and exclude pests.

Most varieties germinated within 1-4 weeks of sowing, and 90% of the total seedlings after six months, 370, appeared within six weeks. Assuming that from 95 packets there should have been 950 seeds in all (10 per packet), this represents an overall germination rate of only 39% or 3.9 per packet. From 17 of our 95 packets no seed germinated at all, although other seed-raisers had some germination with 10 of these items, and the *Tephrocactus*, no. 271 should probably have been pre-treated by chilling. The individual results are listed in the table on pp. 115-6.

Low germination rates were obtained with several species which grow well from fresh seed, like *Notoctactus leninghausii*, where we obtained virtually 100% germination from seed harvested from a cultivated plant in 1979 and sown under the same conditions at the same time. The conclusion that the Society's seed was not fresh, and had lost its viability, is inescapable. The same explanation can probably be applied to most of the other failed items and staleness of the seed may largely account for the low average germination of 39%, a much lower figure than we would consider desirable. Only 37 of the 95 packets yielded five or more seedlings. In many packets, however, we found less than 10 whole, filled seeds. We found little evidence, however, that the carefully packed seeds had been crushed in the post.

That one should not be too hasty in throwing out seeds which do not come up within a month or so was demonstrated by several late-starters in our lot, notably no. 230 *Lobivia laeae* and no. 243 *Matucana madisoniorum*. Seedlings of some fifteen species germinated more than six weeks after sowing.

Observations by other members

At the date of going to press, reports had been received from twelve members and their analyses are incorporated in the table. The results are consistent with our own, overall germination rates of 18–45% being obtained, with an average of 3.6 seedlings per packet from the total of 296 packets sown.

Several members recorded the number of seeds in some or all of the packets they received. The average (51 packets counted) was 10.7. JOHN FISHER recorded two packets with 19 seeds in each, and got 18 seedlings from one of these (no. 223 *Gymnocalycium schickendantzii*). Junior member IAN HOWELL got 18 seedlings from one packet of another item, no. 214 *Espostoa nana*, and the packeters also gave me generous quantities of these two items, with 14 seedlings germinating from each. These results were exceptional, and very few other species averaged better than five seedlings per packet.

Although, as already implied, we consider the overall germination figures disappointing and unsatisfactory, some recorders commented favourably on this year's results, including John Fisher and Ian Howell, influenced perhaps by the performance of nos. 214 and 223 already mentioned! John Fisher says, 'I sowed seed from four different sources and had most success from GB seed.' Ian Howell had his faith in seed-raising restored: 'I have been growing cacti now for five years, obtaining them as small plants from nurseries and specialists. My first attempts at seed-raising were a disaster and subsequent attempts were no better. The few seeds which germinated mostly died, due to my ignorance, since the abundant articles on raising cacti from seed each gave different methods so that I simply became confused. From these attempts I managed to keep alive two seedlings of *Harrisia martinii* and *Opuntia rufida*, six epiphyllums and a few others from mixed packets. I vowed never to buy another packet of cactus seeds again.

'Then, on joining the CSSGB I received a seed list from which ten packets could be ordered free of charge. This I did, for what had I got to lose? Also, I wanted to experiment with vermiculite since my problems had stemmed from watering: too much and seeds and seedlings rotted, too little and they died through dehydration.'

Ian Howell sowed his seeds in damp vermiculite in 2-inch pots 'above a paraffin heater at a temperature of 70°C' (surely he means 70°F:!) and didn't water again until well after germination. His success, like ours, was moderate, as shown in Table 1, but he concludes:

'I must thank you for restoring my faith in cactus-raising from seed and I shall continue to obtain seeds from CSSGB and carry out further experiments with vermiculite.'

T. C. DUNN remarks that 'the percentage of seeds germinating has been very much higher this year than it has in any of the previous years with GB seeds', but 'still not so high as I have obtained from many commercial suppliers, although these seeds are, of course, very much more expensive'. Mr. Dunn's sowing method is as follows: 'Seeds were germinated in Levington compost diluted with much gravel and coarse sand. Each packet of seed was scattered on the surface of the mixture in a 2-inch pot. I should say that I had put a little cotton wool in the bottom of each pot and pulled a little through the drainage holes. The full pots were placed on a piece of capillary matting dipping into water and the whole lot placed in a Humex "Bigtop" propagator at 85°F. They are still there (30 September).'

IAN ECKFORD confesses to treating his seeds 'in a most cavalier manner', depositing them unceremoniously on a compost of equal parts John Innes no. 2 and gravel and soaked by Chinosol. 'The temperature varied from 70–85°F but germination was best in the lower seventies. Due to neglect the soil dried out frequently, also one or two seedlings.'

E. E. T. HOBDAY planted his seeds in vermiculite and watered with a nutrient solution. He remarks that 'it may be of interest that seed of *Austrocactus patagonicus* from the 1979 distribution failed to germinate that year but was kept on in 1980 and one plant germinated. It is coming on very slowly'.

R. J. HUMPHREY modestly describes his skill at seed-raising as 'virtually zero' and says 'by my standards this year's batch of Society seed is by far the most successful I have ever sown'. He also used 2-inch pots, but 45% John Innes Seed Compost, 35% medium gravel and 20% Bedford sand in a propagator 'at about 75°C' (surely, 75°F again?!). His happy little family suffered some untimely bereavements on pricking-out and when two healthy seedlings of no. 211, *Echinofossulocactus* sp. 'were hit by a low-flying hammer' (a cruder method of despatching *Echinofossulocactus* than that described on pp. 105–7 of this issue!).

MIKE JONES considered his results 'very disappointing and I cannot put this down solely to my methods since seeds from other sources did quite well'. He also complains that 'most of the Society's Top Men seem to be more interested in cacti than other succulents and this seems to be reflected in the seed list which was sadly lacking in really interesting succulents, e.g. euphorbias, caudiciforms, etc.' Without doubt, the Society's Top Man on seed-raising, Dr. Terry Smale, would answer that the reason why the list is predominantly cacti is simply that seed of worthwhile 'other succulents' is very much scarcer, and as a result their propagation by cuttings is often more usual.

LES PEARCY found that 'this year the success rate has

been very good with a few exceptions'. He notes difficulty with no. 204, *Coryphantha greenwoodii* 'only two remain but do not appear to have a growing point'; no. 208, *Echinocereus longisetus* 'very attractive seedlings, quite slow'; disappointing germination amongst the mammillarias (our *M. barbata* failed too, but *M. baxterana* and *M. nivosa* were all right); and the first time out of five sowings that any seeds of *Neowerdermannia chilensis* have germinated.

General Conclusions

Although the results presented above do not amount to a thorough-going survey, the generally comparable results obtained by different growers using a variety of methods suggests that the viability of the seed, rather than the method, is to be blamed for the relatively poor results, and the quantity of seed supplied consequently insufficient to yield a reasonable number of seedlings from each packet. Allowing for losses after germination, the grower may reasonably want to get say half a dozen plants per packet from which to keep some for the collection (and, hopefully, further seed-production) and some to give away or barter. On this basis, an average of 10 seeds per packet may not be quite enough, and the Society's officers have already agreed on the desirability of increasing the number to 15. We are also conscious of the need to see that what goes into the packets is whole, filled seeds and not just fragments or extraneous material. The desirability of improving the quality of the seeds is self-evident, and ways of reporting back to, and encouraging the suppliers, will be looked into, although naturally, the introduction of stringent precautions to ensure seed meets a minimum acceptable

germination rate would be liable to put up the cost per packet very considerably. All this still will not ensure the delivery of the seeds in good condition, but the Seed Distributor, Isobel Boote, has given a lot of thought to packaging and makes it as difficult as possible for the Post Office to crush the life out of even the most can't-wait-to-germinate seed before it reaches the grower.

Finally, looking on the brighter side, 300 or so seedlings (allowing for those which succumbed to maltreatment and various infantile ailments) are not bad value for an outlay of $(95-10=) 85 \times 5p = \pounds 4.25 + 12p$ postage, i.e. about 1.5p each, especially as this does not take into account of the entertainment value of watching for germination, the first spine and so on! If you have not tried seed-raising, or have been disappointed with the results, do try and try again.

Key to Recorders (see table)

Members whose data are listed in the table below are: David Hunt (DH), Clive Bird (CB), T. C. Dunn (TD), Ian Eckford (IE), John Fisher (JF), Bob Hollingsbee (BH), E. E. T. Hobday (EH), Ian Howell (IH), R. J. Humphrey (RH), Mike Jones (MJ), William Morris (WM), Ray Pearce (RP) and Les Pearcy (LP).

Postscript

Since the report was compiled, data have also been received from: J. L. Brooker, F. W. Chalkley, M. Evans, M. A. Gem and W. J. Walker. Their data were generally in accord with the other figures, but when added to the totals in the table they reduce the overall average seedlings per packet to 3.4 (total no. of packets 355).

No.	Name	Initials of Recorder/Seeds Germinated														Totals		No.
		DH	CB	TD	IE	JF	BH	EH	IH	RH	MJ	WM	RP	LP	Germ'd Pkts			
192	Acanthocalycium variiflorum	1	0											1	2	3	192	
193	Ariocarpus furfuraceus	0	0												0	2	193	
194	Astrophytum capricorne var. minor	8								0					8	2	194	
195	ornatum var. mirbellii	7		5		5									17	3	195	
196	senile	6	1			4									11	3	196	
197	Buiningia brevicylindrica HU167	3				0		4	4	6					17	5	197	
133	Cereus hexagonus	—								3					3	1	133	
134	jamacaru	—													—	—	134	
198	Copiapoa aurata KK1397	6		3											9	2	198	
199	cupreata KK1382	2											1		3	2	199	
200	dealbata var. diminuta KK1383	5									2		0		7	3	200	
201	longispina KK1135	3										0			3	2	201	
202	pendulina KK1391	3													3	1	202	
203	Coryphantha bergeriana	5	10			9			4					4	32	5	203	
204	greenwoodii	5	3	2	3									5	18	5	204	
205	Echinocereus adustus	0				2		5			1			2	10	5	205	
206	dasyacanthus	0					3						1	0	4	4	206	
207	gentryi	4					2	3							9	3	207	
208	longisetus	1		4		0								5	10	4	208	
209	subinermis	3						3							6	2	209	
210	Echinofossulocactus multicostatus	4													4	1	210	
211	sp.	4		5		3				2					14	4	211	
212	Echinopsis mamillosa KK719	1	0									0	2		3	4	212	
141	Erdisia ayacuchensis KK1274	0							0						0	2	141	
213	Escobaria dasyacantha	3											8	4	15	3	213	
214	Espostoa nana KK301	14		5		5			18			7			49	5	214	
215	Eriosyce ausseliana KK1327	4										0	3		7	3	215	
216	sp. (Los Loros) KK1322	1		1											2	2	216	

No.	Name	Initials of Recorder/Seeds Germinated														Totals		No.
		DH	CB	TD	IE	JF	BH	EH	IH	RH	MJ	WM	RP	LP	Germ'd Pkts			
143	Eulychnia procumbens KK1284	6					4								10	2	143	
217	ritteri KK95	4			3	2	1		4						14	5	217	
218	Ferocactus glaucescens	10			6				4						20	3	218	
219	Gymnocactus beguinii var. (Paila)	0				4									4	2	219	
220	Gymnocalycium castellanosi	5		2				3			2				12	4	220	
221	friedrichii	4						2							6	2	221	
222	pugionacanthum	5					2	5							12	3	222	
223	schickendantzii var. Lau 473	14		8		18							9		49	4	223	
224	spagazzinii	2			1										3	2	224	
225	Haageocereus horrens KK325	3										3			6	2	225	
149	mixed spp.																149	
226	Lobivia charazanensis	6	2	8		10								9	35	5	226	
227	chilensis	3		4									6	0	13	4	227	
228	corbula KK1539	3	2	7										0	12	4	228	
229	haageana	1												5	6	2	229	
230	larae	4				2	9							2	17	4	230	
231	zecheri var. fungiflora	5	1	6			2							0	14	5	231	
232	Loxanthocereus eulalianus KK452	7													7	1	232	
233	Mammillaria barbata	0		3		8		8						0	19	5	233	
234	baxteriana	6		6										0	12	3	234	
235	centraliplumosa	5				8				3					16	3	235	
236	cowperae	3		2											5	2	236	
237	eriacantha Lau 1104	11			4	6								1	22	4	237	
238	guelzowiana	2	3										3		8	3	238	
239	mundtii	5	6									3			14	3	239	
240	nivosa	10		8		7		8						0	33	5	240	
241	xaltiangensis	10	2	4		7		5		3				4	35	7	241	
242	Matucana intertexta KK1216	5			5			4							14	3	242	
243	madisoniorum KK456	8						4							12	2	243	
244	Melocactus alpesiensis KK1047	8		5			6					4			23	4	244	
245	longispinus	6		5								2			13	3	245	
162	Mila cereoides KK1404	0													0	1	162	
246	Neoporteria aerocarpa var. fulva	11		5		10							8		34	4	246	
247	calocephala	3		4											7	2	247	
248	cephalophora	3					5								8	2	248	
249	deherdtiana KK1114	7				2	5	7			1				22	5	249	
250	glaucescens	6		2			3								11	3	250	
251	paucispina KK348	3		1									5		9	3	251	
252	polyrhaphis	5		6			8								19	3	252	
253	Neowerdermannia chilensis KK625	0			0				0	1				2	3	5	253	
254	Notocactus brevihamatus HU43	0		0		1								0	1	4	254	
255	herteri	2	0		1						3				6	4	255	
189	leninghausii	3													3	1	189	
256	warasii	3		1		1								4	9	4	256	
257	werdermannianus	0								0				0	0	3	257	
258	Obregonia denegrii	7	4	4						4			5		24	5	258	
259	Oreocereus hendriksonianus																	
	var. densilanus KK1117	5					6								11	2	259	
260	Oroya acollana KK578	3		6			3								12	3	260	
261	citriflora KK1463	3		0			2					3			8	4	261	
262	Parodia hausteiniana	2													2	1	262	
263	maxima KK691	3		3		6			1						13	4	263	
264	pluricentralis	6		1											7	2	264	
265	tilcarensis	1													1	1	265	
178	sp. (Pazna) KK967	5													5	1	178	
266	Pfeiffera ianthothele	5			1		4	3	0				4		17	6	266	
267	Philippicereus castaneus KK197	4			1			6							11	3	267	
268	Pilocopiapoa solaris																	
	var. luteispina KK1239	2			2								4		8	3	268	
190	Rebutia fiebrigii	4													4	1	190	
269	graciliflora var. borealis	0													0	1	269	
270	narvaecense	1	0												1	2	270	
191	Setiechinopsis mirabilis	0													0	1	191	
271	Tephrocactus chilensis var. rubra KK1501	0										0			0	2	271	
272	Thelocactus bicolor (Huizache)	0		1		7								5	13	4	272	
273	flavidispinus	3	2											2	7	3	273	
274	wagnerianus	0	0				5							0	5	4	274	
275	sp. (Rayones) Lau 744	0		0		0								1	1	4	275	
187	Trichocereus spachianoides	8													8	1	187	
276	Turbinicarpus klinkerianus	1	4					1	4	1				2	13	6	276	
277	Weberbauerocereus longicomus	7					6								13	2	277	
278	Weingartia saintpieana KK1573	0		2		0								5	7	4	278	
Number of seedlings germinated		370	40	129	27	117	86	71	39	23	9	22	51	71	1055			
Number of packets sown		95	18	35	10	26	19	16	10	10	5	10	14	28		296		
Average seedlings per packet		3.9	2.2	3.7	2.7	4.5	4.5	4.4	3.9	2.3	1.8	2.2	3.6	2.5	3.6			

Notes from Members

Nomenclature of fasciated plants

from Paul Heath

In the May issue some notes by Len Newton claimed that Article 71 of the International Code of Botanical Nomenclature forbids the use of Latin names for monstrose or cristate plants. Unfortunately this is no longer so because in the latest (1978) edition of the Code Article 71 has been abolished. In its place the current ICBN simply has a note which reads: 'Article 71, dealing with monstrosities, was deleted by the Lenin-grad Congress, 1975'.

Paul Heath

9 Hazeldene Meads

Brighton

Sussex BN1 5LR.

Yes, and the Editors had overlooked the deletion of Art. 71 until it was too late too. The problem with Art. 71 was how to define monstrosities and hence where to draw the line and decide which names to reject. Whether or not to treat cristates etc. as forms or cultivars is now simply a matter of taxonomic judgement or preference. We would recommend the use of cultivar rank in any instance where the plant is propagated artificially, i.e. perpetuated by the agency of Man.—Eds.

Conservation and the Vicious Circle

from Paul Sherville

I should like to back up Werner Reppenhagen's plea in the August issue for 'Conservation by propagation', and to add from my own experience that it is not only in Mexico that cacti are endangered by selective collecting. Like another contributor to the August issue, Will Tjaden, I attended the IOS Congress in Mexico last March, and witnessed the avarice of some participants (not, I understand, IOS members) for whom the temptation to own habitat material was so great that they flouted the 'no collecting' rule of the Congress, ignored rebukes from IOS President John Donald and, of course, abused the hospitality of our Mexican hosts. Naturally, the plants they collected were not the myriad opuntias or myrtillocacti which clothed the landscape but the small rare species like *Pelecyphora aselliformis*, small mammillarias, thelocacti, and the like.

At the end of the Congress, I left Mexico and made my way to Peru, and all thoughts of the events in Mexico were erased from my mind as I focussed my camera on the large stands of *Espostoa ritteri*, *E. lanata*, *Weberbauerocereus longicomus*, large specimens of *Melocactus* and of *Borzicactus (Matucana) intertextus*, many showing flowers and fruits. Here were the plants that I had used to illustrate a talk at the Congress, all growing happily, many absolutely exuding health, others near the end of their lives were dying, even decaying, often also supporting large populations of Mealy Bugs in their final days; but also there were, in every possible niche, seedlings from plants a few millimetres in

diameter upwards. Here then was a stable, ecologically healthy state of affairs. Happy in this knowledge, I continued my journey southwards to Bolivia, and once again due to the generous hospitality of Roberto Vasquez and his family, and that of Edgar Aguilar also, I was able to make some very interesting forays into the Bolivian cactus habitats.

Alas, here in Bolivia I found things changed since my previous visit and experienced quite conclusively the devastating effect on the populations of the 'desirable' species, of their selective removal solely for the purpose of languishing in someone's greenhouse. For me, the most dramatic example was near the small town of Epizana, where the road to Sucre leaves the Cochabamba to Santa Cruz road. On my previous trip to Bolivia with John Medway in December 1978, we had visited this very same site, and even in the gathering dusk we had not had any problem at all in finding good, clean specimens of *Sulcorebutia bicolorispina* to photograph; plants of 4 and even 5-inches in diameter were all over the tops of the large granite boulders, and the same boulders were also the home to a host of other plants, being completely clothed in vegetation, including numerous *Tillandsias* (another group of plants of interest to me). On the occasion of my second visit in May 1980 to try and obtain better photos of the plants, even in bright sunshine of a winter's afternoon, we had to spend almost an hour searching for a *Sulcorebutia* worthy of being photographed. The rocks, once clothed in vegetation, were now completely bare, yes—the *Tillandsias* also have their followers—and there were only some eleven rather scruffy plants, no seedlings, and more importantly, no nice damp niches amongst the other vegetation where any seed produced by the remaining plants could germinate and develop.

Much further south, between Tarija and Narvaez, there are many cacti. In places, they could even be considered to be the dominant members of the flora. We visited one site where a distinctive and beautiful cactus was discovered by Walter Rausch not many years ago, and introduced to cultivation where it gained immediate popularity. This particular species grows in association with *Lobivia tiegeliana* near the base of some low hills in a rather stony, sandy soil. We found the *Lobivia* quite readily, although further travels to other habitats revealed that this particular population was considerably reduced in both density and quality of the specimens remaining. However, after some three hours of diligent searching, the habitat produced not one single specimen of the plant we were particularly looking for. The habitat is not very large in extent, and there is not much other vegetation to impede the search. The plant? *Rebutia (Aylostera) heliosa*.

By way of conclusion may I make some requests? If you are the proud owner of a habitat-collected *Rebutia heliosa*, do try to ensure that it stays alive. Try

to propagate from your specimen, or cross-pollinate it with another plant and produce some seed. At least this will keep the species in cultivation, because, almost certainly there will be no more imported plants available. There will certainly be no more from the type locality. I say the same to owners of *Sulcorebutia bicolorispina*, although your task is less easy as this species is considerably more difficult to propagate.

My final message may, I fear, fall on stony ground: do resist the temptation to acquire and own habitat-collected plants. Why am I pessimistic? Because there is an element of status to habitat plants and it is human nature to attach even more status to owning something which is scarce. As habitat plants become ever more difficult to acquire, so their acquisition will become of even more importance to some collectors . . . one of life's many vicious circles!

P. H. Sherville
51 Park Road
Enfield
Middx. EN3 6SR

Insecticides

from W. F. Maddams

It may be helpful to indicate sources of supply in Britain for the insecticides listed in N. P. Davis's valuable article (in CSJGB 42(3): 81-86). The majority of the organochlorine materials (Aldrin, Dieldrin, DDT and Heptachlor) have been withdrawn from use because they have proved deleterious to wildlife, and parathion is not available to amateur growers because of its toxicity. Other materials are marketed as follows:

Type and Trade Name	Source
A. Organochlorine	
Chlordane	Fisons
Dicofol	PBI
Kelthane	Murphy
Endosulfan	Boots
Gamma-BHC/Lindane	Boots
Lindane	Boots
Gammacol	Plant Protection
B. Organophosphorus	
Demeton-Methyl	Plant Protection
Metasystox	Boots
Daratox	Shell
Dimethoate/Rogor	Fisons
Fenthion/Lebaycid/ Baycid/Baytex/ Mercaptophos	Bayer
Malathion	Murphy
Dichlorvos/Nogos 50EC	Ciba-Geigy
C. Carbamates	
Benomyl	Du Pont
Carbamyl	Boots, Union Carbide
Murvin	Murphy

W. F. Maddams, M.Sc., A.Inst.P.
26 Glenfield Road
Banstead
Surrey SM7 2DG.

ANNUAL GENERAL MEETING, 28 March 1981 Preliminary programme details

Venue: Pickard Motor Hotel, A217 Brighton Road, Burgh Heath, Surrey.

Morning session: 10.00 Coffee on arrival. Plant Sales by 'Pete and Ken'; 10.30-12.30 Illustrated programme by Bill and Yvonne Tree.

Lunch: 12.30-2.00. Available at the Hotel or local 'Happy Eater'.

Afternoon session: 2.00 Annual General Meeting; 4.00 Tea, Plant Sales; 5.00 Meeting closes.

Further information from the Publicity Officer, Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey SM7 2DG, Tel. Burgh Heath 54036.

Branch Activities

Items for inclusion in the next Issue must reach the Editors no later than 19 December.

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.

Future events:

6 December Christmas Social Evening

North London

Secretary: Roger Day, 50 Admiral's Walk, Hoddesdon, Herts. tel. no. Hoddesdon (STD Code from London: 61) 69521.

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

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

Future Events:

19 December Christmas 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.

The Branch's new venture with the local Beekeepers—the Carshalton Cactus and Honey Show—proved a very successful occasion. The judges of the Branch's part of the Show, Mr. and Mrs. R. Holt, had great difficulty in making awards with such a fine and large display of good condition plants. Of particular note was the Parodia class with most of the fine exhibits in six-inch pots. Dr. and Mrs. Smale were presented with the Chelsea Award for the highest total points and also awards for the highest total points in both sections. The Chuter Cup for novices was shared jointly with Mr. Ellis and Mr. O'Connell and Mrs. Leach won the Flora Award for her attractive miniature garden.

Future events:

2 December Members' slides

6 January 1981 New Year Party

3 February Branch AGM

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.

The Branch's 2nd Annual Show was very successful and the Committee would like to thank all those who entered and helped to make it a pleasant occasion. It is gratifying that the display we staged at Southport Flower Show gained a Silver Medal, not to say some new members.

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, 28 March 1981, at the Pickard Motor Hotel, A217 Brighton Road, Burgh Heath, Surrey, 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 1979 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, 23 January 1981.

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. Bowdery, Mr. L. Hurley, Mrs. B. Maddams	

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.

Future events:
10 December Branch AGM, followed by a social evening at which 'Plant of the Month' trophies will be presented.

For copies of the 1981 programme, please contact Mrs. Pritchard.

Wirral

Secretary: Mrs. I. Boote, 110 Mount Pleasant Road, Wallasey, Merseyside L45 5HU, tel. no. Wallasey (051639) 4305.

Meeting Place: The Grange, Grove Road, Wallasey.

Time: 3rd Thursday in month, 7.45–10.30 p.m.

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), Clif Road, Wreton, 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 4×8p 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. Penrhynedeuraeth (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.

Gloucestershire

W. G. Geissler, 1 Lyefield Road, Charlton Kings, Cheltenham GL53 8BA. Tel. no. Cheltenham (0242) 517846. Open weekends and evenings. No list, no orders by post, but visitors very welcome in Cotswold country.

P. Strong, Green Mead, Green Lane, Chedworth, Cheltenham GL54 4AR. Tel. no. Fossebridge (028572) 581. Surplus seed-raised plants.

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, Telscombe Cliffs, Sussex BN9 7LG. Tel. no. Peacehaven (07914) 3260. Open by appointment; closed Sundays. Send 12p 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. Send 25p for current catalogue of plants and seeds. 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. Sargent) Hampreston Village, Wimborne, Dorset BH21 7LX. Tel. no. Northbourne (02016) 3829. Not open Sundays and Mondays. List 12p. Plants and seeds.

Devon

Phil Goodson, 1 Marsh Lane, Chudleigh, Newton Abbot, Devon. Tel. no. Chudleigh (0626) 852309. Collection open, plants usually for sale. Between the scenic Teign Valley and Haldon Hills, five miles from M5. 'Phone for directions and convenient times.

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 Devonian Collection of Cacti & Succulents; over 4000 species. Surplus plants for sale or exchange.

Westfield Cacti (Ralph Northcott), 10 Shillingford Road, Alphington, Exeter, Devon. Tel. no. Exeter (0392) 56925. Nursery grown cacti and other succulents. S.A.E. for list. Open to visitors from 1 January 1981, 9.00 a.m. till dusk, by appointment.

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 12p. Large selection succulents. Cornish cream teas June-Sept. incl.

Hoyas - Senecio - Crassula - Ceropegia

Please write for price-list

MARIN CACTUS PATCH

**61 Granada Drive
Corte Madera, California 94925, U.S.A.**

H. GUIRL

Grower of Cacti and Succulent Plants

**'Glenholme' Nursery Road
Nazeing, Essex**

Telephone: Hoddesdon 62291

Sorry - No Lists

● VISITORS AND PARTIES WELCOME ●

A prior telephone call would be appreciated

The Cactus and Succulent Journal of America

Six issues per year, fully illustrated, total on average 300 pages and catering for all levels of interest. Subscription: \$16.00. Apply direct to Box 3010, Santa Barbara, California 93105, USA.

Whitestone

Whitestone Gardens has everything for succulent fanatics and beginners. A large stock of plants, seeds, books and sundries is constantly on view, and the nursery is open to visitors every day.

Our plants are primarily nursery-grown seedlings, but we also stock a range of larger plants. The nursery shop carries almost everything ever likely to be needed by the cactus enthusiast, including a range of books and other publications which is the most comprehensive in the world. We stock every book in print and many that aren't—why be kept waiting by your local bookseller when you can ring or write to us and get your needs by return of post.

Most of the Whitestone Collection is permanently on view to visitors—free of charge. This is constantly expanding, and now represents one of the best displays in the country. It is of special interest to serious students by virtue of the logical arrangement and the high proportion of authenticated reference material.

Anyone who hasn't been before can find us about 3½ miles from Thirsk on the A170 Scarborough road in the heart of North Yorkshire's most attractive tourist countryside.

1980 Whitestone Price List 45 pages of plants, books, seeds, and sundries, illustrated in full colour and monochrome. Free to existing clients (sent automatically). New UK customers please send *four 8p stamps*, and overseas customers *three International Postal Reply Coupons*.

A few popular book titles from our extensive range:

Cactus Lexicon (Backeberg) £25 plus 86p post

Illustrated Encyclopaedia of Succulents (Rowley) £7.95 + 80p post

Cacti: Botanical Aspects, Descriptions & Cultivation (Barthlott) £7.95 + 50p post

Illustrated Reference on Cacti & Other Succulents (Lamb)

Vols. 1, 2, 3, 4 £7.50 per Vol. + 50p post each

Vol. 5 £8.50 + 50p post

The Cactaceae (Britton & Rose) 2 Vols. £25 + £1.25 post per set

Cacti & Succulents—A Concise Guide in Colour (Subik & Kaplicka) £1.50 + 40p post

Post indicated above applies to UK and surface mail overseas

STILL WANTED!

Obsolete publications, especially American journals (we pay 50p per issue), NCSS and GB Society journals (we pay 15p per issue) and all kinds of books for our second-hand trade.



Whitestone Gardens Ltd

The Cactus Houses
Sutton-under-Whitestonecliffe
Thirsk
North Yorkshire YO7 2PZ

Telephone: Sutton 467

You will find a warm welcome
and a good selection of
cacti and succulent plants
at

THE CACTUS PLACE

(DAVID & BARBARA
BREWERTON)

33 BRIDGE AVENUE, UPMINSTER,
ESSEX, RM14 2LX

*"The Cactus Place" is almost
always open, but please phone
Upminster 29911*

Collections Bought — No Lists Issued
BRANCH VISITS BY APPOINTMENT

CACTUS and SUCCULENT PLANT SEEDS

from the deserts
of the world

s.a.e. for latest list.

SOUTHWEST SEEDS
200 SPRING ROAD
KEMPSTON
BEDFORD
ENGLAND

*Seeds despatched Air Mail
to all parts of the World.*

The National Cactus & Succulent Society

has over 100 Branches meeting
regularly in all parts of the British
Isles. The quarterly journal re-
plete with scientific and cultural
information, news and views, has
the largest circulation in the
English-speaking world, and is
amply illustrated on art-paper.
Seed-list with December issue.

Annual subscription £3.00 or \$7.50 U.S.

Further details from the Membership
Secretary, Miss W. E. Dunn, 43 Dewar
Drive, Sheffield, England S7 2GR, to
whom applications for membership
should also be sent.

WHELDON & WESLEY LTD.

Buy and Sell

BOOKS

on all branches of

NATURAL HISTORY

especially

Botany & Horticulture

in all languages

LYTTON LODGE,
CODICOTE, Nr. HITCHIN,
HERTS.

Telephone: Stevenage (0438) 820370
Telegrams: Wheldwesly, Codicote, Hitchin