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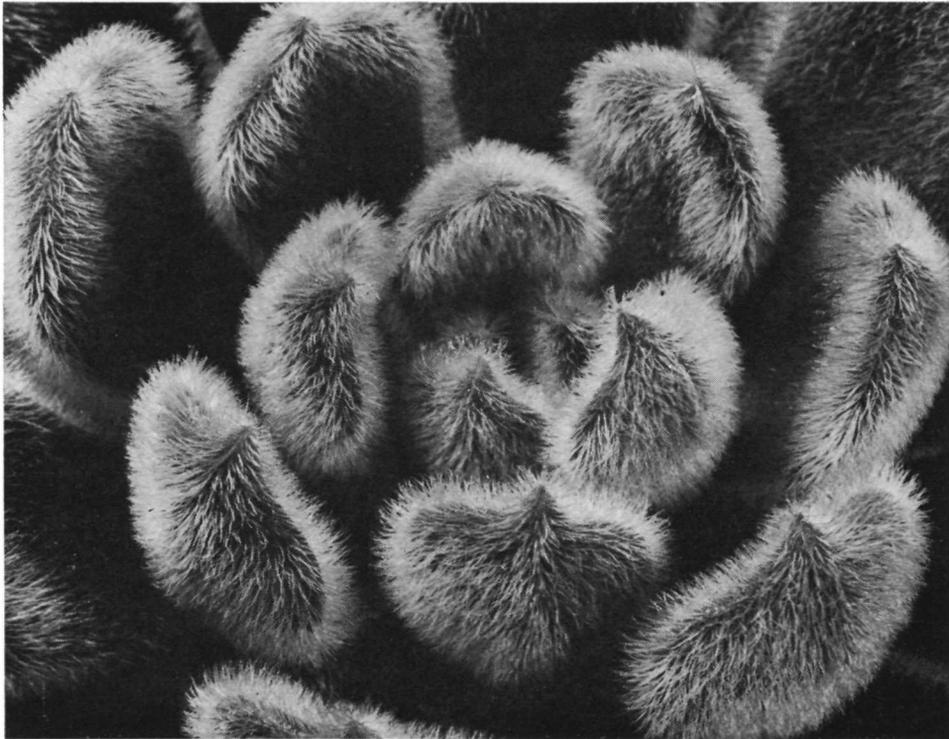
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Echeveria 'Doris Taylor' (photo: M. J. Martin)

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From the President

THIS is the first issue of the current year and I would like to wish you a Happy New Year and much fun and success in growing your plants. It may be that the remarkable summer we had in 1975 benefited some of them and some satisfactory developments may occur. I hope this may be so and it may be interesting to compare notes. I have seen various comparisons made that it was the hottest summer for 200 and 300 years and surely some influence must have registered with our plants, or did it pass like a dream?

We have been a corporate society for 44 years. May we still be so for another 44 years. After all life is lived

day by day and that builds into years. May we make our days count in whatever occupation we spend our lives. We are all remarkable in our own way. It is diversity that enlivens the weaving of our lives.

Cottage gardens, scent of flowers,
Grassy banks and shady trees—
Fancy lingers long on these.
Through our dreams for ever fair
Winds a lane to—who knows where?

(David Hope)

DORA SHURLY

Editorial

Some time ago Dr. W. V. Harris expressed the wish to relinquish the editorial chair and he has arranged for his successor, David Hunt, to assume responsibility with this first issue of the new volume. Of Dr. Harris's work as Editor, our Chairman W. F. Maddams writes: 'When I persuaded Dr. Harris to take over the editorship I was confident he would make a success of the job. I had no doubts about his reliability and he had two other valuable assets, his reputation as a scientist of distinction and his experience of publishing. Anyone who has written a book (in Dr. Harris's case, a standard text on termites) acquires a good deal of know-how that is useful in editing a journal such as ours. During the past five years, when it has not always been easy, even up to the last minute, to acquire sufficient material to fill each issue, he has also revealed the ability to keep cool and turn out the journal on time. We extend to him our hearty thanks and hope we may still have his services in the role of an occasional contributor.'

Kew Gardens—Quickly!

For many years Punch has run a competition inviting readers to put new captions to old cartoons and, judging from some of the winning entries, even a simple drawing can hold messages to a later generation which would have astonished the original artist. It so happens that for your new editor's purpose the original caption to Anton's 1948 cartoon (opposite) cannot be improved, since it contains concise instructions to everyone with news for the Journal!

But what does Anton's drawing mean a generation on? Not simply a warning to those who order unnamed varieties from unscrupulous seedsmen or even to those who mix chemistry with cacti?

Unlike the Loch Ness Monster, which seems likely to make a public appearance at any time (unwilling, perhaps, to be outsold by North Sea Oil as Scotland's major non-alcoholic export), the man-eating cactus,* along with so many other species, is on the decline. Back in 1948, press reports of remarkable cactaceous phenomena like this were not infrequent, as readers of Mr. Shurly's gleeful !!! feature will remember. Interest in all aspects of horticulture, succulents included, has become so much more knowledgeable since those days that the man-eating cactus has been almost eradicated from belief, along with other die-hard fallacies like 'they grow in dirt and don't need water' and 'they only flower once in seven years'. Techniques of cultivation are more sophisticated and a wider assortment of species is available to tempt us. As in other walks of life, competition to be amongst the experts, coupled with financial and other constraints, has made specialists of many of us. Like the not-so-mythical laboratory botanist who cannot tell a dandelion from a daisy, the day may not be so far off when there will be cactus experts who can't tell an *Adenia* from an *Adenium*, or an *Agave* from an *Aloe*. What show organizer these days lets the *Mammillaria* judge loose among the *Crassula* classes?

Specialization in our hobby is reflected in the proliferation of new societies and by the fact that the

*Since learned authorities have seen fit to bestow a scientific name on Nessie before proof of her existence, may I (on no authority whatever) draw the attention of botanists to this species, *Macabreocereus anthropophagus* (Mac for short), before it finally becomes extinct? Amongst recently described cacti it is, believe me, outstandingly distinct!



Kew Gardens—QUICKLY!

(reproduced by permission from 'Punch')

number of journals and bulletins on succulents in Britain alone has increased from two to nearer twenty-two. Clearly, there are more writers at work too, many of whom find it easier to test the temperature of the water in the seclusion of the specialist bulletins rather than in the formality of the printed page. The newer societies and their bulletins are welcome, but their double challenge is clear: to the non-specialist editor, who must find and attract the contributors who can provide the 'meat' of his copy; and still more to our non-specialist Society itself, which must identify itself with positive and individual objectives. The first challenge is now particularly addressed to me, the second to Council and the whole Society, but the reply to both is surely the same, a combination of adaptability and competitiveness. Adaptability, because it is the one thing the specialist groups lack, and competitiveness because it means being as good or better than the rest in all kinds of ways.

For most of the societies, publications are both the shopwindow and a means of communication between members. For the 'GB' journal the role of shopwindow has long been paramount, and with the bank balance down (to quote the Treasurer) and the subscription up, the new window-dresser seems in for a long spell (*sic*) of unpaid overtime. Lots of new ideas are needed, and

if you have any please bring them forward. We also need to improve features where we are *uncompetitive*, or cut them out altogether. We could have more lively discussion and debate on the lines of last year's 'Forum' on *Lobivia*, for instance, and more brief items of news and observation from members. Which brings me back to Anton's cartoon again . . . *if anything unusual should happen in YOUR greenhouse—or laboratory—do let me know!* News and views, notes and ideas, however brief, good black and white photographs, drawings, cartoons or quotations will all be welcome, and on page 22 there are a few topics to write about on which few of us hold no opinions at all. I hope to hear from you. The new address for correspondence is D. R. Hunt, c/o The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB.

Forthcoming Meetings at Westminster

February 18th Mr. G. Hollis on 'Plants in My Collection'.

March 31st Annual General Meeting.

April 14th Mr. R. Holt on 'My Favourite Plants'.

These meetings are held in the R.H.S. New Hall, Greycoat Street, Westminster at 6 p.m. for 6.30 p.m.

Seasonal Cactus Care

by W. F. & B. Maddams

VERY few cactophiles keep any sort of account of the time and money they expend on their plants. This is no bad thing because it is purely a hobby for most of us and, within reason, we like to ignore the mercenary aspects of it and to treat it differently from the household accounts and the income tax returns. However, despite the lack of detailed information on how much the average enthusiast spends and how his time is expended, it is reasonably safe to predict that the job of repotting is the most time consuming of his activities. In view of the steeply rising prices of compost, and to a lesser extent pots, it may also prove to be the biggest financial drain. It is therefore no bad thing to consider in some detail the why's and wherefore's of repotting, the more so in February because this is the time of the year when, in our neophyte days, most of us were told that repotting should be done.

There are three major reasons why plants need to be repotted from time to time. If they are progressing satisfactorily they outgrow their containers and, more or less by way of a corollary, they exhaust the nutrients in the compost in which they are growing. Finally, and by no means least, the compost gradually becomes compacted in a given container and this may lead to drainage problems. As it happens, with a typical plant these three factors have approximately equal time scales and if it is not repotted every other year its growth will probably be checked. There are dangers in generalisations of this kind, of course. Plants such as the various *Ariocarpus* species may be perfectly happy with a repot every third or fourth year. On the other hand vigorous small plants from many genera will certainly need a move every year and may even require it in the spring and the autumn of one year. The signs are abundantly clear; if the body covers the top of the pot or roots appear through the drainage hole an early move is indicated.

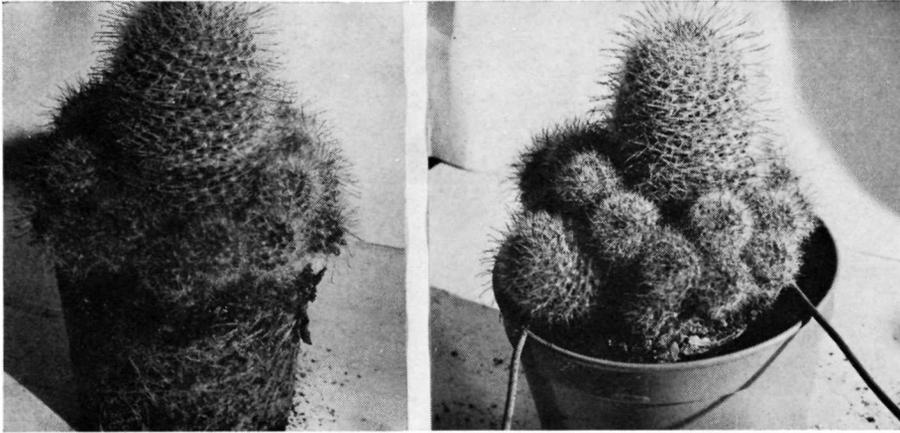
The process of repotting involves the choice of a compost, a container and a technique for handling the plants. Twenty years ago, when we were very much inexperienced beginners, the subject of composts was one for seemingly endless debate and a cause for confusion among novices. Great emphasis was always placed upon first class drainage and various additives to the standard John Innes composts were advocated. There were devotees of vermiculite, crushed breeze block, burnt clay and various other ingredients which are now seldom mentioned. The fact that this mystique has now all but disappeared is a clear indication of what some of us knew instinctively and others learnt by trial and error, that the average cactus is very tolerant of the compost in which it grows. It requires no more than reasonable drainage, adequate nutrients, particularly potash

and phosphorus, and a medium that is neither too acid nor too alkaline.

For this reason the composts now in use have simplified to two rather different types, the John Innes type formulation and the more recent soil-less compost, based on a peat-sand mixture. These latter are rather widely used and are very satisfactory. The reason for their rise to popularity is related directly to the difficulty in obtaining satisfactory JI composts and we propose to discuss the matter in greater detail on another occasion. Good suppliers of conventional compost usually do not need to advertise their wares as the word spreads by mouth and members of the various Branches, in particular, should have no difficulty in finding a source. Hence, for present purposes, we shall suppose that a suitable compost of one or other type is available.

The owner of a collection of any size must also lay in an adequate supply of containers. A few years ago the great debate on plastic versus clay pots generated as much heat as the topic of composts had done a decade earlier. With the virtual disappearance of clay containers from the market the issue is settled and it is now generally acknowledged that plastic pots are very satisfactory. Their impervious walls make them very useful during hot spells such as we experienced in July and August 1975 and if common sense in watering is shown in the autumn the problem of over-wet composts need not arise. The real difficulty arises in finding containers of any type for large plants with shallow root systems, such as the considerable number of caespitose *Mammillaria* species, the occasional large multi-headed *Rebutia* and a range of other plants. The conventional plastic pots of full depth are definitely not suitable and plastic half pots with diameters larger than seven inches are not generally available. On the other hand, the various plastic saucers which come in quite large sizes, are too shallow. It has been suggested that one should cut off the top portion of a plastic pot to make a half pot of the required depth but such containers have no rims and are aesthetically unattractive. Clay half pots are occasionally to be found and there are a few small concerns up and down the country who make them to special order, with a delivery time of some months. The only advice we can give is to keep your eyes and ears open, particularly when a long established nursery moves or closes down.

Probably the biggest disadvantage of plastic pots, particularly the larger ones, is that they contain no large central drainage hole in the base and this can make it difficult to remove plants for repotting. In the case of smaller pots one or two sharp raps against a hard surface will usually loosen the root ball and the plant can be slid out. However, this is not so easily done with



Tip the plant out and see just what the root system is like. Two or three canes will hold the plant in place (photo: B. Maddams)

larger specimens or in cases where the compost has become compacted. In these cases a piece of stiff wire is a useful implement; it can be gradually worked around between the root ball and the inside of the pot. Large plants in clay containers are also something of a problem, simply because of their weight. One cannot simply invert the whole lot onto a table as this would inevitably cause damage to the spines. Our eighteen inch diameter specimens of *Mammillaria bocasana* and *M. centricirra* come into this category and we find that the most difficult part of the repotting operation is the first, to remove them from the container they occupy. It is definitely a two-person operation. Ideally, one finds a cylindrical plug of wood about the diameter of the central drainage hole and pushes it through. As the plant lifts up, two stout canes are slid beneath the clump of heads, one on either side. It is usually possible to get these well beneath the body of the plant to spread the weight and lessen the risk of individual heads breaking away. In the case of large columnar plants the best approach is to wrap several layers of paper around the base, to form a collar so that it can be held without fear of injury. It is then lifted an inch or two and the rim of the container is tapped smartly with a piece of wood until it drops away.

When the plant has been removed from the pot the state of the roots will be apparent. If there is a great deal of healthy root forming a tight mat any attempt to disentangle it and to prise soil away will do more harm than good. In such cases one merely pots on by placing the plant in a larger container and filling soil into the annular gap. In general, however, loose soil will come away and as much should be removed as can be done without the use of too much force. Some root usually comes away in this operation but this is not any cause for alarm as, on close inspection, it usually proves

to be dead. If a plant, particularly one that seems to be ailing, has a poor root system it is best to cut it back to sound tissue as a healthy new root system will then develop more easily.

In most cases the diameter of the new container will depend on the size of the plant itself but the depth will usually be determined by the length of the roots. Columnar Cerei are the exception as their root systems are usually much wider than the plant; with *Cleistocactus* and various allied genera there are vigorous root systems and unless greenhouse space is really at a premium they should not be squeezed into pots barely large enough for them. In any case if a tall plant is placed in a small container it will be unstable and tend to topple over. We were involved in an unfortunate case of this kind when judging at a show; a tall *Opuntia* in far too small a pot fell on an unfortunate steward, with results which may be imagined. The novice cactophile will soon develop an instinctive feeling for the correct size of container, based not only on the size of the body and the root ball but also on probable increase in size during the next year or so.

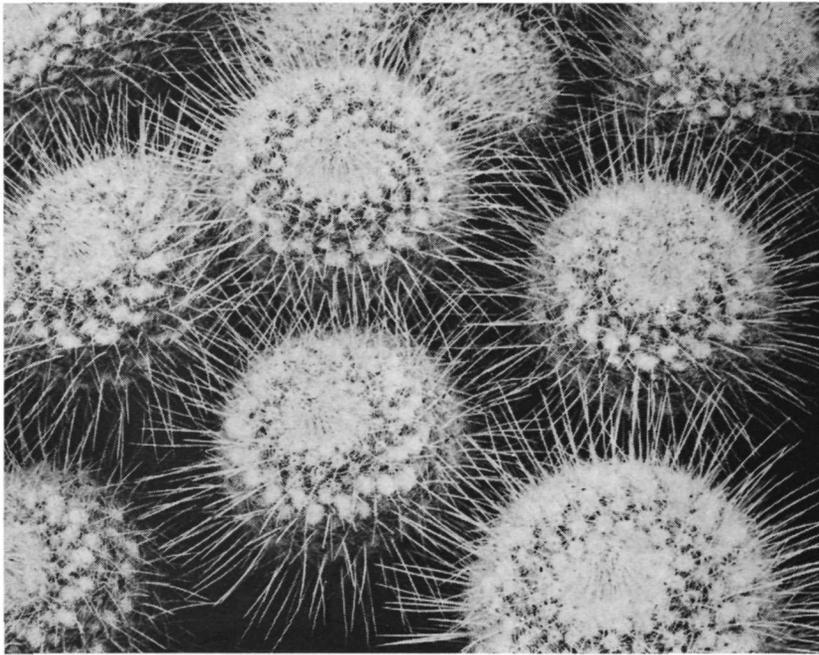
If a clay container is being used the central drainage hole should be covered with one large and preferably curved crock but this is not necessary with plastic pots. Our approach then is to put in a shallow layer of compost, add a few crystals of paradichlorbenzene to discourage root mealy bug, and then cover these with a little more compost. At this point the plant is inserted and if it is a large one it can be held by one or other of the methods mentioned in connection with de-potting. The wearing of gloves for handling plants is very much a matter of personal preference, except in the case of *Opuntias* where only masochists can contemplate the possibility of glochids in their fingers with any sense of anticipation. Gloves can prove a mixed blessing after a

time for, as Charles Glass and Robert Foster remark in an article in the September/October issue of the *American Cactus and Succulent Journal*, "We do not recommend gloves for they will soon be so full of spines that they will be worse to handle than the cactus". In fact, one develops a knack for holding cacti and although a few spines inevitably end up in one's fingers they are seldom troublesome.

The compost should be slightly moist, so that if a quantity is taken into the hand and squeezed it breaks apart very gently when the pressure is released. Some gardeners have the knack of running a handful of soil into the pot around the roots but we find old spoons very convenient implements. A teaspoon does well for small pots and a tablespoon for larger containers. The opposite end can be used to firm down gently as the operation proceeds. No great force should be used but if the compost is too loose the plant will subsequently sink somewhat, particularly with soil-less composts. When the potting is complete, if the plant has been held correctly it will be the same height, relative to the compost, as it was before, and the surface of the latter will be about half an inch below the rim of the pot. It will then be possible to give an ample amount of water during the hot summer weather. Some cactophiles

complete the repotting operation by giving the bottom of the pot a few taps on a hard surface to settle the plant and the compost but this is optional.

It is generally recommended that newly repotted plants should not be watered for a few days, to allow any damage to the roots to heal over. This is probably a sensible precaution but where plants have been potted on in hot weather there may be an advantage in giving some water within a day or two. Likewise, it has often been said that plants should only be repotted when in active growth and there is an element of truth in this, particularly for novices. However, those of us with large collections have to repot at any time of the year when the opportunity presents itself or the task would be an impossible one. We set ourselves the target at the beginning of the year of repotting a minimum of one thousand plants during the ensuing twelve months and, at the time of writing, early in December, we are within sight of this target. We managed one hundred and one in January, ninety eight in February and only in September did we fail to make significant progress. We work on the principle that a plant in need of a move benefits whenever it is done and the results we achieve seem to bear this out.



Mammillaria geminispina Haw. (photo: H. Broogh)

Cultivation of Succulents

by Mrs. M. Stillwell

WRITING these notes on a dark December day one can only take consolation that when they are read it will be time to think of spring and another growing season not far away. We have maintained the temperature about 45°F during the winter with an oil heater, plus a fan heater set to cut in when the oil heater cannot maintain this temperature alone. Now that electricity is so expensive to use solely we find the combination of the two is a better proposition, and the fan heater distributes the heat to all corners of the greenhouse.

Watering is only done during the winter when a plant shows signs of really needing it, since it is desirable to keep the house as dry as possible to avoid unnecessary condensation. *Dactyloopsis digitata* grows during the autumn and winter and will require careful watering to keep it in good condition. With me it does not start to grow until late in the year and I keep it dry during the long resting period in the summer. One could almost think it was dead as the papery skins envelop the new growth. Monilarias go to rest in January or February and require to be kept dry for several months thereafter. Mine come into growth again about the beginning of August. Do not forget to give all the Conophytums one good watering about the end of March and then allow them to rest until the beginning of July. Do not show Conophytums during their rest period as this is not fair to the Judge, who will be aware that the plant is quite healthy and fulfilling its life cycle but is not in the show condition that is expected of a plant.

Repot leafy succulents such as Kalanchoe in the spring and always take a few cuttings. These can in time replace the old plants which have grown ungainly with age. This applies greatly to *Rochea falcata* which tends to make a lot of offsets after flowering and becomes very tall and lank. Second year cuttings produce the best flowers.

Members who give talks to groups such as Townswomen's Guilds or W.I. should make a practice of distributing free packets of seed, at the same time being careful to demonstrate the easy method of growing them inside a sealed plastic bag. I save all my spare cactus and succulent seed, however common to us, and packet it up in my spare time. It is surprising how many people tell me how well the seed germinates and how much pleasure they are getting out of growing the plants. It could well lead to new members of our Society.

I suggest that at Branch Meetings members should be encouraged to bring along a few plants every time, whether for a table-show or not, as this brings a meeting to life, provides one or more talking points, and shows new members what to aim for. If a speaker is giving a

talk about one particular group, I am sure he will appreciate a nice display of plants of that group to which he can refer. The audience will be able to see living specimens rather than just slides.

Have a good spring clean in the greenhouse at the start of the new season. It is amazing how many spiders' webs and dead flies accumulate during the winter. If possible, wash the inside of the glass to remove any deposit caused by the heaters. Be ruthless in removing any plants showing signs of disease, or failing this remove them from the main collection to an out-house while any treatment is undertaken.

During December I noticed that buds were well advanced on *Pleiospilos nelii* and *Crassula* cv. Morgan's Beauty. Several species of *Titanopsis* and *Fenestraria* were still in bloom then. *Sedum palmeri* flowers very early in the year with feathery branching sprays of bright yellow flowers; it is a great favourite of mine which I can strongly recommend. Over the Christmas period I always find the dwarf Aloes are most attractive. *Aloe albiflora*, with its tall stems of white, lily-like flowers, and *A. jucunda*, with attractive stems of red flowers, are worth noting. If you have room for them the larger Aloes are fine plants to grow. In time they develop attractive heads of flowers, usually during the summer months. I find they bloom well outdoors during the summer, *A. nitriiformis* being one that is very suitable.

My Testudinarias have made masses of tall growth this past year, but I shall trim them down when the leaves die off. *Cotyledon buchholziana* still has a number of the succulent green leaves that follow the flowers in August and September. These will soon drop off as the plant enters its resting period. The Cotyledons are a vast family and well worth growing, although some such as *C. wallichii* are said to be very poisonous. *C. reticulata*, with its persistent dead flower stems, is rather attractive.

It is worth while to spend the long winter evenings getting to know your plants really well by reading those many large books now available. Most Public Libraries will be only too pleased to obtain any current ones you may care to name, giving the author and, if possible, the publisher. Volumes out of print are often available from our Society library. One cannot learn enough in this boundless subject. It is worth while endeavouring to build up a good reference library of one's own, available for consultation at all times. The excellent bibliography in Hermann Jacobsen's new 'Lexicon of Succulent Plants' is worth studying. And in the meantime let us hope spring comes early this year and we can enjoy another happy growing season with plenty of sunshine.

Notes on the 1976 Seed Distribution

by Terry Smale

IT ONLY seems a very short time to me since I was writing these notes for last year's distribution. One publication of note that has appeared in the intervening twelve months is the IOS "Code of Conduct" for collectors and growers of succulent plants. Among the recommendations it suggests that only cuttings or seeds should be removed from habitat and not the intact plants. It is becoming apparent that some countries are going to back up these recommendations by legislation. Thus Peru has already applied new restrictions on the exportation of plants. The eventual consequence of this to the collector will be the non-availability of certain species in the nurseries. There are some species which the nurseryman probably can not produce economically and therefore we amateurs are going to have to improve our propagation techniques and raise the more difficult species ourselves.

The intention of my preamble, of course, is to persuade you to sow more seed. The grafting of young seedlings is a technique which can be of great help with the slower growing or more difficult plants. On the Continent and in Japan, this technique is widely practised, but the *Hylocereus* and *Pereskia* stocks which are used are not very suitable for our low temperature greenhouses. On the seed list this year are two species of *Pelecyphora* (or *Normanbokea* if you prefer). Both of these plants are normally obtained as wild-collected specimens. The larger plant is *P. pseudopectinata* which grows up to 45 mm across and is densely covered with white pectinate spines. The flower buds are formed during the winter and the pale pink flowers open very early in the spring. The other species: *P. valdeziana* is very small, only 25 mm in diameter, and the spines are very short and carried on rather woolly areoles. The violet flowers are quite large for the size of plant. I sowed seed of both species in a shady part of the greenhouse in July of 1975 and grafted the tiny seedlings one month later. The grafts on *Trichocereus* and *Cleistocactus* did not take, but the ones on *Bolivicereus samai-patanus* grew away beautifully and the resulting plants are now (December) about 10 mm across. So perhaps this is a stock worth investigating for seedling grafting.

Continuing with the notes on North American plants, there is seed available of *Turbincarpus polaskii*, which is another Mexican miniature that is something like a flattened diminutive *Lophophora*, about 30 mm in diameter. The ribs are ill defined and the soft curved yellowish spines are produced singly from the areoles. The white to pale pink flowers are produced continually throughout the summer months. The genus *Stenocactus* (more pedantically known as *Echinofossulocactus*) is not very popular at the present time, perhaps because they are not very fast growing. They are very distinct in that

they have a large number of ribs, which are very thin and wavy. *S. lloydii* is one of the most attractively spined species in which the central spine is long, flattened, papery and curved upwards. *Echinomastus* is a genus of very attractively spined plants which are unfortunately quite difficult to grow. They are frequently encountered as imported plants which are extremely difficult to re-root, so perhaps this is another case where you could try your grafting skill. *E. mapi-miensis* is a Mexican plant which grows to about 80 mm across and is densely armed with whitish interlacing spines, many of which tend to point towards the crown of the plant where the small whitish flowers are produced.

There are three species of *Echinocereus* which are quite uncommon in cultivation. *E. sciurus*, whose name pertains to a squirrel's tail, is a freely clustering species from Lower California, which has elongated stems about 40 mm in diameter. There are many ribs and the plant is covered with short off-white spines which are chestnut coloured in the new growth. The large flowers are violet. *E. scopulorum* on the other hand is usually solitary, with a 60 mm thick body that is covered with purplish spines and bears large deep pink flowers. *E. radians* from Chihuahua, is another of the pectinately spined *Echinocerei* with 50 mm diameter, light purple flowers, but is distinguished by the single long black central spine.

Turning now to the '*Coryphanthanae*' there is a *Coryphantha* proper, in the form of *C. daimonoceras*, which is a flattened grey-green plant with very large tubercles. The greyish radial spines are tufted at the top of the areole and the few thick centrals are dark and curved. The monotypic genus *Bartschella* was submerged into *Mammillaria* by David Hunt. *B. schumannii* is a clustering plant with greyish-green bodies up to 60 mm thick. The radial spines and the usually single hooked central spine are white at the base and bright brown in the upper half. The purple flowers are large, up to 40 mm across and can be produced by quite young plants. Included in the *Mammillarias* are two unusual ones from Baja. *M. lewisiana* is a smallish, solitary, flattened plant with 10-13 whitish radial spines and a single contrasting central spine, which is strong, curved and purplish-black coloured. *M. albicans* grows on an island in the Gulf of California and forms cylindrical bodies which are densely covered with short white spines. The large pale-pink flowers with very prominent stigma are rather attractive.

The two *Opuntias* available this year are North American and members of the *phaeacantha* group, which are low growing and not too difficult to flower when given plenty of root space. *O. vaseyi* has pale green,

100 mm long pads with large brown areoles and few spines; the flowers are deep salmon. *O. engelmannii* v. *discata* has large round, glaucous blue-green pads, about 200 mm across and is yellow flowered.

That completes the notes on the cacti from north of the Equator and we can now consider the South American species, starting with the 'Echinocactanae'. We are again listing quite a few forms of *Gymnocalycium* as these continue to be very popular with growers. *G. horridispinum* would be my favourite on the list, since it is attractive and very distinct. It was described in the German society's journal in 1963 from plants collected in Cordoba in Argentina. The medium sized, dark green body is divided into about 10 prominent ribs, and the fairly numerous spines are very stout, up to 30 mm long and brown in colour. The beautiful flowers first appear as pointed red buds, which then develop into large lilac blooms which are long lasting. Another unusual flower colour for *Gymnocalycium*s is provided by *G. oenanthemum*, which produces dark red flowers. The flattened grey-green body is not very big and carries about 5 stout spines on each areole. *G. valnickeianum* is large growing, eventually 300 mm tall and will form groups with age. The body is dark glossy green in colour; the spines variable and the flowers white with a red centre. The spelling of *G. ochoterenai* is incorrect on the seed packets. This is a 100 mm diameter plant which is rather squat and has very low ribs; there are few spines and the short tubed flowers are white in colour. I have not been able to trace a description of *G. pseudoragonesii*, however as a guide, *G. ragonesii* is a small brownish, disc-shaped plant, with tiny spines and long tubed white flowers.

Once again there is a batch of the newer *Notocacti* which have been made available to us largely through the expeditions of Leopold Horst. The finest of these is *N. buiningii* which is a cactus with a most unusual pale grey-green epidermis. The 16 or so ribs are very thin and deeply notched, with the areoles in the notches. The spines are pale glassy yellow with a red base and the flowers are yellow. This plant is interesting from a botanical viewpoint because it forms a link with the genus *Wigginsia*. *N. tenuicylindricus*, which is closely related to the true *N. caespitosus*, is probably the smallest growing species in the genus. It forms groups of elongated heads, only about 25 mm in diameter and is covered with short yellow and red spines. The flowers are yellow and with me it readily forms buds, but these do not develop and open except during an especially fine spell of weather. The species of *Notocactus* described above, are more difficult to grow than many of the others. A peaty compost and not too much drying out in winter should help to keep them healthy. *N. fuscus* is a many ribbed plant which has the woolly areoles close together and it is densely spined with 20 mm. long spines which are a very dark brown on the new growth. The *N. muricatus* seed which is available is from the true

species that was rediscovered by Horst as HU 19 and is not the plant that belongs to the *apricus* group which is normally seen in cultivation under this name. The true *muricatus* is related to *N. ottonis* and offsets from below ground level in the manner of that species. It has about 16 ribs and the areoles, which are close together, each bear a cluster of about 20 thin, outwards pointing, white and brown spines. The yellow flowers are not very large but are produced over a long period.

Parodia mendezii and *ayopayana* are both larger seeded types and therefore comparatively easy to raise. I have no information on the former, but *P. ayopayana* is a member of the interesting group of species that includes *P. echinus* and *comosa* and which come from the most northerly end of the *Parodia* distribution range in Bolivia. It is a globular plant, about 90 mm in diameter with thick white wool on the new areoles: the radial spines are white and the 30 mm long light brown centrals are not hooked. The yellow flowers are only about 30 mm long, but they are larger than the other members of this group. A characteristic feature is the elongated fruit, which is up to 40 mm long.

Weingartia lanata derives its specific name from the very woolly areoles. It is quite a large growing globular plant, with ribs divided into large tubercles. The strong spines are yellow-brown in colour and the yellow flowers are typical of the genus and produced from the shoulders of the plant. The related *Sulcorebutia candiae* forms clusters of flattened heads, each up to 50 mm across, with pectinate pale spines and yellow flowers.

There is a wide range of forms amongst the members of the *Neoporteria* group on the list. *Neoporteria castanea* v. *tunensis* eventually forms an elongated plant up to 150 mm in diameter. The areoles are large and produce about 25 spines which are long, straight and chestnut-brown in colour. The purple flowers are typical of *Neoporteria* as used in the narrow sense. The Chilean *Neochilenias* offered, are all dwarf forms growing to about 50 mm across and there is a uniformity in the flowers, which are about 30 mm in diameter, white to pale pink or cream in colour. There is however, diversity in body form. *N. calderana* has a many ribbed body which is almost black in colour; each areole has about a dozen thin, dark coloured spines, which are bent upwards. *N. floccosa* in general form is reminiscent of a young plant of the *paucicostata* group with straight black spines, but the whole plant is covered by long white hairs, which make it look like a small *Oreocereus*. *N. malleolata* is an offsetting plant which has areoles close together. These are very white woolly, especially in the crown, and carry tiny spines. *N. pseudoreichii* has a flattened body which is covered with yellowish pectinate spines. The genus *Islaya* comprises a group of plants which inhabit the southern coastal desert of Peru. In this area, rainfall is almost non-existent and the plants absorb moisture from the sea fogs, the "Garua", which are very common. The *I. longispina* seed was

collected in this area by the young Czech, Karel Knize. *Pyrrhocacti* are plants of the *Neoporteria* group, which has strayed over the Andes into Argentina. *P. catamarcensis* is one of the largest plants in this genus, growing up to 500 mm tall, with thick curved yellow to dark brown spines. The flowers are yellow and urn shaped.

Moving on now to the *Echinopsis* group of species, there is firstly *E. coronata* which is one of the Bolivian types, which is solitary and globular. The ribs are sharp edged and notched and it produces the usual long white flowers. *Pseudolobivia carmineoflora* is a small flattened plant with longish curved spines, however the most unusual feature for a plant in this genus is the carmine red flower, which is diurnal and only 75 mm long. From a taxonomic point of view, the most interesting *Lobivia* is *L. draxleriana* which was described by Rausch in 1971. It is a member of the *cinnabarina* group, with a much flattened solitary body that is divided into many ribs and covered by shortish spines. The flowers are large and red with a violet throat. In common with a number of *Lobivias* that were described in the nineteenth century, *L. cinnabarina* has disappeared from cultivation, although there are many imposters to be found under this name. However *L. draxleriana* agrees very closely with the original description of *L. cinnabarina* and may well turn out to be the rediscovery of that species. *L. shafteri* is a small cylindrical, very spiny plant, which produces pale yellow flowers, and *L. incuiensis* is one of the self-fertile *Acantholobivia* types from southern Peru. *Soehrensias* are the barrel cacti of Argentina and this body form is exemplified by *S. oreopepon* which will reach 300 mm in diameter. Young plants are very attractive with their long yellow to red spines, but the flowers can only be expected on old plants.

Within the *Rebutia* group, the name of the red flowered *R. spinosissima* must be self explanatory, but the epithet *Aylosteria Lau* 405 requires some clarification. Alfred Lau on his expeditions in Bolivia collected several plants which are obviously related to *A. heliosa*. One of these is his number 405 which is said to be variable in spination, but should turn out to be very attractive plants. *Mediolobivia costata* is a small clustering plant with elongated dark green stems, few ribs and orange-red flowers.

The most attractive of the columnar *Cerei* is *Espostoa hylaea* which is a slender branched plant. It is covered with white hair, through which the many short, fox brown spines can be seen. *Eriocerei* are thin stemmed, climbing plants which readily produce their large white nocturnal flowers, followed by large red fruits. They are also frequently used as grafting stock and a tip recently heard from Tom Jenkins was that if they were potted very hard, then excessive winter shrinkage would be avoided.

I regret that there is not such a large range of species available in the "other succulents" but at least there is a reasonable variety of *Lithops*. These are easily raised

from seed and are probably better sown in a dull corner of the greenhouse in May, rather than in the more humid confines of a propagator. The white flowered species are *L. bella* which has a brownish top with yellow islands; *L. deboeri* which has a blue-grey body with zig-zag dark markings on top; and *L. umdausensis* which is a form of *L. marmorata* with greyish-green body and light grey markings. The yellow flowered types are *L. pulviceps* which is red-brown in colour with darker spots on the upper surface; and *L. gracilidelincata* which does not cluster readily, but has a large pale grey body with very thin darker markings on top.

Argyroderma patens is another dwarf mesembryanthemum which will form small clusters of whitish bodies. The flowers are variable in colour from purple to white. *Rhombophyllum rhomboideum* forms a stemless clump of rosettes, each consisting of about 10 thick grey-green leaves, which are flat on the upper surface and keeled. The flowers are golden yellow "dandelions" and are produced in summer. *Conicosia communis* is a short shrubby type, with long thick leaves and yellow flowers. It could be grown in the open during the summer months.

Anacampteros ustulata is a member of the family Portulacaceae and forms dense groups of short stems which are only about 2 mm thick, with the tiny silvery leaves clasped tightly to the stem. The small flowers are terminal, pale cream and only open in hot weather. The only stepeliad available is *Huernia kentensis* which has short spikey stems and produces its 25 mm diameter, bell shaped, dark purple flowers over a very long period in summer. These flowers are formed from the same point on the stem for several seasons, so do not cut off the old stems too soon. Yet another plant family, the Bromeliaceae, is represented by *Puya raimondii* which is native to the Andes and forms rosettes of spiny leaves.

The two *Agaves* are of medium size and are off-setting types. *A. bracteosa* has grey green leaves which are narrow and finely toothed in the margins. *A. univittata* v. *poselgeri* has even narrower leaves which are lightly striped and produce larger sharp teeth.

There are two low growing *Aloes* and two large ones on the list. *A. chabaudii* forms a stemless rosette of pale blue-green leaves which are wide at the base and taper towards the tip. The inflorescence of red flowers is only 1 m tall. *A. fosteri* has no connection whatsoever with Australian lager, but is a stemless *Aloe* with dark green thorn-edged leaves that have transverse bands of lighter spots. The larger *Aloes* are *A. ferox* and *A. candelabrum* which in age form a thick unbranched trunk, which is covered with dead leaf remains, with the rosette of thick spiny leaves at the tip. When these species flower, they are magnificent with their spikes of red flowers resembling "red hot poker".

I have not been able to describe every plant on the seed list, but I have tried to provide some information on the not such well known species. Good growing!

Mammillarias in Early European Literature (1) Before 1700

by D. R. Hunt

Introduction

THE name *Mammillaria* was not proposed for a genus of cacti until 1812, but by then some of the West Indian species had been known to science for more than a hundred years. The pioneer naturalist-travellers began to send back cacti to Europe as early as the sixteenth century, beginning with the original 'spiny melon-thistle', first described and illustrated in 1576 and later known as *Melocactus communis*, and an assortment of 'Indian figs' (*Opuntia* spp.) and 'torch-thistles' (*Cercus* spp.). By the late seventeenth century, two or perhaps three species of *Mammillaria* were in cultivation in Europe.

John Ray's Mystery Mammillaria

Possibly the first recognizable description of a *Mammillaria* is that published by the illustrious English botanist, John Ray (1627-1705), in his great *Historia Plantarum* 2: 1917 (1688), under the following name:

Echinomelocactus lanuginosus tuberculis spinosis undique obsitus fructu e latere sparsim egrediente ('the woolly spiny melon-thistle, covered all over with spiny tubercles and producing sparse fruit from the sides').

In the custom of pre-Linnean days, the name was a diagnostic phrase, succinctly characterizing the species in the universal language of science. Ray's ampler description goes on to record the globose, unribbed, tuberculate habit of the plant, the tubercles tipped with spines an inch long and interspersed with dense wool, and the fruits so fortified on all sides by spines that 'one may not touch them with impunity' (*ut impune eum contingere non liceat*)! He had seen the plant or plants in the famous Fulham garden of Henry Compton, Bishop of London.

Later authors seem largely to have ignored or overlooked Ray's description, or to have identified it as applying to *Mammillaria mammillaris* (as, for example, did Bertrand & Guillaumin in "Cacti", 1952). This is understandable, because *M. mammillaris* certainly became known at this time and was probably in Bishop Compton's collection by 1691. The densely woolly axils and inch-long spines described by Ray do not fit typical *M. mammillaris*, however, and (if we rule out the Mexican species, which did not begin to reach Europe for another century) sound more like *M. nivosa* Link or *M. ekmanii* Werdermann. Either of these might conceivably have been collected by some early traveller, but to date I have discovered no other evidence that they were. The subject of Ray's description remains a mystery.

Plukenet and the first illustrations

Whatever it was that Ray saw in Bishop Compton's collection, it seems likely that at the same time or not long afterwards there were two other *Mammillarias* at Fulham. The Bishop's collection provided many of the specimens illustrated by Leonard Plukenet (1641-1706) in his great *Phytographia* (1691) where, in plate 29, two *Mammillarias* are portrayed (fig. 1). To my knowledge, these are the earliest illustrations in European literature of the genus.

The generic identity of the plants illustrated is not in doubt, nor is the specific identity of one of them, despite the lack of flowers, fruit or seed in the drawing, insufficiently diagnostic vegetative parts, and any indication of where in the wild the plant grew. Plukenet's fig. 1, bearing the name *Ficoïdes* s. *Melocactus mammillaris glabra, sulcis carens, fructum suum undique fundens* ('the glabrous tuberculate fig-like plant or melon-thistle,

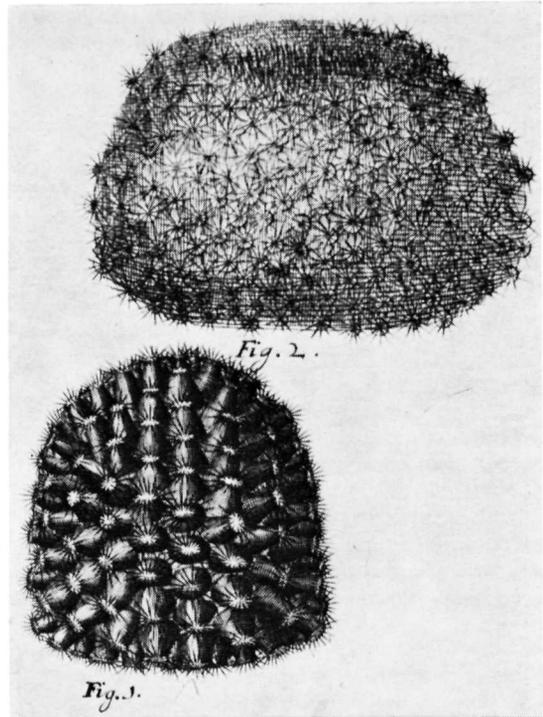


Fig. 1. Plukenet's two *Mammillarias* (*Phytographia*, t. 29, figs. 1, 2. 1691)

The upper one has not been satisfactorily identified.

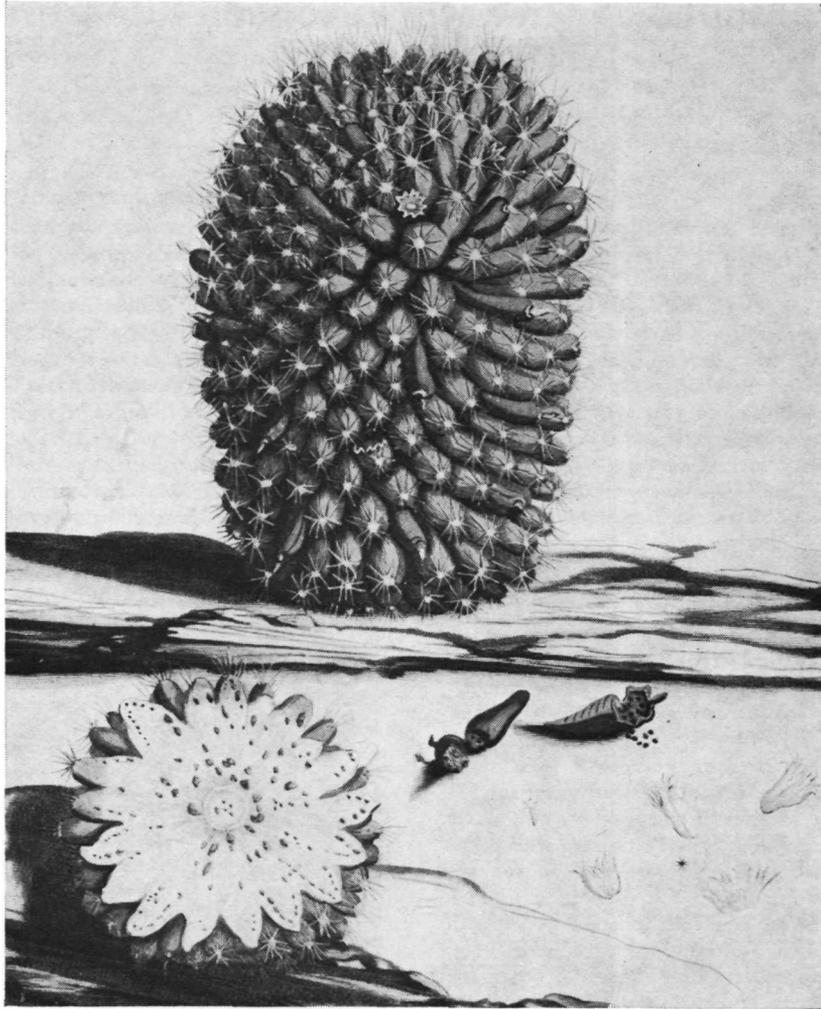


Fig. 2. The fine coloured plate of *Mammillaria mammillaris* in Commelin's *Rariorum Plantarum Horti Medici Amstelodamensis* 1: 105, t. 55 (1697) has few peers nearly three centuries later.

lacking grooves and sending forth its fruit on all sides'), is certainly *Mammillaria mammillaris* (L.) Karsten. For one thing, Linnaeus himself cited the figure when he published *Cactus mammillaris*; and for another, the historical facts of the introduction of *M. mammillaris* are unequivocal. We know that it was introduced to Holland from the Dutch island of Curaçao at about this time (though by whom we do not know) on the evidence of the text accompanying a most beautiful illustration in Commelin's *Rariorum Plantarum Horti Medici Amstelodamensis* 1: 105, t. 55 (1697), a hand-coloured engraving which even today must rate amongst the

finest drawings of a *Mammillaria* (fig. 2). Bishop Compton is known to have exchanged much material with the Dutch gardeners and it is likely that they had passed the species on to him. The details of Plukenet's description and drawing, such as they are (the form and attitude of the tubercles, the milky sap, and the number, length and attitude of the spines), agree closely with Commelin's.

The second of Plukenet's illustrations (his fig. 2) is far more problematical: as much a mystery, in fact, as the plant described by Ray. The descriptive phrase-name given by Plukenet is in part the same as Ray's,

suggesting that it might have been based on the same plant, but this is abruptly denied by the mention (and illustration) of weak spines:

Ficoides s. Melocactus minim. lanuginos. spinis mitioribus, fructu sparsim egrediente ('the small woolly fig-like plant or melon-thistle with weaker spines (i.e. than in *M. mammillaris*) and sparsely produced fruit').

Plukenet's drawing suggests a solitary, depressed-globose plant with small tubercles, densely woolly in the axils. It does not immediately call to mind any known West Indian species. Plukenet himself identified it with first one and then, in a later work, the *Almagestum Botanicum* (1696), the other of two plants mentioned in a catalogue of the Royal Botanic Garden at Paris which appeared in 1689.* These are recorded as having come from the gardens of a Belgian, Fagel, otherwise Caspar Fagelius, one of several well-known private horticulturists of the time.

Various authors have believed or acquiesced in the belief that Plukenet's problem plant was *M. prolifera*, which received the epithet by which it is known today from Philip Miller in 1768. Even Britton & Rose subscribed to this identification, citing the plate under *M. prolifera*. Surely this must be wrong? The drawing does not begin to resemble *M. prolifera* and just as significantly perhaps, the species seems to have died out of cultivation quite soon, being unknown to Bradley or Linnaeus. One would have expected the easily-grown *M. prolifera* rapidly to have become more widely known than *M. mammillaris*. There is further evidence against the identification, as we shall see later.

Commelin, Hermann and Morison

The fine plate of *M. mammillaris* in Commelin's *Rariorum Plantarum Horti Medici Amstelodamensis* (1697) (fig. 2) has already been mentioned. It is interesting to note, however, that only one species referable to *Mammillaria* was described in that work, as it implies that any others were not known, or at least were less well-known, in Holland at that time. This tallies with the fact that *M. mammillaris* is the only species known from the Dutch West Indies and points to the conclusion that other species would have reached European gardens by a different route.

The year after Commelin's plate, another illustration of *M. mammillaris* appeared, in Paul Hermann's *Paradisus Batavus*, 136, 1698 (fig. 3). Hermann died in 1695 and the publication of this work, like the *Prodromus* of 1689, was arranged by William Sherard. It was dedicated, incidentally, to Bishop Compton. The *Paradisus*

*The work in question was the 'Cat. H.R.P.', *Catalogus Plantarum in Horto Regio Parisiensi* compiled by J. P. Tournefort and published together with Paul Hermann's *Paradisus Batavus Prodromus* by the Englishman William Sherard in 1689 under the title *Schola Botanica*. The references to 'Echinomelocacti' are on p. 33 of the *Catalogus*, and on p. 331, in the *Prodromus*, there is *Echinomelocactus minor lactescens absque tomento cylindris laxioribus*, mentioned by Plukenet as a synonym of the modern *M. mammillaris*.

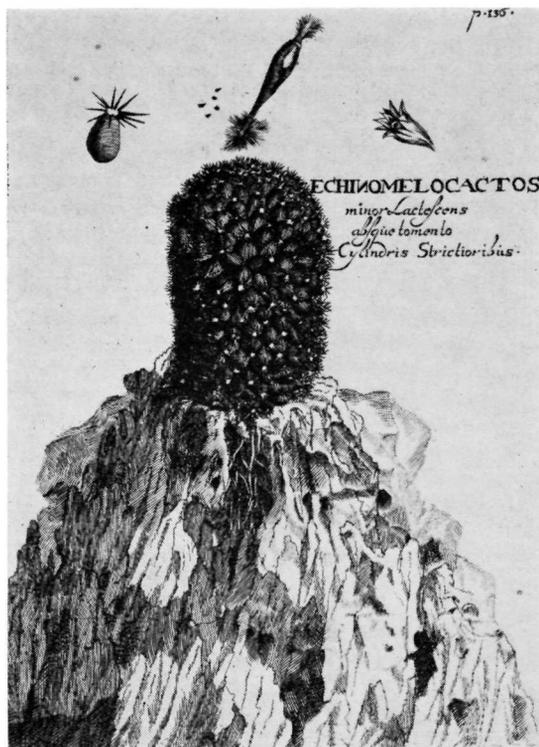


Fig. 3. Hermann's figure of *M. mammillaris* (*Paradisus Batavus*, 136, 1698). The engraver, drawing the image to be reversed when printed, must have forgotten to write the 'N' backwards!

Batavus is an account of plants cultivated in Holland, mainly at the Botanic Garden of Leiden University where Hermann was Professor of Medicine and Botany.

Hermann's bibliography on the species we now call *M. mammillaris* refers back to the *Prodromus* of 1689 and to his still earlier book, *Horti Academici Lugduno-Batavi Catalogus*, published in 1687, where (p. 670) there is possibly the oldest name of all for *M. mammillaris*, *Ficoides occidentale spinosum . . . minus absque tomento* ('the lesser spiny fig-like plant from the west (Indies) lacking tomentum').† In the *Paradisus*, Hermann also cites Plukenet's second species, differentiating it by the smaller tubercles and, in the name he himself gives, indicating that it has milky sap. He comments on the greater ease of cultivation of the smaller 'Echinomelocacti', i.e. *Mammillarias*, as compared with the larger, i.e. *Melocactus spp.* but does not explicitly record having

†The late Mr. Shurly is quoted (this journal, vol. 8 (3): 50, 1946) as saying 'the first reference to *Mammillarias* is in Breyne's *Prodromus* of 1679'. It is true that the first part of this work, by Jakob Breyne, listed notable plants in Dutch gardens in 1679 (published 1680), but the reference to *M. mammillaris* is in the second part, referring to 1688, which was not published until 1689.

grown the second *Mammillaria*. Perhaps he had, or perhaps he just assumed it had milky sap; in any event we cannot safely assume, as most authors have, that he knew the same plant as Plukenet, or that Plukenet's plant had milky sap.

Last, because it did not appear till 1699, but not least of the books to be mentioned in this survey, is Morison's *Plantarum Historiae Universalis Oxoniensis*. This work is likely to be better known, at least by its title, to students of *Mammillaria* than the others so far mentioned because

7. *Melo carduus ovalis*
spinis longissimis armatus
Tradescanti

V pag. 171.

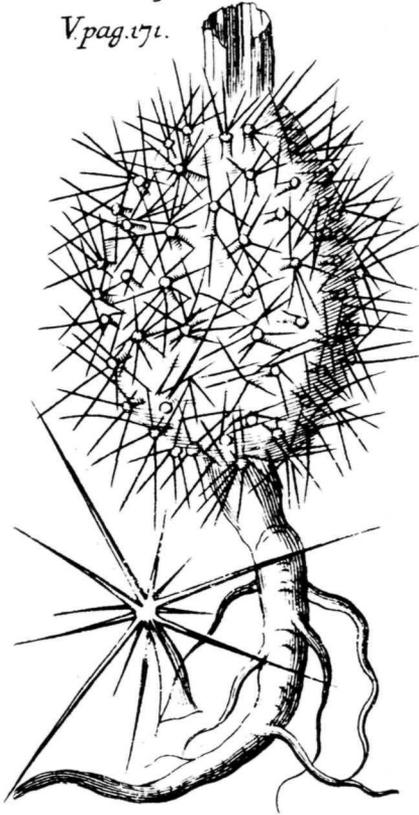


Fig. 4. *Melocarduus* no. 7 from Morison's *Plantarum Historiae Universalis Oxoniensis* 3: 171 (1699). It was probably not a cactus at all.

Morison is credited by some authors, including Craig (The *Mammillaria Handbook*, 106. 1945) as the source of the epithet '*mammillaris*' in the name *M. mammillaris*. Technically, the epithet must now be credited to Linnaeus, whose *Species Plantarum* (1753) is taken as the starting point of the modern system of binomial nomenclature, but in any case Morison would have to give place as first authority to Plukenet who had coined the epithet eight years earlier. Not only this, but Morison listed no less than three species with phrase-names all beginning *Melocarduus mammillaris* . . . These appear in the posthumous third volume of his magnum opus, page 171, which was edited by Bobart and published in 1699 (not 1715 as cited by Craig, l.c.).

Of the three species listed by Morison, the second (*Melocarduus* no. 8) is referable to *M. mammillaris*. He gave an illustration of the first (*Melocarduus* no. 7) which was based on a specimen collected by the younger John Tradescant and had 'tubercles' an inch long surmounted by spines an inch long also (fig. 4). Morison himself was very dubious about its identity and the way the central 'pith' extends beyond the top of the specimen suggests it was not a cactus at all. Unfortunately, there is no specimen in the Morisonian herbarium at Oxford to confirm this.

The third of Morison's species (*Melocarduus* no. 9) was identified by him with the more problematical of Plukenet's specimens. Morison says that the globose stems are often the size of a man's first or larger, proliferating from the base, with the spines short and thin and the flowers *pale reddish*. Here is further evidence based on what sounds like first-hand observation, that Plukenet's problem plant was not *M. prolifera*. The size of the stems and the 'pale reddish flowers' are not consistent with such an identification. But what was the plant? Only one of the known West Indian *Mammillaria* species has reddish flowers, a form allied to *M. columbiana* Salm-Dyck recently discovered in a remote area of Jamaica and growing almost inaccessibly on limestone cliffs; this does not sound a likely candidate for introduction before 1700. The only other possibilities, more realistic ones perhaps, are two obscure species (possibly one and the same) from Haiti, *M. glomerata* (Lam.) DC., discovered by Plumier before 1700 but apparently never recollected and long assumed to be synonymous with *M. prolifera*, and *M. ekmanii* Werdermann, described from sterile herbarium material in 1931 and not subsequently recollected or introduced to cultivation. The two species are, however, only possibilities. The history of *M. glomerata* and *M. prolifera* will be reviewed in the second of these articles.

Summer Show, London 1976

AFTER the success of our Saturday Show last June we have decided to hold it at St. Saviour's Hall, St. George's Square, Pimlico, again this year on June 12th. We hope even more members will be entering on this occasion. As well as the competitive classes there will again be plants, seeds and Society goods on sale, a Show Draw and refreshments available from 2.00-5.30 p.m.

The classes are mainly as last year's schedule so reference back to your February 1975 Journal will give full details. There is a good selection of classes for specimen cacti and also some for smaller growing species such as that for six *Mammillarias* in 4½ in. maximum pots and three *Notocacti* in 4½ in. maximum pots and three cacti in 4½ in. pots. This time the classes for three small *Rebutias* and three small *Gymnocalyciums* will be for novices only, that is those who have not won a first prize in any show organised by the Society. In the classes for other Succulents there is another class for Novices, this time for one plant in *Liliaceae* so it is to be hoped that all novices will be able to find a *Gasteria*,

Aloe or *Haworthia* for example in good enough condition to show; these classes have been put in at your request so please bring your plants along, Novices. It is hoped that more members will bring along their plants for the open classes for other succulents this year. Please note that the class for three other succulents of any genera has a six inch pot size restriction. This class brought some very interesting entries in October and some of them should be ready to show in June as well. There is one extra class this year for an exhibit of twelve cacti and/or other succulents by commercial growers. What a good chance for some of our Journal advertisers to show their own plants.

If you would like a schedule and entry form please ask your Branch Secretary or send a stamped-addressed foolscap envelope to the Show Secretary, Mrs. H. Hodgson, 16 The Braid, Chesham, Bucks. HF5 3LU to obtain your schedule in good time to see the details and get your plants repotted and tidied up ready for the event.

Results of the Westminster Show, October 1975

Judges: K. H. Grantham (Cacti), Mrs. M. Stillwell (Succulents)

Class 1 Three Cacti. 2 entries

- 1st Mr. and Mrs. W. F. Maddams. *Stenocactus ochoterenus*, *Mammillaria kuentzii*, *Haageocereus multiangularis*.
2nd R. H. I. Read. *Ferocactus acanthodes*, *Espositoa melanoosteles*, *Mammillaria plumosa*.

Class 2 Three Coryphanthanae. 4 entries

- 1st Mr. and Mrs. W. F. Maddams. *Dolichothele longimamma*, *Cochemia maritima*, *Mamillopsis senilis*.
2nd Dr. and Mrs. G. C. W. Randall. *Mammillaria heyderi*, *Escobaria runyonii*, *Coryphantha senilis*.
3rd D. T. Best. *Mammillaria plumosa*, *M. discolor*, *M. centricirra*.

Class 3 One Cereanae. 6 entries

- 1st M. Dennard. *Cephalocereus senilis*.
2nd Mr. and Mrs. W. F. Maddams. *Weberbauerocereus longicomus*.
3rd A. Canham. *Espositoa nana*.

Class 4 Three Echinocactanae. 4 entries

- 1st Mr. and Mrs. W. F. Maddams. *Copiapoa hypogaea*, *Ferocactus acanthodes*, *Sulcorebutia steinbachii* v. *gracilis*.
2nd D. T. Best. *Ariocarpus fissuratus*, *Astrophytum ornatum*, *Parodia chrysacanthion*.
3rd Dr. and Mrs. G. C. W. Randall. *Neochilenia napina*, *Lophophora williamsii*, *Obregonia denegrii*.

Class 5 Three Echinocactanae, in pots not exceeding 3½ in. diam. 9 entries

- 1st Mr. and Mrs. W. F. Maddams. *Turbincarpus pseudo-macrochele*, *Pilocanthus paradinei*, *Aztekium ritteri*.
2nd M. Dennard. *Obregonia denegrii*, *Aztekium ritteri*, *Ariocarpus kotschubyanus*.
3rd Mr. and Mrs. P. Whicher. *Aztekium ritteri*, *Roseocactus kotschubyanus*, *Obregonia denegrii*.

Class 6 Six Cacti, in pots not exceeding 6 in. diam. 5 entries

- 1st Mr. and Mrs. W. F. Maddams. *Ancistrocactus scheeri*, *Copiapoa haseltoniana*, *Mammillaria magallanii*, *Coryphantha hesteri*, *Cochemia poselgeri*, *Gymnocalycium hossei*.
2nd Dr. and Mrs. C. W. G. Randall. *Gymnocalycium saglione*, *Trichocereus randallii*, *Astrophytum ornatum*, *Parodia aureispina*, *Mammillaria baumii*, *Eriocactus schumannianus*.
3rd D. T. Best. *Notocactus leninghausii*, *Cephalocereus senilis*, *Ariocarpus fissuratus*, *Parodia suprema*, *Astrophytum asterias*, *Mammillaria neocelsiana*.

Class 7 Three Cacti in pots not exceeding 5 in. diam. (for juniors and members who have not won a first prize in any cactus class). 4 entries

- 1st N. Randall (junior). *Cochemia poselgeri*, *Gymnocalycium monvillei*, *Mammillaria aureilanata*.
2nd M. Dennard. *Mammillaria magnifica*, *Ariocarpus fissuratus*, *Thelocactus bicolor* v. *tricolor*.
3rd A. Sidaway. *Notocactus apricus*, *Mammillaria elongata*, *Astrophytum ornatum*.

Class 8 Three Euphorbias. 5 Entries

- 1st Mr. and Mrs. W. F. Maddams. *E. obesa*, *E. valida*, *E. stellata*.
2nd D. T. Best. *E. horrida*, *E. 'Denton Hybrid'*, *E. bupleurifolia*.
3rd B. A. Baldry. *E. echidne*, *E. meloformis*, *E. milii*.

Class 9 Three Crassulas. 4 entries

- 1st P. Poulter. *C. alstonii*, *C. comptonii*, *C. deceptrix*.
2nd Mr. and Mrs. P. Whicher. *C. suzannae*, *C. cornuta*, *C. pyramidalis* v. *minor*.
3rd J. Rawling. *C. montis-draconis*, *C. 'Morgan's Pink'*, *C. marneriana*.

Class 10 Two Asclepiadaceae. 4 entries

- 1st Mr. and Mrs. W. F. Maddams. *Hoodia gordonii*,
Fockea crispa.
2nd J. C. Hughes. *Huernia primulina*, *H. insigniflora*.
3rd I. Horan. *Ceropegia barklyi*, *Stapelia variegata*.

Class 11 Three Liliaceae. 4 entries

- 1st Mr. and Mrs. W. F. Maddams. *Aloe jucunda*, *Haworthia truncata*, *Gasteria armstrongii*.
2nd Mr. and Mrs. P. Whicher. *Haworthia bolusii*, *H. truncata*, *Aloe cooperi*.
3rd P. Poulter. *Haworthia maughanii*, *H. marginata*, *Gasteria batesiana*.

Class 12 One Succulent. 4 entries

- 1st M. Dennard. *Pachypodium namaquanum*.
2nd Mr. and Mrs. W. F. Maddams. *Testudinaria paniculata*.
3rd R. H. I. Read. *Euphorbia horrida*.

Class 13 Three Succulents, in pots not exceeding 6 in. diam. 6 entries

- 1st M. Dennard. *Calibanus hookeri*, *Euphorbia groenwaldii*, *Raphionacme hirsuta*.
2nd Mr. and Mrs. W. F. Maddams. *Kedrostis nana*, *Pachypodium geayi*, *Ceraria pygmaea*.
3rd D. T. Best. *Haworthia truncata*, *Testudinaria elephantipes*, *Pachypodium succulentum*.

Class 14 Six South African Succulents, in pots not exceeding 4½ in. diam. 4 entries

- 1st. Mr. and Mrs. W. F. Maddams. *Conophytum pauxillum*, *Huernia loeseneriana*, *Cotyledon reticulata*, *Anacamperos alstonii*, *Adromischus leucophyllus*, *Haworthia bolusii*.
2nd M. Leach. *Sarcocaulon burmannii*, *Tavaresia grandiflora*, *Crassula teres*, *Euphorbia memorialis*, *Kedrostis nana*, *Pachypodium saundersii*.
3rd Mr. and Mrs. P. Whicher. *Crassula globosa*, *Aloe linearifolia*, *Euphorbia bupleurifolia*, *Othonna litoralis*, *Conophytum truncatum*, *Haworthia maughanii*.

Class 15 Three Conophytums and/or Ophthalmophyllums. 2 entries

- 1st Mr. and Mrs. W. F. Maddams. *Conophytum cupreatum*, *C. uvaeformis*, *Ophthalmophyllum* sp.
2nd Mr. and Mrs. P. Whicher. *Conophytum scitulum*, *C. truncatum*, C.sp.

Class 16 Three Lithops. 5 entries

- 1st Mr. and Mrs. W. F. Maddams. *L. terricolor*, *L. schwan-tesii*, *L. bella*.
2nd P. Poulter. *L. marmorata*, *L. peersii*, *L. eberlanzii*.
3rd J. Hughes. *L. peersii*, *L. salicola*, *L. aucampiae*.

Class 17 Six Stemless Mesembryanthemums. 2 entries

- 1st Mr. and Mrs. W. F. Maddams. *Lithops lesliei*, *Nananthus transvaalensis*, *Psammophora longifolia*, *Titanopsis schwantesii*, *Aloinopsis schooneesii*, *Fenestraria rhopalophylla*.
2nd Mr. and Mrs. P. Whicher. *Frithia pulchra*, *Lithops herrei*, *Fenestraria rhopalophylla*, *Dinteranthus microspermus*, *Dinteranthus vanzijli*, *Conophytum wettsteinii*.

Class 18 Succulents raised from seed. 1 entry

- 1st J. Hughes.

Class 19 Three Succulents, in pots not exceeding 6 in. diam. (for members who have not won a 1st in classes 9-19). 1 entry

- 1st A. Sidaway.

Class 20 Three Succulents, in pots not exceeding 5 in. diam. (for Juniors or members who have not won a 1st in a succulent class).

- 1st N. Randall (junior). *Adromischus cooperi*, *Crassula tecta*, *Echeveria affinis*.
2nd G. Cryer. *Euphorbia trigona*, *Euphorbia polygona*, *Pelargonium jacobsonianum*.
3rd J. Rawling. *Kleinia radicans*, *Faucaria felina*, *Diplocyatha ciliata*.

Class 21 One Cactus and one Succulent in pots not exceeding 6 in. diam. 4 entries

- 1st M. Dennard. *Brachystelma barbarae*, *Mammillaria wildii*.
2nd Mr. and Mrs. W. F. Maddams. *Euphorbia pentops*, *Mammillaria guelzowiana*.
3rd Dr. and Mrs. G. C. W. Randall. *Euphorbia bupleurifolia*, *Mammillaria humboldtii*.

Class 22 Miniature Garden. 6 entries

- 1st Dr. and Mrs. G. C. W. Randall.
2nd B. A. Baldry
3rd Mr. and Mrs. W. F. Maddams.

Class 23 Group of Cacti and/or Succulents. 4 entries

- 1st Mr. and Mrs. W. F. Maddams.
2nd J. Hughes.
3rd B. A. Baldry.

Awards

Theobald Cup, Collings Cup, Pryke Howard Cup, Denton Medal, Farrow Cup: Mr. and Mrs. W. F. Maddams.

Sir William Lawrence Cup, Pullen Cup: Dr. and Mrs. G. C. W. Randall.

Hedges Cup: Dr. J. Hughes.

Banksian Medal: Dr. and Mrs. G. C. W. Randall.

Best Succulent Spoon: Mrs. M. Dennard.

Best Cactus Spoon: Mr. and Mrs. W. F. Maddams.

Book Review

The Second Fifty Haworthias by John W. Pilbeam. The Succulent Plant Trust, 14 Chesnut Avenue, Buckhurst Hill, Essex. 1975. 74 pp., illustrated.

The review of Mr. Pilbeam's "First Fifty Haworthias" in this Journal for November, 1970 concluded with the hope that at some future date it might be followed by a "Second Fifty". Now, after an interval of five years, here it is. In addition to providing descriptions and figures of a further fifty plants, Mr. Pilbeam provides an index and bibliography for both volumes, he summarises Bayer's revised classification of the genus (1971-74) based on floral characters, he figures four species described since 1970, and for good measure adds to his previous notes on cultivation and propagation. The clarity of the illustrations and the simple language of the accompanying descriptions cannot fail to interest anyone interested in *Haworthia*.

Since Jacobsen lists some 450 species and varieties from *H. aegrota* to *H. zantneriana*, there would appear to be ample scope for Mr. Pilbeam to continue his good work.

W.V.H.

The Name Game

TERRY SMALE's despair over cactus names and classification (in the last issue, p. 87) echoes back at least to 1843 when German botanist Wilhelm Walpers, attempting to deal with the Cactaceae in a monumental catalogue of the flowering plants, described the situation even then as reduced to 'incredible confusion' by writers, growers and travellers, with an enormous number of badly described and circumscribed species based on the flimsiest of characters 'more to the joy of gardeners and nurserymen than of botanists' (Repert. Bot. Syst. 2:269). Later, Mrs. Katharine Brandegee, a sturdy Californian botanist who acquired a reputation for pulling no punches, was equally forthright:

'Cacti, as is well known, are in trade to a considerable extent. Large collections are made in their native places and shipped to dealers, mostly in Europe, who find numbers of plants that answer to none of the spine descriptions in their manuals. They must have names, being unsalable without, and the honest dealer has recourse to a specialist, and waits with what patience he may, while the botanist racks his head over a mass of descriptions which do not describe and struggles to find by a process of exclusion whether the plants have possibly been described by some one who threw away the type after inditing a diagnosis that, but for the generic name, might stand for a sea urchin. In the meantime the unscrupulous dealer prints his list bespangled with "new" species to which he attaches his name, disseminates them to the four quarters, mixing them from time to time as the exigencies of trade demand; the next monographer pours all these names into the turgid synonymy, and so the process continues' (Zoe 5: 1.1900).

It is certainly rather appalling that three-quarters of a century on the same strictures still seem to apply. Despite all the newer taxonomic techniques and concepts the flow of new 'species' over-hastily described from a single plant or a very few from a single locality continues unabated. Often no attempt is made to differentiate the novelty from previously known species and the new 'species' are seldom published as part of a comprehensive treatment of the genus or group. Sometimes an author's sole and rather dubious qualification for describing the plant appears to be that of first collecting it. 'Field study' for some cactophiles means nothing more than treasure-hunting. Time is rarely spent determining the variability or range of populations other than in the most subjective way, and who bothers to grow a range of individuals for several years under experimental conditions for comparison with allied species? Who, moreover, really troubles to preserve complete and adequate authentic material to permit anyone else to evaluate the novelties satisfactorily?

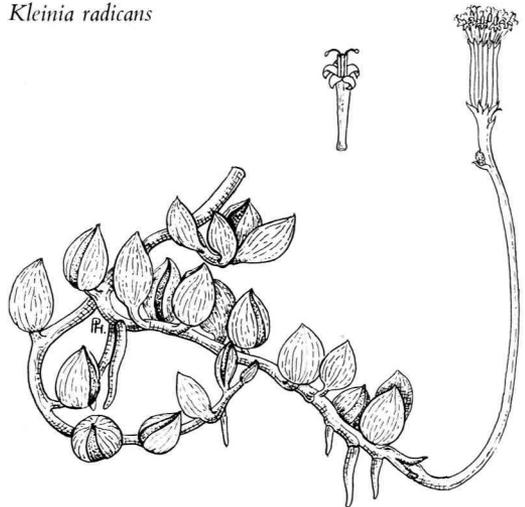
So is it any wonder that no one, professional or amateur, is in any position to put down 'definitive' ideas on

this large family? The ground work has not been competently done and is still not being competently done by the exponents of individual species. The best one can hope for is provisional schemes for genera and groups of genera, improved and refined as each group is worked out competently.

Even where the ground work is sound, taxonomy, like the more exact sciences, is not static, however, and taxonomic pronouncements are susceptible to revision as the result of improved observations, new techniques and new ideas, just as in organic chemistry, for instance, there are stable compounds that are unstable as regards their nomenclature and classification and hypotheses that await proof or disproof. But organic chemistry is not a popular field for amateurs, and its language is not the common property of professional scientists and amateur collectors. Fortunately for Dr. Smale (and the rest of us) the chemistry textbooks and journals are not written by amateurs, or there might be even more nasty smells and explosions than we have to put up with already, and we might have to prepare our fertilizers and pesticides by the recipes and methods of Shakespearian witches! The naming and classification of plants, on the other hand, is one branch of science where anyone can still have his say and meddle with the basic means of communication for both scientists and hobbyists, plant names. Occasionally a professional botanist (and rarely even a specialist taxonomist) will be guilty of changing classification without due regard for the practical importance of stable nomenclature, but I don't think this can be the source of most of the anguish experienced by Dr. Smale. On the contrary, I'm afraid he must lay the blame elsewhere, with a fair share for Backeberg and some of the others who have had the 'courage and diligence' to put their experience and ideas into print.

D.H.

Kleinia radicans



OS BRITISH SECTION OPEN MEETING

Royal Botanic Gardens, Kew, Surrey, 20 March 1976. 10.00 a.m. - 5.30 p.m.

DEFINING GENERA AND SPECIES

The British Section of the International Organization for Succulent Plant Study (IOS) is holding a meeting at Kew Gardens on 20th March 1976 open to all who are interested in the problems of classifying succulents. Under the title 'Defining Genera and Species' there will be two sessions of illustrated talks and discussions with a long interval to see the Kew collections including the *Aloineae* research collection.

Speakers will include Gordon Rowley, John Donald, Charles Jeffrey (author of *An Introduction to Plant Taxonomy*), David Hunt, Brian Ivimey-Cook, Geoff Swales, Helmut Tölken and David Field.

Admission will be by ticket only, price £1, including morning coffee and afternoon tea, but excluding lunch. Coffee will be available from 10.00 a.m. and the first session of talks will begin at 10.30 a.m.

Tickets and programme from David Hunt, c/o The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB.

Society Sales

PLEASE note that Society goods can now be obtained as follows:

Bulk orders for booklets—Mr. H. Miller as before.

Back numbers of Journals—Mr. A. Heathcote as before.

Other items: Mrs. B. Maddams, 26 Glenfield Road, Banstead, Surrey, SM7 2DG.

Orders can be brought up to Westminster meetings or Council meetings with prior warning if a number of particular goods are needed (e.g. badges, stickers, biros) or a binder is required. A small number of each item will be available at these meetings and purchasing in this way will save postage. Prices are as follows:

Binders for 3 volumes of Journal—£1 plus 30p postage (overseas £2 post paid)

Booklets — 15p plus 10p postage

Badges — 45p plus 7p postage

10 for £4.75 (including postage)

Ties (Navy) — £1 plus 10p postage

Car Stickers — 17p plus 8p postage

10 for £1.65

Ball point pens (now in four ink colours—red, blue, black and green)—5p each

10 for 45p (including postage—60p)

20 for £1 (including postage)

When ordering it will assist if you *print* your name and address and add your Membership number. Branches can save postage for themselves and their members by ordering in bulk. With several items ordered together please add 15p postage for two and 20p for three or more except in the case of binders.

Overseas Subscriptions

IT WAS stated incorrectly in the November issue that 'journal only' subscriptions overseas had been suspended. In fact such subscriptions will be accepted as before at the new rate of £1.80, inclusive of postage by surface mail. Air mail postage will be charged at cost. We apologise for any inconvenience caused by this error.

Succulent Snippets

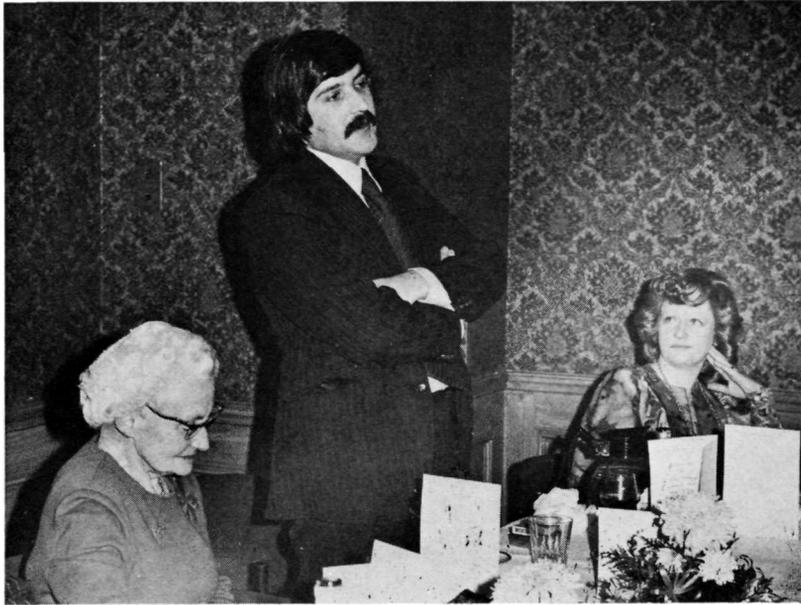
by Sally Cornioides

PERHAPS I had better get mixed up with the Show Committee notes again—at any rate there were more entries for the Autumn Show than for a number of years. I feel justified in making a few comments about it although, regrettably, none of the 'dailies' or garden journals apparently noticed our two rows of staging stretched right across the centre of the R.H.S. New Hall filled with some very fine plants. The Daily Telegraph listed all the other Societies taking part but not ours and I do not think writing a rude letter to them will do any good, it never has before!

Therefore, for the benefit of those who were unable to be present can I say that the plants were of high standard, and in some classes the judges must have had difficulty in selecting the winners. This was particularly so in the class for one 'Cereanae' where there were some impressive columnar plants and also in six cacti in six inch pots where a fine selection of genera could be seen. Apart from a colourful display in the Lithops class with a fair number of entries the Mesembryanthemum classes were disappointing—I am sure there are more members with Conophytums and others of the family such as Pleiospilos, Fenestraria, etc. which would have all been at their best at the time. What, too, of all the seed of other succulents that is distributed each year? I cannot think that only one person in the Home Counties has success with germination. As seed is always on sale at these shows it is much more gratifying if there are a number of seedling boxes to show how well these plants do grow from seed.

Two other impressive classes were those for three succulents in 6 in. pots and for one specimen succulent. Here could be seen an interesting array of more usual genera such as Haworthias and Euphorbias and more unusual genera such as Pachypodiums, Cerarias and Testudinarias all in excellent condition. They showed well the range of different growths and habits from tall columnar plants to miniature tree-like growths and interweaving vines.

It would be amiss not to congratulate Dr. and Mrs. Randall on gaining the Banksian Medal and several cups. It is encouraging to see new winners coming along



Annual Dinner, 1975. Peter Peskett, editor of Garden News, proposes the toast to the Society. Seated beside him are the President, Mrs. Shurly, and Mrs. Peskett.

and there is no doubt the joint members seem to do well with their plants. Maybe it is because there are two people to talk to the succulents and give them encouragement!

If you did not manage either of the Society Shows last year, I hope you will make the effort in 1976 and play your part in making them more successful than ever.

At our Dinner Betty Maddams in toasting the visitors mentioned chatting up one's plants and so did John Rayner in his reply. Betty's story, as far as I remember, related to a visit to a friend's collection where she was left to admire the plants while her friend went to make coffee. Amongst other fine plants she espied an *Espostoa*. "Oh, you beautiful thing", she said as she stroked it gently. She nearly fell backwards into an *Echinocactus grusonii* when it answered, "Yes, I am, aren't I?—I won first prize in the Show last week!" Betty staggered back to her friend's kitchen and said, "Do you know your *Espostoa* just spoke to me and said he won first prize at the Show last week?" "Oh, you must not believe him", said her friend, "He's an awful liar—he only got 'Highly Commended'!" A shaggy plant story if ever there was one!

John Rayner replied that when he greeted his plants one morning they said, "Lay off on that systemic, we've been up and down all night!"

These were only a couple of quotes from a very merry selection of speeches after an excellent meal. There was

no doubt that our Guest of Honour, Peter Peskett, Garden News Editor, and his wife thoroughly enjoyed it. They dallied chatting to members at the end although they had a long drive back to Peterborough ahead. Perhaps he will not think cactophiles are such extraordinary beings any more, particularly as he found most of them grew other plants such as vegetables, chrysanthemums and daffodils as well!

I could not resist including this little recipe that I found in the Australian Cactus Journal but which was in turn taken from or written by a member of the Mojave Desert Cactus Club. I think we can give it the title, 'the vaguest recipe of the year'.

Cactus Candy: Use purple hedgehog cactus by soaking it in a strong lime and water solution for $\frac{1}{2}$ hour. Drain and leave the cactus out overnight when the dew is heavy. Boil 5 gallons of water with 20 pounds of brown sugar, add the cactus slabs and cook until it has candied.

I know we are not likely to waste our best *Echinocerei* like this but even with that proviso they do come in all sizes and how much water and what kind of lime—fruit or otherwise and how much? Next problem a container to boil 5 gallons in and finally, for English housewives frantically searching for a couple of pounds of brown sugar for puddings and cakes before Christmas—has anyone ever seen 20 pounds together let alone boggled at the cost incurred! Well, I suppose it is different if you live in the Mojave Desert!

Connoisseur's Corner

Islaya grandiflorens

The genus *Islaya*, in the form of the type species, *I. islayensis* has had a chequered taxonomic history. It was originally described as an *Echinocactus*, as long ago as 1861 and then subsequently transferred to *Malacocarpus*. Although Backeberg established the genus *Islaya* in 1931 reference to Borg's well-known book will reveal that he regards it as a *Parodia* species. Finally, in 1966, Donald and Rowley reduced it to infrageneric status, within their rather embracing view of the genus *Neoporteria*. On this basis it was one of four Series within *Pyrhocactus*, which stand equal with *Neoporteria* as a subgenus within the group.

All this may sound rather confusing to the cactophile whose primary aim is to grow interesting plants but he should not let it deter him from adding one or two *Islaya* species to his collection and the one illustrated, *Islaya grandiflorens*, is typical of the genus. They present a mild challenge in that they are rather less easily grown than most of the cacti from South America. The reason for this is that they are native to the coastal desert region of northern Chile and southern Peru, where the rainfall is very low and the precipitation occurs mainly as coastal fogs. Hence, a porous compost is advantageous and watering of *Islaya* species should be done with caution in all but the hottest of weather. Some writers have recommended that they should be sprayed regularly and not watered conventionally but insufficient information is available to decide which is the preferred approach. Not surprisingly they are of rather slow growth but attractive seedling plants are now coming onto the market and they should develop into better plants than the imported specimens which account for most of the *Islayas* now in cultivation.

I. grandiflorens is typical of the genus. It has fairly fierce dark brown spines, and should be grown in full



Islaya grandiflorens (photo: B. Maddams)

sun for these to develop to advantage. There is a good deal of wool at the apex and the yellowish flowers, some 4 cm in diameter, emerge through this at intervals throughout the summer months. They contrast attractively with the wool and dark spines.

Cacti and Succulents in Monaco 1976

AT THE 3LK (3 Countries Conference) held September 1975 in Belgium—the three countries are Belgium, Holland and Germany—Mr. Kroenlein, Director of the Exotic Gardens in Monaco invited the organisers to hold a special gathering next year in Monaco; the preliminary suggestions are as follows:—

(a) *Probable date*: last weekend in September 1976.

(b) *Travel*: Each country, for economy, to arrange its own charter flight to Nice or Monaco, arriving in good time on the Saturday morning.

(c) *Programme*: Rest of Saturday probably consisting of illustrated talks with simultaneous translation, in one of Monaco's excellent conference-halls. On the Sunday visitors will see the Exotic Gardens at Monaco, including the greenhouses which are normally closed to visitors; possibly also visits to local collections. Monday will be devoted to visiting Mr. Marnier-Lapostolle's famous plant-collections at Les Cèdres, Cap Ferrat. Return that evening by charter flight. An alternative programme will be arranged to ensure plenty of interest for attendant non-cactophiles.

(d) *Accommodation* at moderate cost will be arranged in Monaco.

(e) *Rough estimate of cost*: It is obviously impossible to give more than a rough idea because of the many uncertainties at this stage; but it seems likely that at *present rates* £60 would cover travel, bed and breakfast, and the proposed programme; but any intending visitor would be well advised to allow an ample margin for other meals, depreciation of the £, rising costs, etc.

Obviously charter-flight and accommodation must be arranged in good time in order to obtain the best possible terms; and it is hoped that more information will be available within a few weeks. Details will be sent to anyone writing—with s.a.e. please!—to:

Mrs. L. Glass,
125 Mary's Mead,
Hazlemere,
HIGH WYCOMBE, HB15 7DY.

who will also co-ordinate initial correspondence between the continental organisers and bodies or individuals in this country but cannot make arrangements for travel, accommodation.



Mrs. H. Hodgson (centre) talking on 'Stemless Mesembryanthemums' at the 3LK Convention in September, 1975, with her on the platform Mrs. L. Glass and Mr. Hans Bonefaas.

Publicity Officer's Notes

FIRST of all, thank you, all of those who brought new members into the Society in 1975 and those Branches and groups who staged displays which gave us good publicity as well. I hope that there will be more activities of this kind this year and I shall always be willing to send along some of the new membership forms for use at this type of event and at local Shows—please assist by sending a stamped-addressed foolscap envelope. If you would like other publicity items in bulk please see the sales list.

Chelsea Show—Stewards will be needed on May 25th–28th from 8.30 a.m. to 8.00 p.m. on the first three days and until 6.00 p.m. to cover clearing on the Friday. If you can manage to help for even one two-hour spell during this time I should like to know the convenient times and dates and whether you can obtain an R.H.S. entry ticket.

Pimlico Show—If anyone can offer a prize for the Lucky Draw or would help sell tickets please let me know with details of prize and number of tickets required by mid-February at the latest.

Stewards will also be needed for the time of the Show 1.45–6.00 p.m. and to assist in preparations early that morning and the evening before between 8.00–9.30 p.m. I should like to hear about this as soon as possible, too. Please send a stamped-addressed envelope if you require an answer on any matters.

B. Maddams

Correspondence

Indian Succulent Society

We the cactus growers in India have joined together to form this society and have taken in hand the publication of the first and only journal on cactus and succulents in this country.

While our members are taking a lot of interest in growing these plants, non-availability of plants, seeds, books and other reading material on this subject in our country adds to our difficulty in further learning and enlarging the sphere of this hobby. Strict control over foreign exchange and import by our government does not permit us to pay and enjoy the facilities available in the western countries on this subject.

We would be grateful if the cactus and succulent growers of Great Britain extend the following help to our young society:

- books and other reading material,
- seeds and plants,
- articles by experienced writers for our Journal.

Mrs. Anjoo Serohi (Secretary),
c/o Mrs. A. K. Sharma,
1354 Sukhram Nagar,
LUDHIANA, India.

(Membership forms available from Mrs. Maddams; entrance fee £1, annual subscription £1).

Notes and News

Cactaceae y Suculentas Mexicanas

The Journal of the Mexican Cactus Society. Published quarterly in Spanish with extensive English summaries. Well illustrated in black and white and with at least two colour illustrations. At least 24 pages in each issue, featuring scientific articles, reports of field trips and so on.

The annual subscription (including Society membership; Journal sent by surface mail) is \$5 U.S. currency, payable direct to Dudley D. Gold, Apdo. Postal 979, Cuernavaca, Morelos, Mexico. Alternatively, you can send £2.50 to David Hunt, who will make the necessary arrangements for prospective U.K. members.

Change of Address

Please notify the Membership Secretary immediately of any change of address to avoid unnecessary loss of Journals and waste of postage.

Back numbers of the Journal

Some incomplete volumes of the Journal—mainly those between 1958 and 1972—are available at a specially reduced price to Branches or individual members wishing to sell them at shows, etc. Please contact the Publicity Officer for details, stating probable numbers required.

S.A.E.

Do remember to include a stamped addressed envelope or at least a stamp, when a reply is required from officers of the Society.

Pay Them a Visit

Several members have mentioned recently that they are unfortunately, owing to transport difficulties or because they live in remote parts, unable to get to any meetings or Shows. However, they would welcome a visit from any member in their vicinity. If you are in this situation yourself or would like to call in when on holiday or visiting different areas please contact the Publicity Officer with your name, address and telephone number (if possible). A list will be kept for information and if you would like your name and address included in the 'Visiting List' in the Journal please say so. To start the ball rolling here are two members who will welcome you (please contact them to fix a time first):

Mr. L. Reynolds, 33 Broadoak Avenue, Maidstone, Kent.

Mr. & Mrs. B. Hall, 16 Bossathnoe Way, Heamoor, Penzance, Cornwall.

If any members are willing to hold an open day for a gathering of other members during the summer will they please contact the Publicity Officer giving a proposed date and time.

Greenhouses, Heaters, Composts

Earlier I asked for participation in the Journal. Ray Pearce's Forum on Lobivia (August last year) showed how readers can contribute without going to great length or formality, and the idea can, I think, be usefully extended to cover aspects of cultivation, where an exchange of views in the Journal can help both beginners and experts.

Greenhouses. The range of aluminium and wood greenhouses available is very wide. We can't hope to do a 'Which?' report but I should like to know from you:

1. Which make(s), model(s) and size(s) you have.
2. If assembled from a kit, how easy? Any snags, missing parts, etc.? Any *successful* labour-saving features?
3. Any disadvantages (or advantages) in use not revealed by the advertisements?
4. How well has it lasted?
5. Any hints for intending buyers?

Heaters. My own experience has not been very wide or very warming! How about you?

1. What type of heater do you use? Make and rating?
2. How expensive to install?
3. How effective?
4. What type of thermostat? How reliable?
5. What about after-sales service?

Composts. One man's peat is another man's poison:

1. Soil v. soil-less, proprietary v. home-mixed?
2. How variable from one bag to the next are proprietary brands?
3. What's best for seed-sowing?
4. Feeding?
5. Frequency of repotting?

We will hope to add some addresses of suppliers, current prices, etc. and print your views in a future issue—Ed.

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Slide Competition Results

Division 1 The entries in these three classes were surprisingly low but of a fair standard for those not so expert in colour photography.

Class A—1st—Mrs. Strickland; 2nd—Mrs. Strickland

Class B—1st—Mrs. Strickland; 2nd—R. Worrall

Class C—1st—G. V. Thomas; 2nd—R. Worrall;
3rd—G. V. Thomas

Division 2 There were seventy four entries in this section and the judge, Miss E. M. Drage, commented that some had to be eliminated on very minor faults as the standard was so high.

Class A—1st—P. R. Chapman; 2nd—P. R. Chapman;
3rd—Miss M. Martin

Honourable Mentions—J. Meldrum, R. Pearce, Miss Martin, Mrs. B. Maddams.

Class B—1st—P. R. Chapman; 2nd—P. R. Chapman,
3rd—F. Smith

Class C—1st—P. R. Chapman; 2nd—Dr. A. Rainbow;
3rd—Mrs. B. Maddams

Many thanks to all those who made the effort to enter and contributed to an interesting evening. It is hoped there will be even more entries next time.

Branch Meetings

Berks. and Bucks. Allotment Holders' New Hall, St. Leonards Road, Windsor, 2nd. Tuesday in month at 7.30 p.m.

East Surrey. Community Centre, High Street, Caterham, 3rd Tuesday in month, 7.45 p.m.

Essex. Cranbrook Methodist Church Hall, The Drive, Ilford. 1st Saturday in month, 7.30 p.m.

Hatfield & District. Hatfield Congregational Church Hall, St. Albans Road East, Hatfield. 4th Monday in month, 7.30 p.m.

Herts. Friends Meeting House, Upper Latimore Road, St. Albans, 2nd Monday in month, 7.30 p.m.

Northern Counties. Social Service Centre, Park Road, Whitley Bay. 3rd Monday in month, 7.30 p.m.

North London. Capel Manor Primary School, Waltham Cross. 3rd Friday in month, 7.30 p.m.

North Staffs. Contact Mr. J. Wilson, 5 Monkton Close, Dresden, Longton, Stoke-on-Trent, ST3 4BG.

North Surrey. Adult School, Benhill Avenue, Sutton. 1st Tuesday in month, 7.45 p.m.

Wirral. "The Grange", Grove Road, Wallasey. 3rd Thursday in month, 8 p.m.

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Owing to greatly increased postal charges correspondents within the United Kingdom are requested to include a stamped addressed envelope if a reply is required.

ADVERTISEMENT RATES

Advertisements for insertion in the August issue must be in the hands of the Editor by 10 June and for the November issue by 10 September. Copy advertising plants must conform with the recommendations of the IOS Code of Conduct.

Rates for 1976 are as follows, and pre-payment is requested:

Full page	£9.00 per issue
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Enquiries to Dr. G. C. W. Randall,
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Volume 38
Number 2
May 1976

The Cactus and Succulent Journal of Great Britain

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M. Julien Marnier-Lapostolle

With great regret, we learned in early March of the death of Monsieur Marnier-Lapostolle, who over many years developed possibly the finest private botanical garden in the world at his home near Nice on the Côte d'Azur with rich collections of succulents, bromeliads and many other groups. He had been in poor health for some years.

IOS meets at Kew

IOS, the International Organization for Succulent Plant Study, broke new ground on 20 March when the British Section held a one-day Open Meeting at Kew Gardens, by kind permission of the Director, Professor J. Heslop-Harrison, F.R.S. Sessions of talks and discussions in the lecture theatre of the Jodrell Laboratory (celebrating its centenary this year) were separated by a long lunch interval when the 120 or so attending were able to see the support and research collections as well as the greenhouses usually open to the public.

During the day nine speakers presented short papers on various problems to do with 'Defining Genera and Species' and it is hoped to print some of these in our August issue.

The next IOS Congress is scheduled for September of this year and is to be held in Barcelona, Spain.

Britain monitors imports of succulents

As from 1 January 1976 the controls affecting international trade in succulents which were publicised at the IOS Conference in 1973 and described in the booklet 'Succulents in Peril' (1974) have been applied by the British authorities. This brings Britain into line with countries that have already ratified the International Convention on Trade. Britain's own ratification is expected later this year.

The groups covered by the regulations are the family *Cactaceae* and the genera *Aloe*, *Anacampseros*, *Euphorbia* (succulent species) and *Pachypodium*.

In order to monitor trade in the listed groups, the British regulations go a step further than the International Convention. All imports of species in the listed groups now require the issue of an appropriate document from the licensing authority here as well as an export licence from the exporting country. Exports from this country require a licence also.

Full details of the regulations as they stand at present for both intending importers or exporters, whether private or commercial, are available from the Department of the Environment at the following address:

Department of the Environment
Wildlife Conservation Licensing Section
17-19 Rochester Row
LONDON SW1P 1LN.

Women's Lip

With an eye to more widely publicised legislation, Sally Cornioides (page 42) warns the ladies of North Surrey Branch to be wary of the recent Act designed to rid us of sexual inequality. If it is true they regularly meet down there in conclave to dine on prawn-cocktails, caneton à l'orange, and lemon soufflés, only to keep poor old Dad waiting for his supper while they water their *Testudinarias*, may they indeed be hoist by their own petticoats—if not long since burned! And if

Sally C. is surprised to be with us still, can it be that no male chauvinist editor would dare to sack her now?

I'm sorry this has little to do with succulents, but scarcely anyone troubled to respond to my pleas in the last issue for relevant news and views, so can you blame me?

There was one letter though. A protest. And from a charming lady who, I'm sure, would never burn her underwear. On the contrary, her message, roughly translated, was *Vive la différence!* Her conquests at last year's Westminster Show were duly recorded in our February issue but, by an editorial oversight, her femininity was left, alas, in doubt. *Excuse me, Sir* (as she might have said), *your slip is showing:*

*A cactophile? Not she!
How could I be so silly?
Her name is unisex, maybe,
But Pat's a CACTOPHILLY!*

New contributors

Besides the regulars, we welcome two new contributors to this issue. Jackie Panter is a recent recruit to the Society, but no novice with Echeverias. She and her mother have a garden full of greenhouses in Heston, Middlesex. Our other newcomer signs himself *Endymion*. Like his mythical archetype, he was once kissed by the Queen of the Night, and has not been quite the same since . . .

We also reprint a short article which first appeared in the compellingly titled research bulletin, *Incompatibility Newsletter*. Fred Ganders has been observing the love-life of the *Cactaceae*, a subject on which, as he says, little has previously been published. As Len Newton pointed out during his short tenure of the editorship ten years ago, it is a subject where any scientifically-minded collector can make a useful contribution to knowledge, without special equipment or training, merely by making a careful record of which species do, and which do not, as a rule, fruit in the greenhouse in the absence of other plants of the same or closely related species. Few responded to Len's challenge (*Cact. Succ. J. Gt. Brit.* 28: 9. 1966), so I hope that Dr. Ganders's article may stimulate more interest in a topic which is relevant not only to botanical studies of breeding systems, variability in populations and speciation, but to the potential role of cultivated collections in the propagation of endangered species.

More new Editors

Bill Putnam has relinquished the helm of the N.C.S.S. journal where his place is being taken by all-rounder Bill Keen, to whom we wish every success and a prosperous voyage, etc. Bill Putnam is not disembarking but 'going below' to continue his work on other publications for the Society and the S.P.I. He takes the title of Assistant Editor and, like Nelson, will no doubt get a prominent column all to himself . . .

Cyril Parr, father of A.S.P.S. and editor of its

Bulletin for more than ten years, has well-earned his retirement and translation to the Presidency. Will Tjaden, horticulturist, bibliographer and one-time official of H.M. Treasury (as he disclosed to me at Kew the other day) is his well-qualified successor.

Octoginnarian

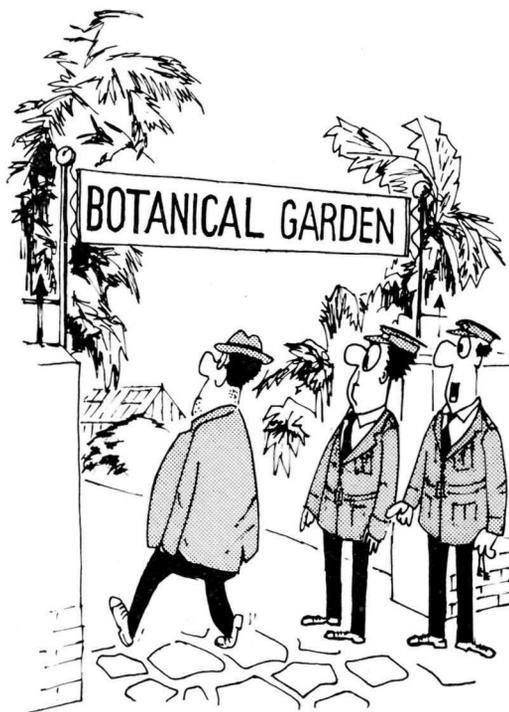
Congratulations to Ron Ginns, plantsman, philosopher and populariser of our hobby, who celebrated his 80th birthday in March.

Second International Cactus & Succulent Exhibition '76

The Polish Cactus Lovers Society and the Silesian Park of Culture are mounting this exhibition from 29 May–9 June in the Exhibition Hall (2,000 sq. metres) of the Silesian Park of Culture in Katowice-Chorzow, Poland. The festivities mark the 10th Anniversary of the Society and the 25th Anniversary of the Park and are to include lecture sessions as well as competitive and non-competitive displays.

Further particulars may be obtained from David Hunt or from P.T.M.K., Zarzad Główny, 40-163 Katowice 28, Post Box 18, Poland.

More notes and news are on page 40.



Keep your eye on him—he's a vegetarian!

Seasonal Cactus Care

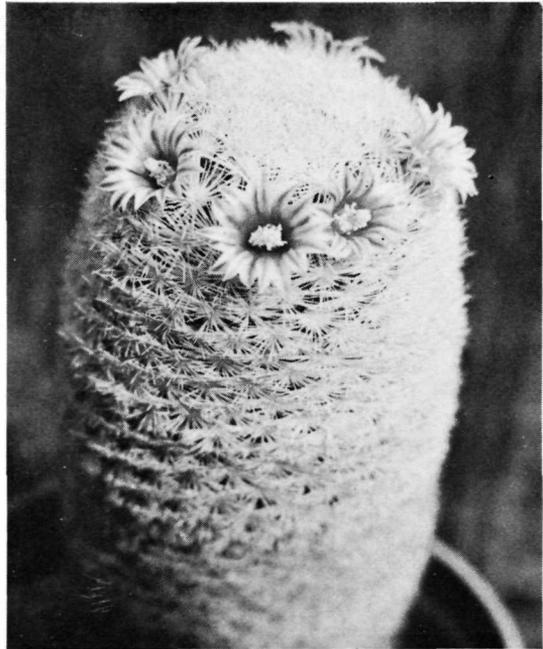
by W. F. & B. Maddams

At the time of writing, early in March, we are having a taste of spring weather with sunshine and warmth by day, even if this then leads to overnight frost. Although it may not last, and one must be cautious in view of the wintry conditions of early April 1975, it is cheering and will bring the plants into growth. This prompts comment on two matters. The first is that with the daytime temperatures in greenhouses reaching 21-27°C (70-80°F) the plants require some water. The amount given will depend on a number of factors and it is difficult to lay down precise rules. One factor to bear in mind is the minimum night temperature which is being maintained. If ample water is given and cold dull days follow a little later the plants will be less affected if temperatures do not drop below say 10°C (50°F) overnight rather than 5°C (40°F). One should also look for signs of movement, in the form of new growth or the development of buds, before being too generous with the water. Again, plants exposed to full sunshine will need a drink before those in semi-shaded locations. At this time of the year, and also in the autumn, one tends to develop an intuitive feeling on these matters based largely on experience.

Early-flowering Mammillarias

The second point is that although by late March, given reasonable weather, flowers should be appearing in considerable numbers, many cactophiles fail to take advantage of the early flowering Mammillaria species which will provide them with blooms from early February. By and large these species fall into two groups. The first comprises *M. lasiacantha* and its allies such as *M. egregia* and *M. magallanii*. These white-spined species are attractive in their own right but the flowers are an added bonus. Although they are not particularly large and are of a colour which is probably best described as buff, they appear in considerable numbers. *M. aureilana* with larger pale pink flowers and attractive interlacing fine white to yellow radial spines, also comes into this group of plants and should be in every collection. *M. picta* and its allies are also ideal for early blooms. In fact, *M. picta* may well flower at any time during the winter given a sunny day or two. Of the allied species, *M. sanluisensis* (the true species and not the hooked spined plant that masqueraded under this name for so long) is particularly appealing. Like the others it has cream flowers which appear in considerable numbers but its attraction lies in its more numerous and softer spines.

There are also one or two species with hooked spines which are good for early flowers. Foremost among these is *M. pennispinosa*, a gem by any standard. That it is not more widely seen in collections is probably because it is a trifle more difficult to grow than most Mam-



Mammillaria lasiacantha var. *denudata*. The common form of the species, early and free-flowering. (photo: Betty Maddams).

millaria species. It is slow from seed and young plants tend to have rather sparse root systems. Its recently described variety, *nazasensis*, is, in our experience, more accommodating and faster growing. *M. couperae*, which really ought to be called *M. moelleriana*, is also an asset to any collection, particularly the form with deep yellow spines. Its appeal is such that the flowers are almost superfluous but they are a harbinger of spring. The third plant of this group is a recent introduction, at least to British collections. It appeared four to five years ago under the name *M. weingartiana* but has subsequently been called *M. unihamata* by the trade. It is a small growing plant, the typical specimen being about 5 cm. in diameter, whose most obvious feature is the relatively long dark brown central spine. There appear to be two forms, one having cream flowers and the other blooms of a distinct pink hue with darker mid-stripe. In both cases they may appear as early as late January.

Composts

In our previous article, which was concerned principally with repotting, we referred to soilless composts without discussing them in any detail. We propose to do so now, not least because relatively little has appeared in print about the reasons for their appearance and obvious popularity. Articles and books written twenty years ago

invariably exhort the neophyte cactophile to use variants of the basic John Innes formulation. It was usually suggested that sharp sand should be added to improve the drainage although the merits of added vermiculite or broken breeze block were championed by some converts. These composts proved very successful and some very fine plants were raised in them during the earlier part of the post-war period. However, complaints about the quality of these composts became increasingly numerous, not only among cactophiles but among horticulturists in general.

In order to appreciate the reason for this it is necessary to look into the formulation for the John Innes composts. As is fairly well-known the potting compost should consist of seven parts loam, three of peat and two of sand, with the addition of an appropriate amount of JI base fertiliser for the types 1, 2 and 3. What is much less widely known, and sometimes ignored one suspects, is that the John Innes Horticultural Institute laid down fairly stringent requirements for the type of loam to be used. They recommend the product obtained when turfs are cut from a pasture on a medium loam soil and stacked in a heap until the grass and roots have rotted. The best material comes from a good pasture and consists of the top four or five inches. The dangers of inferior loams were also emphasised; the most important of these is the low humus content and this is usually accompanied by a poor crumb structure, high acidity and low phosphate content.

Although there are also detailed criteria for the types of peat and sand to be used in the JI composts it is the difficulty of obtaining loam of the required quality which has led to the deterioration of JI composts from many commercial sources of recent years. Turf loams from good pastures are very difficult to find and all too often, one suspects, any soil that happens to be surplus from building works is used as loam. In these circumstances it is not surprising that enterprising and far-seeing horticulturists began to look around for an alternative to the JI composts to find a formulation that would not only provide their equal for cultural purposes but one that could be prepared from standardised and readily available components. This search led to the development of no-soil composts.

Although we have not attempted to trace the history of this type of compost it is clear that the University of California played a significant part. The formulation of workers there, based on sand and peat in about a three-to-one ratio with added nutrients, is known, particularly in the USA, as the U.C. mix. It was already well-established when, in the late 1950's, the International Succulent Institute began its valuable work of propagating lesser known succulents and this led the members of that organisation to base their composts on the U.C. mix. Full details of the care with which they approached the problem are to be found in a very informative article by Dr. J. W. Dodson in the January/February

1959 issue of the *American Cactus and Succulent Journal*. It suffices to say that they used a mixture of 75% of thirty mesh sand and 25% of Canadian peat moss. To each cubic foot there was added six ounces of a mixture of purely inorganic nutrients, consisting of potassium nitrate, potassium sulphate, single superphosphate, dolomite lime, calcium carbonate lime and gypsum. This compost may be stored indefinitely without deterioration because it is low in nitrogen and what is present is inorganic in form. Hence, although it is eminently suitable for seedlings and for rooting cuttings it cannot be used to sustain growth over a period of time, such as a full season. Dr. Dodson and his ISI colleagues overcame the problem by mixing in about one teaspoonful of hoof and horn meal per gallon of basic mix immediately before the modified compost was used and noted that they obtained excellent results.

Soilless composts first came into prominence in Great Britain about 1960 when the J. Arthur Bower compost, marketed by Lindsay and Kesteven, became available. Others have subsequently appeared and the best known of these is the Levington compost, described by Dr. Rainbow in one or two recent articles in the *Journal**. The formulation of these commercial materials is, of course, a trade secret, but they represent the result of careful attempts to improve the U.C. mix in various respects. There have been a number of advances, notably the development of a slow release nitrogenous fertiliser, so that the compost may be stored for a reasonable period of time. As is well-known, dry peat is difficult to wet and this undesirable property is also found to an irritating degree with soilless composts. Hence, the recent appearance of a new Levington compost containing a wetting agent is a further step forward.

We have used soilless composts almost exclusively for about fifteen years and, as many members will have seen, the results testify to their effectiveness. Our experience has been almost entirely with the J. Arthur Bower material, of which there is a special cactus compost with added grit, but there is no reason to suppose that other formulations will not be equally effective. We have never claimed that they give better results than authentic JI composts but, unlike the latter, they are readily standardised and easy to obtain. One notable advantage is the very good root development that is encouraged and this is particularly valuable in the case of seedlings. Furthermore, as the compost is very light and not prone to compacting, the pricking out of seedlings is greatly facilitated. These composts can hold a substantial quantity of moisture without becoming waterlogged, and therefore dangerous for plant roots, and the advantages of this in a summer such as the one of 1975 hardly need emphasising. In fairness we must also point out one or two disadvantages attendant on

*The Times They are a-Changing, in *Cact. Succ. J. Gt. Brit.* 36 (1): 10-11 (1974); *Water, Water Everywhere*, *l.c.* 37 (1): 10-13 (1975).

their use. The wetting problems have been mentioned above and this is particularly noticeable in the early spring. When water is first given after the winter rest it is very inclined to take the path of least resistance between the pot wall and the compost and not wet the latter. This can be overcome by using reasonably warm water and now that one commercial mixture contains a wetting agent others will presumably follow suit. The lightness of these composts is an added advantage in most circumstances but it can cause problems in the case of larger columnar cerei, particularly if plastic pots are used. There is insufficient weight near the base and the plants tend to topple, particularly when being carried to and from shows. For this reason we continue to use the conventional JI type of compost for such plants. To summarise, soilless composts have proved their worth and, like plastic pots, they are undoubtedly here to stay.

Ventilation

By the time that these notes appear we shall be into the month of May and, we hope, the weather will be appropriate for the time of the year. Although night frosts cannot be excluded the sun is nearing its summer solstice and the temperatures within greenhouses can rise very rapidly given bright weather. Hence, the need for adequate ventilation is paramount. We have previously written on the advantages of automatic ventilators but for those who do not possess them and are not at home during the daytime, too much rather than too little ventilation is the watchword once we reach the month of May. It is better to admit some chilly early morning air than to run the risk of scorching and this seems an appropriate piece of advice with which to close these notes.

Cultivation of Succulents

by Mrs. M. Stillwell

Window-sill wisdom

When writing these notes, I like to feel I am catering for all the new members and those who enjoy their plants without wishing to be too technical, for we must bear in mind that we were once all beginners and as such welcomed all hints on growing our plants to perfection.

Many of us started with window-sill collections, and had to learn the limits of this accommodation. Here it is important to try and choose a window preferably facing south or south-west, where the maximum of sun is obtained, and a room that is fairly warm at nights, in other words a "lived-in" room, where good ventilation is provided during the daytime and adequate protection on frosty nights. Avoid direct draughts especially on windy days, and in other words give the plants the same sort of comfort as you would yourselves. Water from

the base at all times if possible, without letting the plants remain in too sodden a condition. Once or twice a week should be ample indoors. Choose the more leafy succulents to start with such as Kalanchoes, Crassulas, Haworthias, Aloes, etc. which should grow to perfection here, and even flower for you. It is better to grow a commoner plant well, than be tempted to buy choice plants that require experience and often high temperature greenhouse conditions which you may not be able to provide at first.

Planning a greenhouse

Plan your first greenhouse carefully and, above all, make sure it is built in the ideal spot in the garden, away from large overhanging trees and preferably where it will not be overshadowed by high buildings. Choose a spot which is free from damp and make sure it has a good solid foundation. If you wish to have beds that the larger plants can be grown in, make sure they have plenty of open drainage beneath the soil, and always have a wide concrete path for your own comfort, especially during the winter. I personally prefer a whole concrete floor, as it provides a drier winter atmosphere, when the damp rises considerably. Glass to the ground I feel is essential, but may take a little more heating up. The ideal method if you can afford it these days is electricity with a good thermostat cut-out, although I have heard of some very good results from the new gas greenhouse heaters. Either of these methods enable one to go away for short periods during the winter knowing that all is well. Oil heaters of a reputable make are quite satisfactory, but of course do need daily attention, and also it is safer to keep one small window permanently open to take away the fumes.

Propagating and watering

It is well worth installing a good propagator for seeds and cuttings, again an electric one complete with thermostat which can be left at about 21°C (70°F) is the ideal and most carefree method. If left unattended for longish periods, the seedlings are safer if the pans are enclosed in plastic bags to safeguard against drying out too quickly. If one can give daily attention, it is possible to sow in the normal way. A fine mist spray is essential for watering the seedlings, and also for spraying the plants on summer evenings before closing the house. It is well worth paying a little extra for a first class pressure spray that will also provide a strong jet for cleaning up any plant that shows signs of mealy bug or any other pest in its early stages. Always use clean tap-water in sprays and do not rely on rain water, which may contain dirt which will clog the delicate nozzle. Rain water is excellent for watering the plants and a good system for collecting rain water should be a *must*. Plastic guttering is very light and easy to keep clean. Keep the top of the rain water container covered at all times to prevent algae.

Some greenhouse aids . . .

A plain wooden *step stool* similar to one used in the kitchen with fold-away treads is very useful, I find, for viewing and reaching top shelves, and also for a convenient seat, without taking up too much room. A soft *long-handled brush* I find handy for sweeping up the floor without creating a lot of dust and again for easy storage in an odd corner. A *wire door* for the summer which if very hot can be left in day and night keeps the house well ventilated and also, if at all possible, panes of glass at intervals that can be lifted out and wire frames put in their place for the summer months. I used to use this method in my previous greenhouse and found it most successful.

. . . and activities

May should be a month when many of the stemless mesems will be needing attention and repotting such as Lithops, Argyrodermas, Gibbaeums, Cheiridopsis, etc. Leave the Conophytums until about July when they can have the dead skins removed at the same time as repotting, if it should be necessary. Young Conophytums need potting—on more often than large established clumps which tend to slow up in growth. New cuttings of Kalanchoes, Cotyledons and the large Crassulas should make nice plants during the summer and the old ones can be discarded keeping the collection looking fresh and healthy.



Kalanchoe pumila. One of the most attractive small growing species with mealy-grey leaves and purplish-pink flowers from March onwards. Easily grown and readily propagated from cuttings. Native to Madagascar.

Aloes are to me always very attractive, particularly the dwarf varieties. Young offsets of the larger growing types also make nice plants if you have not enough room to accommodate the adult plants, although they do make lovely plants for bedding out in the garden for the summer, but be sure to use plenty of slug killer to protect any succulent grown out of doors. Large tubs planted with colourful succulents placed in the front garden always catch the eye of passers-by and can provide a talking point which may even lead to a few new members for the Society.

Correspondence

Grown in Hong Kong

At the suggestion of our Hon. Treasurer, Dick Rolfe, Mr. D. F. Lee has written to describe the activities and experiences of our members in Hong Kong. Mr. Lee would appreciate letters from other members and the address to write to is: 4th Floor 'B', 95 Blue Pool Road, Happy Valley, Hong Kong. His letter runs as follows:

'As far as I know there are just a few Hongkong members of the Society, among whom one is a prominent medical doctor, two are senior government officials, one an educator who is very keen and experienced in the cultivation of cacti and succulents. I was introduced to become your member several years ago by the educator. All of them have regular work to do and none of them has yet retired. So, you see, we collect, cultivate and keep the plants as a pastime and pleasurable hobby.

The plants come mostly from Japan by air which takes merely a few hours. These are ordered or offered at random, and prices are usually rather reasonable. The plants, without pots of course, are carefully wrapped individually in cellophane and then packed in corrugated cardboard cartons, varying in size depending upon the quantity of the order. Japan is the only country in the Orient systematised in the cultivation and trading of cacti and succulents, with scientifically prepared soil and many kinds of insecticide for sale.

We are fortunate enough to be favoured with a moderate climate, the lowest temperature in winter is 4°C (39°F), but that lasts just for a few days, the average being around 15°C (60°F). In summer 35°C (95°F) is about the highest. We usually keep our plants in the open protecting them from scorching sunshine and heavy rainfall by overhead coverage of glass or plastic sheets mounted on frame. Only a few nurseries in suburban areas and villa gardens of the well-to-do can afford to keep them in greenhouses, as the value of land and rents here are high, and a majority of the people live in flats keeping their favourites on the window sill or veranda.'

The Beautiful Cabbage

by Jackie Panter

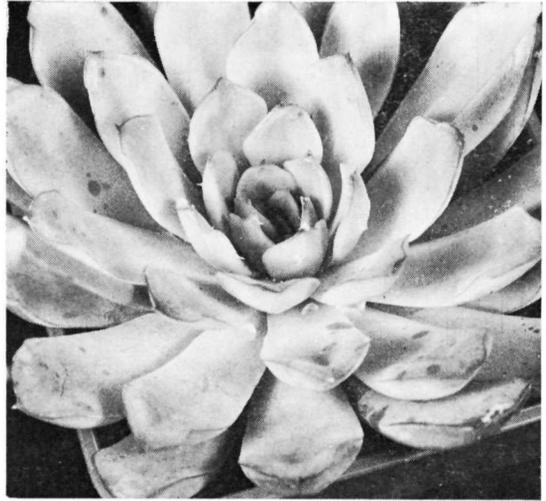
It is sad that the popularity of the 'other' succulents is still declining in favour of cacti. Is this due to the fact that they are often sold by florists as house-plants and are therefore regarded as being too easy to grow, or is it that they are not considered to be as exotic as cacti? Whatever the answer, both of these ideas are misconceptions. I find that they need much more care and attention than cacti and as for not being exotic enough, take a look at the flowers of *Ceropegia stapeliiformis* or (if you like prickles) try growing a *Pachypodium*. The enormous difference between these two plants illustrates the point I want to make and that is that variety in a succulent collection increases the interest and enjoyment of our hobby. With that in mind, this article is all about one genus of the 'other' succulents which will provide both.

Echeverias are disdainfully referred to by some cactophiles as 'those cabbages' and although this term is, I admit, a fair description of some of the species, I have yet to see a cabbage that could be compared with the colours and forms to be found in this genus. So if up till now you have dismissed Echeverias as not being worthy of attention, read on.

History and habitat

The history of these plants began in the 1790's when one was brought to Europe and cultivated in the Botanic Gardens at Madrid. In 1793 it was described, illustrated and given the name *Cotyledon coccinea* by Cavanilles. It was not until 1827 that a new genus was recognised and named *Echeveria* by A. P. De Candolle in honour of a Mexican artist Atanasio Echeverria, the botanical illustrator to an expedition through Mexico led by Martin Sesse and José Moçino which lasted about fifteen years.

Although the main home of Echeverias is Mexico, the range of known species extends over four thousand miles from south western Texas to north western Argentina. This large area varies considerably in altitude and climatic conditions and at one extreme we find such species as *Echeveria pittieri* growing as an epiphyte in tropical rain forest while at the other there is *E. alpina* just below the snow line. These two are exceptions, though, and the majority of Echeverias grow on rocky cliffs and steep slopes in a warm temperate to sub-tropical, seasonally dry climate. This does not mean that they should be exposed to full sunlight when grown under glass. Slight shading is better, certainly in summer, although too much will produce elongated plants without much colour. Some species can be planted outdoors in the summer months, like *E. pumila* var. *glauca*



E. pulidonis (photo: Margaret Martin).

(formerly *E. glauca*) which is often used in floral displays especially on the south coast. Unfortunately the rain can spoil the attractive effect of the plants by washing away the white powdery bloom on the leaves, which normally protects them from scorching and desiccation. The highly succulent species such as *E. agavoides* are not so suitable for planting outdoors except in a very well-drained soil.

Soil requirements

The rocky terrain generally inhabited by Echeverias is often devoid of any soil except for pockets of leaf-mould which collect in the crevices, and the root system of the plants is fine and fibrous. To get the best results in cultivation the most suitable soil is one that is light and porous and enables the roots to spread easily. I use a mixture of equal quantities of peat and coarse sand with the addition of a little John Innes No. 2 (this prevents the peat from drying out too quickly) and some base fertilizer. I try to re-pot at least once a year, sometimes twice with certain species, but I never use extra liquid fertilizers as this tends to produce large overblown plants which lose their character. In nature the nutritional value of the soil in which Echeverias grow is replenished by the decay of the leaves which they shed, but in cultivation the shrivelled and fallen leaves can cause problems. Not only do they look untidy but the dried leaves provide a home for pests and if left on damp soil they will go mouldy and spread rot. My plants shed their lower leaves one by one all year round, but especially at the beginning of winter as watering is reduced. I find that the best way to deal with the problem is to have a lot of patience and a pair of long tweezers! Some species have a tendency to lose quite a few leaves when flowering, for the flowering shoot tends to starve



E. carnicolor (photo: T. Harwood)

them as it develops, resulting in a shrunken rosette on a tall stem. The only way to prevent this happening is to cut off the immature inflorescence as it emerges; this means, of course, no flowers, but if the plant is allowed to continue flowering every year it becomes top heavy and will have to be beheaded or else it will fall over and snap its stem. The inflorescence can be kept and put in a little soil then watered occasionally, it should then produce roots and form offsets from the bases of the bracts.

Propagation

This, of course, is one method of propagation. Others are seed-raising, leaf-cuttings, offsets and beheading. True seed is difficult to obtain as two plants of the same species but of different clones are needed. Growing from leaf-cuttings is not always satisfactory as only those leaves which are easily detached (literally falling off when touched) can be used and although they root readily some will not produce a new plant, but merely swell up and burst. To get the best results with leaf-cuttings the bracts from the inflorescences should be used as they usually fall off easily and the appearance of the rosette will not be spoilt. A good plant to try this with is *E. carnicolor*.

The quickest method of propagation and the most likely to succeed is the removal of offsets which often have roots of their own. If, however, the plant does not

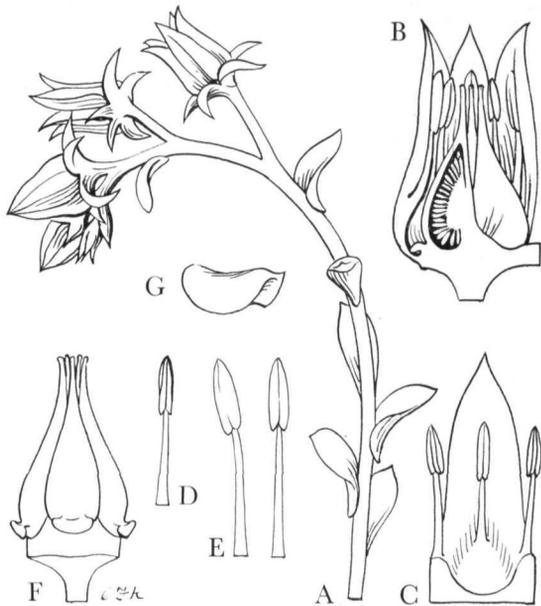
offset the only answer is to behead it and this should be done in early May. The rosette is cut off about two inches below the lower leaves and put aside for a week or so for the cut to dry. Then it can be placed with the stem through the drainage hole of an upturned flower pot and left until a good clump of roots is showing. This method is often recommended but it has a drawback in that, when the cutting is removed from the pot, all the roots can get pulled off. I prefer to pot up cuttings, unrooted, in dry soil and leave them in a shady place. After a week or two, roots will have formed and I then give a little water and move the plant back into the sunlight. The original stem should be kept in its pot, put in the shade and occasionally watered as new plants will soon develop from the axillary buds above the old leaf scars. Beheading is also a way to save a sick or rotting plant by cutting well above the rot until clean tissue is reached, then a dusting with sulphur powder will help the cut to dry and keep out infection.

Pests

Pests are always a problem and Echeverias have their share of troubles caused mainly by our old enemy the mealy bug and occasionally by greenfly on the inflorescence. The most efficient way to deal with mealy bugs on Echeverias (and this applies to all members of the *Crassulaceae*) is to water them once a year with systemic insecticide. I consider this essential as mealybugs love Echeverias and they can do a lot of damage to the growing point of the plant. One reason for using a systemic instead of spraying with malathion is that the spray falling onto the leaves removes the powdery bloom and marks them badly, but malathion is considered to be harmful to the *Crassulaceae* anyway. Greenfly can be a nuisance as they secrete a sticky liquid which spoils the appearance of the plant. To deal with this I cut off the inflorescence where they gather.



E. fulgens. A caespitose form collected by David Hunt (no. 8849) above Tetipac, Guerrero, Mexico, in 1974. (photo: R. Zabeau).



The structure of an *Echeveria* flower. A, the inflorescence, $\times \frac{2}{3}$. It is technically a 'cincinnus', with the flowers all on one side of the axis, though actually in two rows; B, half-flower, showing one of the carpels in section and the ovules in situ, $\times 2$; C, one corolla-lobe or petal with the stamens attached, $\times 2$. In the whole flower there are twice as many stamens (10) as petals (5). They are in two whorls, one opposite the petals, the other alternating with them. The outer whorl, alternating with the petals, are slightly larger. D, stamen from inner whorl, $\times 3$; E, stamens from outer whorl, $\times 3$; F, ovary, consisting of five flask-like carpels appendaged with nectary glands, $\times 2$; G, a nectary, $\times 6$. The drawing, by Christabel King, is of *E. fulgens* (Hunt 8849).

Watering

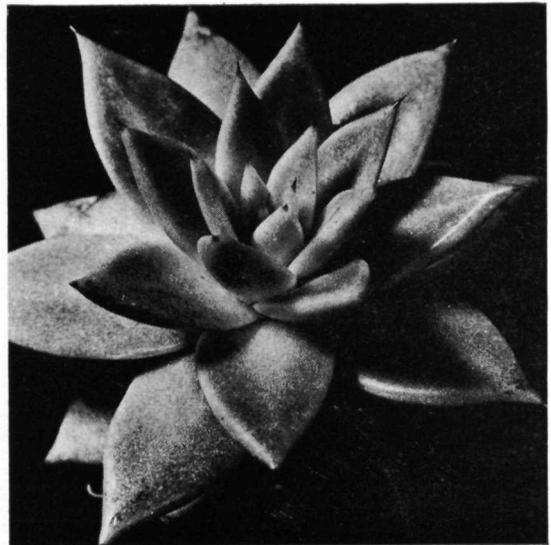
Watering *Echeverias*, as with all succulents, is to some extent a matter of trial and error to suit the soil and greenhouse conditions. From April to the end of the summer I water them at least once a week depending on the weather. Last summer, for instance, the smaller plants in $3\frac{1}{2}$ " pots and under needed watering every three days or so. During the winter the highly succulent species are not watered at all; the low-growing plants which form clumps have a little water about once a month; and the tall-growing ones are watered once a fortnight, reducing to once a month or so in the depth of winter. All this sounds rather complicated, but, as I remarked, watering is a question of experimentation until the right balance is found. Luckily most *Echeverias* are tolerant of experiments except for a few touchy ones, which is only to be expected in a genus of about 140 species plus 60 cultivars.

Which species to grow?

Such a large group must surely contain some species that will appeal to anyone interested in succulents; and a good choice will provide any collection with colour and an abundance of flowers to brighten up the greenhouse especially during the winter and early spring. The flowers are bell-shaped and mainly coloured pink and red or red/orange and yellow. Some exceptions are *E. affinis* (blood red), *E. pulidonis* (lemon yellow), *E. rauschii* (orange) and *E. heterosepala* (green). The largest flowers are to be found on *E. harmsii* and *E. runyonii* var. *macabeana* and the strangest flowers are produced by *E. rosea* where the inflorescence is like a bottle brush.

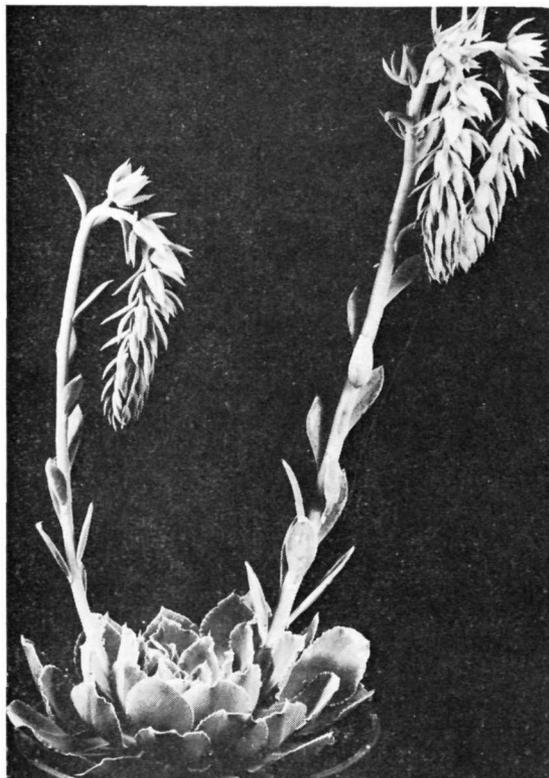
If by now you think that perhaps you might like to add a few *Echeverias* to your collection, here is a short list of the species that I can recommend as amongst the most attractive or unusual:

- E. affinis.** The so-called 'Black Echeveria', really very dark green, low growing, eventually forming off-sets; flowers deep red.
- E. agavoides.** Slow growing, large single headed, with very fleshy leaves; flowers pink and yellow.
- E. albicans.** Small, freely offsetting, soon forms a clump; pale blue fleshy leaves; flowers pink and yellow.
- E. atropurpurea.** Short stemmed single headed; leaves deep crimson; flowers pink to pale crimson; difficult, dislikes strong sunlight.
- E. carnicolor.** Small, freely offsetting; leaves pale mauve-pinkish, crystalline; lots of pink flowers.
- E. ciliata.** Small, stemless; green leaves with hairy fringes; flowers scarlet/orange and yellow; not readily available.



E. agavoides (photo: Peter Chapman).

- E. coccinea.** Medium shrub, 1–2 ft.; long furry leaves; not a very attractive plant except for the inflorescence which is a large spike of red and yellow flowers with lime green sepals.
- E. craigiana.** Short stemmed, single headed; long, pointed, very fleshy leaves pale chocolate coloured; flowers pink and red; inclined to be difficult.
- E. fulgens.** The typical single headed *fulgens* form has solitary heads, but there is a supposed hybrid which clusters to form a low shrub; leaves blue/green with red edges; lots of red and yellow flowers.
- E. gibbiflora** var. **carunculata.** Tall (over 2 ft.), large, single-headed; long tongue-shaped pink leaves with strange warty bumps on them; large inflorescence with pinkish mauve and yellow flowers.
- E. goldmanii.** Small shrub; thin green leaves tipped red; flowers bright scarlet and yellow.
- E. grandifolia.** Tall, single headed; leaves grey-pink; inflorescence 2–3 ft. with carmine and yellow flowers.
- E. harmsii.** Medium shrub, inclined to sprawl if not cut back; has the largest flowers of the genus, red outside and yellow within.
- E. heterosepala.** Small, short stemmed; deep steel-blue leaves tinged pink; flowers green; unusual.
- E. leucotricha.** Large shrub, slow growing; leaves densely covered with white hair, flowers scarlet.



E. shaviana (photo: Margaret Martin).



E. subrigida (photo: Peter Chapman).

- E. pallida.** Medium to large shrub; leaves pale apple green with red edges; flowers mauve pink and yellow.
- E. cv. 'Paul Bunyan'.** Tall, large single-headed hybrid of *E. gibbiflora* var. *carunculata*; leaves blue with warty bumps and curly edges; flowers pinkish mauve and yellow.
- E. peacockii.** Small short stemmed; pale blue to white leaves; flowers deep pink.
- E. cv. 'Perle von Nurnberg'.** Tall, large, eventually forming offsets; leaves purplish pink; flowers pink and yellow.
- E. rosea.** Medium shrub; leaves apple green tinged pink; flowers pale yellow with pinkish purple sepals; unusual.
- E. pulidonis.** Small, freely offsetting; leaves pale blue-green tinged crimson red at edges; flowers completely lemon yellow; different.
- E. purpusorum.** Small, slow growing, eventually forming offsets; leaves stiff, grey-green, red spotted; flowers broader than usual, red and yellow.
- E. rauschii.** Small, freely offsetting; leaves bright green with crimson margins; flowers completely orange; different.
- E. runyonii** var. **macabeana.** Low growing, soon forms a large clump; leaves pale blue heavily powdered white; flowers large, pink to scarlet.
- E. setosa.** Small, eventually offsetting; leaves fleshy, densely hairy; flowers bright red and yellow.
- E. shaviana.** Low growing, soon forming offsets; leaves pale blue-mauve with crimped edges; flowers pink.
- E. subrigida.** Rightly called the Queen of Echeverias, short stemmed, large, single-headed; leaves pale blue thickly powdered white with red margins, flowers large, pinkish orange; difficult and not readily available.

Mammillarias in Early European Literature

(2) 1700-1800

by D. R. Hunt

More references to *M. mammillaris*

Of the species which had reached Europe by 1700, only *M. mammillaris* appears to be positively identifiable. It persisted in cultivation and was known to the principal writers of the first half of the eighteenth century, in-century, including Bradley, Miller and Linnaeus.

Richard Bradley (1688-1732), author of the pioneer *History of Succulent Plants* published in five parts ('decades') between 1716 and 1727, was under the mis-

apprehension that the plant came from the Cape Region of South Africa and called it the 'Small African Melon Thistle' (fig. 5).

Philip Miller (1691-1771), author of the great *Gardener's Dictionary* and gardener at the Chelsea Physic Garden in London for nearly fifty years, was better informed. In the first edition (1731) he called the plant *Melocactus americana minor* and remarked that it was the only species he had seen in European gardens.

Linnaeus (1707-78) was acquainted with the 'lesser melon-thistle' by 1737, when he refers to it in his enumeration of the plants in the *Hortus Cliffortianus*, a catalogue of the plants in George Clifford's garden at Hartekamp, Holland, and one of the forerunners of his *Species Plantarum*. At this time (1737) and in the later *Hortus Upsaliensis* (1748) Linnaeus had not adopted the binomial system of naming and called the plant *Cactus subrotundus tectus tuberculis ovatis barbatis* ('the subrotund cactus covered with bearded ovate tubercles'), quoting some of the earlier references. For the *Species Plantarum*, however, he borrowed the adjective *mammillaris* from earlier authors to serve as specific epithet. Since this work is taken as the starting point of the nomenclature we use today, it is to him that the credit goes for the epithet, although nothing about it was new; not even the spelling. Pedants who have tried to 'correct' the spelling of *Mammillaria* by leaving out one 'm' have usually blamed poor Haworth for the 'mistake', but the accepted spelling—for *mammillaris* anyway—goes back at least to 1691. Botanical Latin, with its long traditions and notorious idiosyncracies, is in any event scornful of pedants. Its literature, to quote Dr. W. T. Stearn, is a 'strange, barbarous place for classicists' (Botanical Latin, 1966).

Philip Miller and *Cactus proliferus*

In the first of these articles, I put forward the suggestion that contrary to established belief *M. prolifera* was probably not introduced to Europe before 1700 since descriptions and a contemporary published illustration do not fit that species. Also, had *M. prolifera* been introduced to cultivation at that time, one would have expected it rapidly to have become more widely known than *M. mammillaris*, in view of its ease of culture and propagation, whereas, on the contrary, only the latter species was mentioned by Bradley and Linnaeus.

DEC. III. *Historia Plantarum Succulentarum.* 11

Ficoides, seu Ficus Africana
Sphærica Tuberculata La-
tescens, Flore Albo Fru-
ctu Pyramidalis Rubro.

Small African Melon
Thistle.

HUNC Melo Carduum è Pro-
montorio Bonæ Spei origi-
nem traxisse constat, & frigore Hyc-
malia in Conservatorio vulgari haud
difficillimè passus est. Sex superatit
digitos nondum aliquos adhuc me-
vidisse memini, nihilominus perpau-
ci eorum in Hortis Amstelodamen-
sibus diù floruerant.

Truncus hujuscè Plantæ, trium Di-
gitorum Diametri, Substantiam Pom-
i internam quam maximè assimu-
lat, & omnis illius superficies Ma-
mellis usquequaque circumvelata,
summitates vero ornatæ sunt Nodu-
lis spinarum Stellis referentium, è
quarum interspatiis apparent Flo-
res, & postea erumpunt Fructus pri-
mo quidè aspectu, plenè ac per-
fectè maturos, & ad Ruborem altum
accedentes. Illis continentur Se-
mina quaedam exigua nigra, quæ in
Arcolâ callida sata, Plantas juniores
proferunt: Sin autem Cacumen
sive Summitatem illius excindimus
stirps reliqua Verticibus novis repul-
labitur qui Vertices, æstivo tempo-
re abscissi, ad majus Incrementum,
in terram sunt inferendi.

THIS Melon-Thistle is
brought to us from the
Cape of Good-Hope, and is
hardy enough to stand the Win-
ter in a common Green-House. I
have not yet seen any of them
exceed six Inches in height, tho'
there are some of them at Am-
sterdam, that have been there
many years.

The Body of it, which is
about three Inches Diameter,
is of the Substance of the Flesh
of an Apple, which is cover'd
all over with green-Knots
pointed with Stars of a red-
dish brown Colour, from between
which come forth the Flowers,
and afterwards the Fruit breaks
out at once perfectly ripe, and
of a deep red Colour: These in-
clude little black Seeds, which
being sown in an hot Bed, will
bring forth young Plants, or if
we cut off the Top of the Plant,
the remaining part will put
forth young Heads, which may
be separated from it in the Sum-
mer, and planted for Increase.

C The

Fig. 5. Bradley's account of *M. mammillaris*. He thought it was of South African origin.

It is not until the sixth edition (1752) of Miller's *Gardener's Dictionary* that we encounter the first unequivocal published description of *M. prolifera*, under the name *Cactus proliferus subrotundus tectus ovatis lanuginosus, spinis albis erectis*, later to become simply '*Cactus proliferus*' when Miller finally adopted the binomial system of nomenclature for the eighth edition of the *Dictionary* (1768). Miller's turn of phrase is picturesque and his experience of growing the plant at Chelsea more than two hundred years ago is acutely observed (even to the point of noting its probable self-incompatibility!):

'Roundish prolific Cactus, with oval tubercles closely joined, having long white beards, commonly called Small Childing Melon-Thistle'.

'The sixth sort is but a little larger than the fifth (*M. mammillaris*), growing nearly in the same form; but this produces a great number of young plants from the sides, by which it is increased. This sort produces tufts of a soft white down upon the knobs, and also between them at every joint, which makes the whole plant appear as if it was covered with fine cotton. The flowers of this sort are produced from between the knobs round the sides of the plants, which are in shape and colour very much like those of the fifth sort, but larger. These flowers are not succeeded by any fruit, at least all those which I have under my care, have not produced any, although they have produced plenty of flowers for some years; but from the same places where the flowers have appeared there have been young plants thrust out the following season. These young plants I have taken off, and after laying them to dry for two or three days, I have planted them, and they have succeeded very well.'

Miller does not say whence or from whom he had received the species although by implication it must have been in his possession for a number of years before 1752. Possibly it was one of the many plants he received from the Scottish physician William Houston who visited Cuba in 1729.

An earlier French connection

Although Miller was the first to publish an indisputable description of what we now know as *M. prolifera*, it has been assumed by many writers that an illustration published by Johannes Burman in 1758 (*Plantarum Americanarum* t. 201, fig. 1) and based on a much earlier original is also this species. It was an assumption made by Britton & Rose (*The Cactaceae* 4: 124. 1923), for instance, and may well prove to be correct.

When, in the late seventeenth century, the Dutch were on Curaçao and nearby islands, and the British had taken Jamaica, Barbados and so on, the French were on Hispaniola (St. Domingue), Martinique and other islands of the Lesser Antilles. Two French botanists went there in 1689, and worked together. One was Joseph

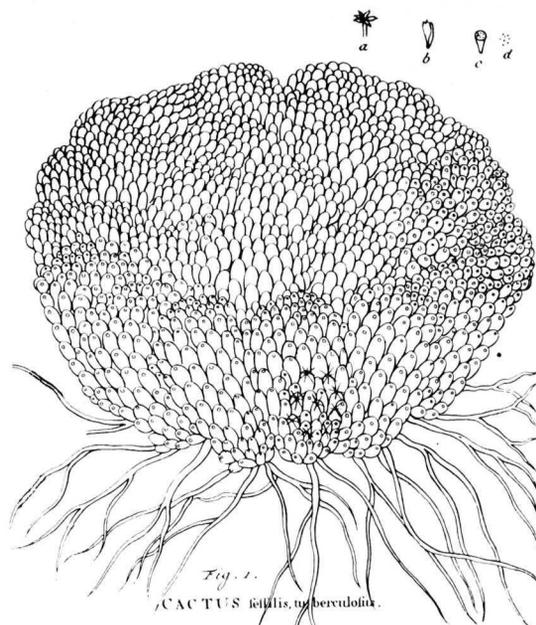


Fig. 6. Burman's reproduction, published in 1758, of Plumier's earlier drawing of a *Mammillaria* from Santo Domingo, later known as *Mammillaria glomerata*. The original drawing, still unpublished, is more detailed, and closely resembles *M. prolifera*, but the flowers were described as red.

Surian (d. 1691), the other Charles Plumier (1646-1704), who was briefly mentioned in the first part of this survey. Surian returned to France in 1690 with a collection of herbarium material which is preserved at Paris and it is possible, though it seems unlikely, that he could also have taken live material of the second *Mammillaria* drawn by Plukenet and known to Morison. Plumier stayed on till 1697, and made a very large number of plant drawings and descriptions which are now at the Bibliothèque Centrale of the Paris Muséum (Stäffleu, *Taxonomic Literature*, 360. 1967).

Amongst Plumier's drawings are more than thirty *Cactaceae*, including two *Mammillarias*.* One of these, never published, appears to be of *M. mammillaris*. The other, incompletely and imperfectly copied, is the one eventually published by Burman. It shows a plant which is hairless, practically spineless and of rather uncertain habit, neither clearly solitary nor clearly caespitose (fig. 6). Britton & Rose (l.c.) inferred that the spines and hairs had 'doubtless been omitted by the artist' since Plumier's name for the plant was *Melocactus minimus lanuginosus* (woolly) *et tuberosus*. In fact, the original drawing was more complete than Burman's

*It is hoped to reproduce some of them in future issues of this Journal.

copy. The Royal Botanic Gardens, Kew, possesses hand-drawn copies of many of the originals and that of *Melocactus minimus*, etc. shows the habit unequivocally caespitose and spines drawn in on several of the offsets at the front. With this extra detail, it is not difficult to see a resemblance to *M. prolifera*.

The evidence in favour of the identification would be strengthened by recollection of the plant in the localities named by Plumier in his manuscript, though not mentioned by Burman. These were on Hispaniola near the lake called Etang Saumâtre and in the region known as 'le grand cul-de-sac'. *M. prolifera* (or rather its var. *haitiensis*) certainly occurs on Hispaniola: around Guayubin in the north-west of the Dominican Republic, near Azua in the south, and around Gonaives in western Haiti. It could well occur in the region of the Etang Saumâtre but no one seems to have collected cacti there in modern times. Against this there is the conflicting evidence of the reported flower colour of Plumier's species, which was said to be red. A few species of the relevant group (series *Stylothelae*) do have red flowers and at least one (*M. wildii*) is apparently variable, but there is no red-flowered *M. prolifera* on record. Conceivably Plumier was mistaken, but the question-mark must remain, at least till the type locality is revisited.

Whether distinct or not, Plumier's plant has its own binomial name, originally published by Plumier's compatriot, Charles Lamarck, as *Cactus glomeratus* (*Encyclopédie Méthodique* 1: 537. 1785), later becoming *Mammillaria glomerata* (Lam.) DC. Amongst authors of the present century two at least have recognised it as a species, namely Urban, in his *Flora Domingensis* (*Symbolae Antillanae* 8: 465. 1920) and Moscoso, *Cactaceas de la Flora de Santo Domingo*, 84 (1941).

First fruits from Mexico

As we now know, the wealth of the genus *Mammillaria* is not in the West Indies but in Mexico. Long before the Spanish Conquest, many of the Mexican *Cactaceae* had Aztec names and amongst them may have been *Mammillarias* (Martin del Campo, in *Cact. Suc. Mex.* 2: 30. 1957). None appears to have reached Europe much before 1800, however, when Casimiro Gomez Ortega published a description (fig. 7) and engraving (fig. 8) of a plant raised at the Royal Botanic Garden, Madrid, from seeds sent by Vicente Cervantes, professor of botany at the University of Mexico from 1788 to his death in 1829. The size of the plant (two feet tall, according to the description) suggests that the seed would have been sent not later than the early 1790's.

Despite the excellent description and illustration, it has to be admitted that Gomez Ortega's plant has yet to be positively identified. Unfortunately, the unimaginative name he chose for it, *Cactus cylindricus*, had already been used by Lamarck and other authors for other species, and did not gain acceptance amongst botanists. In the flood of *Mammillaria* descriptions which

resulted from the efforts of the various collectors who went to Mexico in the first half of the nineteenth century Ortega's *Cactus cylindricus* became submerged in the synonymy of two other plants, *M. coronaria* Haw. (1821) and *M. hamata* Lehm. ex Pfeiff. (1837). Rightly or wrongly it has become identified with the very incompletely described *M. hamata*, though based on a different type, particularly since Britton & Rose (*The Cactaceae* 4: 141. 1923) reproduced Ortega's illustration as *Neomammillaria hamata*.

Nonetheless, until recently nothing like it has been collected in Mexico. The lack of details of where the original seed was collected, coupled with the known plasticity of the relevant group, the series *Polyacanthae*, centred on *M. spinosissima* Lem., help to account for the difficulty of re-collection and positive identification. Claims have been made on behalf of *M. duoformis* Craig & Dawson and the undescribed *M. 'heeriana'*, but

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ICOSANDRIA MONOGYNIA.

CACTUS cylindricus. Vide Tab. 16.

C. *cylindricus*, tectus tuberculis conico-compressis in spiram digestis.

CAULIS bipedalis, brachii crassitudine, glaber, cylindricus, ad basim prolifer, tectus tuberculis conico-compressis in viginti sex spiras digestis, spinis inaequalibus, acerosis, rectis; exterioribus sexdecim, albidis, patentibus; interioribus ferrugineis, robustioribus, erectiusculis terminatis.

Prolifcationes breves, lactescentes, tuberculis minus compressis, similes.

FLORES campaniformes, numerosi, parvi; apicem caulis planum coronantes.

CALYX basi viridis, imberbis, squamis inaequalibus, adpressis, rubris.

PETALA subaequalia, rubra, lanceolata, acuta.

TILAMENTA capillaria, petalis triplò breviora, albida. *Antberae* lutescentes.

STIGMA quadripartitum, lutescens.

BACCA cuneiformis, glabra, parum carnosae.

SEMINA fulva, minima.

Habitat in Nova Hispania.

Floret in Horto Reg. Matr. Junio, et Julio, è semibus missis per D. Cervantes.

Observ. Ad multò majorem proceritatem, et crassitiem in loco natali exrescere, credibile est.

EXPLICATIO TABULAE 16.

1 *Flos* integer. 2 *Idem* longirudinaliter scissus, ut singulae partes appareant. 3 *Pistillum*. 4 *Bacca*. 5 *Tuberculus* cum aculeis. 6 *Idem* lateraliter visus.

Fig. 7. Ortega's description of *Cactus cylindricus*, published in *Novarum, aut Rariorum Plantarum horti Matritensis Descriptionum* (1800).

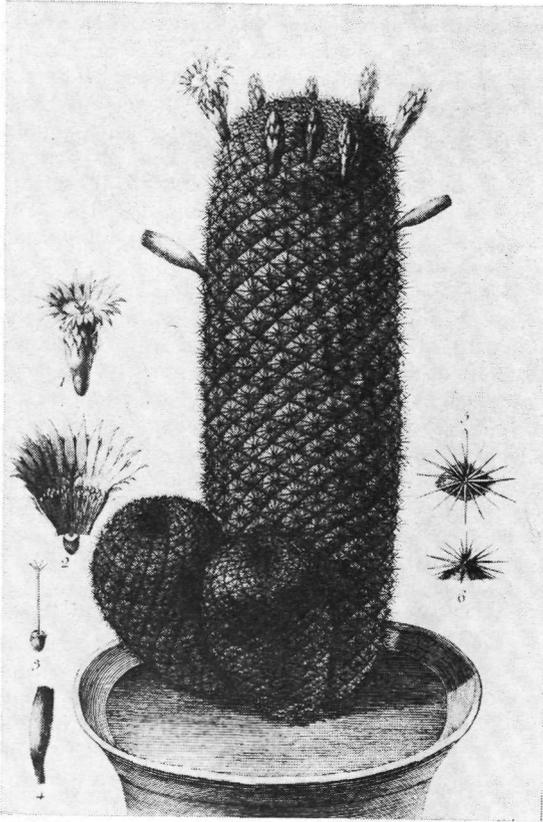


Fig. 8. *Cactus cylindricus* Ortega, from the original illustration published in 1800. It was the first Mexican *Mammillaria* to be described and figured, but has never been positively identified.

these plants do not make the tall, stoutly cylindric growth of Ortega's and the claims have not been made to stick.

There is one plant which, to my mind, has a better claim, and was believed by its collector, the late Sr. F. G. Buchenau, to be the 'true' *M. hamata*. The specimen illustrated in fig. 9 represents this form collected in the state of Puebla some time before 1969 when it was given to the writer with a note of the locality of collection by Sra. Buchenau. In cultivation, this has developed weaker spination, lacking hooked spines, but generally the habit and spines resemble Ortega's description. It has semi-milky sap. Seed of Mexican origin supplied by H. Fittkau under an unpublished name have produced young plants which appear to be

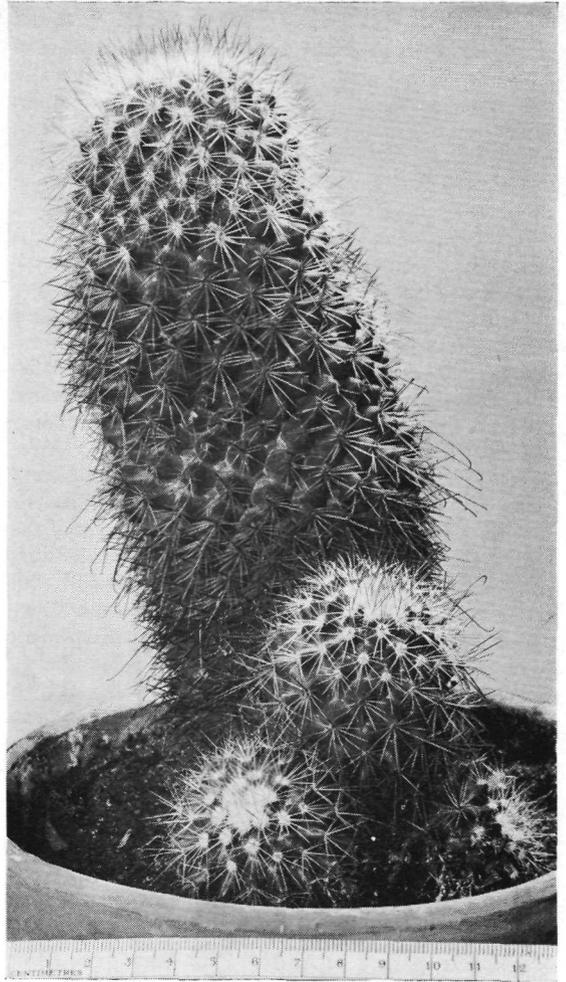


Fig. 9. A plant collected by the late F. G. Buchenau, in the state of Puebla. He believed it to be the species described by Ortega. In cultivation, it has ceased to produce hooked central spines, but they are visible on the older growth. (photo: R. Zabeau).

comparable and may derive from Buchenau's stock or from more recent field-collection at his locality. Further field work is certainly desirable to establish the plausibility or otherwise of plants or seeds being collected there by botanists nearly two centuries ago, and the variability and relationships of this possible contender for the title *M. hamata*.

Self-Incompatibility in the Cactaceae

by Fred R. Ganders

Introduction

The occurrence in cacti of *self-incompatibility* (defined as the inability of a plant producing functional pollen and ovules to set seed when self-pollinated) is virtually unrecorded in the literature on plant reproductive biology. Major reviews of the reproductive methods of flowering plants mention only that some species of *Opuntia* are apomictic (East, 1940; Gustafsson, 1946-1947; Fryxell, 1957). East (1940) states that most cacti are probably self-compatible or apomictic, although no evidence for this conclusion is presented. Actually, many cactus species require cross pollination for fruit and seed production. The purpose of this report is to document that self-incompatibility is widespread in subfamily Cereoideae of the Cactaceae.

Materials and Methods

Self-pollinations were performed on various species of cacti in the collection of the Botanical Garden at the University of California at Berkeley. Pollinated flowers were tagged and fruit and seed set observed on plants growing in the greenhouse or laboratory. Pollinators were excluded, and typically only one plant of each species was in flower at any given time.

Results

Self-incompatibility was indicated in 15 of the 17 genera in which self-pollinations were made. Only *Matucana formosa* and five species of *Rebutia* (*R. grandeolata*, *R. kupperiana*, *R. muscula*, *R. pulvinosa* and *R. violaciflora* var. *knuthiana*) were self-compatible and set normal seed (Table 1).

Several species appeared of *Neoporteria* to be parthenocarpic. Fruits ripened when flowers were self-pollinated as well as when flowers were left unpollinated (although automatic self-pollination probably occurred). The fruits, however, were hollow and contained no seed. The remains of the ovules were small and dark and showed no evidence of any growth. *Neoporteria fusca*, *N. gerocephala*, *N. nigricans*, *N. pilispina* and *N. taltalensis* produced seedless hollow fruits.

Only two species of *Mammillaria* (*M. obconella* and *M. sphacelata*) were self-pollinated and both were self-incompatible. Flowering and fruiting were observed on several other species of *Mammillaria* that were not experimentally self-pollinated. The flowers of these species were small and autogamy undoubtedly occurred since the anthers and stigma were in contact in the

Species	U.C. No.	(1)	(2)	(3)
<i>Arrojadoa penicillata</i>	61.907	4	0	SI
<i>A. rhodantha</i>	68.988	4	0	SI
<i>Borzicactus</i>				
<i>leucotrichus</i>	42.1030	1	0	SI?
<i>Copiapoa humilis</i>	68.272	2	0	SI
<i>Corryocactus</i> sp.	64.1754	1	0	SI?
<i>Echinocereus</i>				
<i>subinermis</i>	67.782	1	0	SI?
<i>Epiphyllum</i>				
<i>oxypetalum</i>	—	2	0	SI
<i>Gymnocalycium</i>				
<i>mihanovichii</i>	—	3	0	SI
<i>Islaya</i> sp.	64.1481	1	0	SI?
<i>Lobivia chrysochaete</i>	68.447	1	0	SI?
<i>L. carminantha</i>	64.617-1	1	0	SI?
<i>L. incaica</i>	64.1524	1	0	SI?
<i>Mammillaria</i>				
<i>obconella</i>	69.118	12	0	SI
<i>M. sphacelata</i>	71.745-3	1	0	SI?
<i>Matucana formosa</i>	65.761	1	1	SC?
<i>Neoporteria fusca</i>	65.983	2	0	P/SI
<i>N. gerocephala</i>	55.636	2	0	P/SI
<i>N. jussieui</i>	52.586	2	0	SI
<i>N. nigricans</i>	68.677	5	0	P/SI
<i>N. pilispina</i>	72.044	1	0	P/SI?
<i>N. reichei</i> f.				
<i>aerocarpa</i>	72.041	1	0	SI?
<i>N. taltalensis</i>	66.142	1	0	P/SI?
<i>Parodia gracilis</i>	71.049	2	0	SI
<i>P. mairanana</i>	56.011-1	1	0	SI?
<i>P. ocampo</i>	64.1381-2	3	0	SI
<i>P. yamparaenzi</i>	64.1373	1	0	SI?
<i>Rebutia grandeolata</i>	68.793	1	1	SC
<i>R. kupperiana</i>	62.1635-1	1	1	SC
<i>R. muscula</i>	72.434	1	1	SC
<i>R. pulvinosa</i>	65.985-1	5	5	SC
<i>R. violaciflora</i> var.				
<i>knuthiana</i>	72.319	1	1	SC
<i>Rhipsalis gaertneri</i>	—	4	0	SI
<i>Schlumbergera</i> x				
<i>buckleyi</i>	—	10	0	SI
<i>S. truncata</i>	—	40	0	SI
<i>Turbincarpus</i>				
<i>polaskii</i>	71.689	1	0	SI?

Table 1. Results of Self Pollinations. The number of flowers selfed and the number of fruit with seed is shown in cols. (1) and (2) respectively. Compatibility is shown in col. (3) as follows: SI, self-incompatible; SC, self-compatible; P, parthenocarpic.

flowers. Some species produced abundant fruit and seed while others produced none:

Fruit set: *M. bocasana*, *M. confusa*, *M. crucigera*, *M. geminispina*, *M. lanata*, *M. mammillaris*, *M. prolifera* and its var. *haitiensis*, *M. ruestii*, *M. tamayonsis*, *M. vaupelii*.

No fruit set: *M. brandegeei*, *M. eichlamii*, *M. mundtii*, *M. occidentalis* and its var. *monocentra*, *M. pentacantha*, *M. viperina*.

Those species setting seed are probably self-compatible (although the possibility of agamospermy cannot be excluded), and it is probable that those which flowered abundantly and did not set fruit are self-incompatible.

Disocactus ramulosus (syn. *Rhipsalis coriacea*), which has small flowers, also sets fruit autogamously (or possibly apomictically). *Frailea cataphracta* appeared to be completely cleistogamous, as it set fruit and seed without the buds ever opening.

Discussion

Self-incompatibility appears to be widespread in the family Cactaceae. Since cacti have trinucleate pollen, it is likely that the self-incompatibility system is sporophytically controlled (Brewbaker, 1957). There are, however, various other breeding systems in the family, including self-compatibility, autogamy, cleistogamy, and agamospermy. In addition, *Mammillaria dioica*, from southern California and Mexico, appears to be gynodioecious, with perfect-flowered plants and pistillate plants in natural populations. It is possible that the hermaphroditic plants are functionally staminate and the species is actually functionally dioecious.

Although cacti are not ideal experimental plants because of relatively slow growth, more detailed investigations of breeding systems in this family would be worthwhile.

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Fred R. Ganders is Assistant Professor in the Department of Botany, University of British Columbia, Vancouver, B.C., Canada. This article is reproduced with his permission from *Incompatibility Newsletter* No. 6: 5-9. 1975.

Notes and News

IOS Register of Specialist Collectors in the United Kingdom

A few copies of this list, published last year and originally available to contributors only, are available price 50p (inc. postage) from Miss J. Panter, c/o The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE.

Echeveria checklist

As part of a programme to obtain more objective data on which succulent species are rare in the wild or in cultivation (or both), checklists are being compiled of various genera, listing all the species with an assessment by experts of how rare or common they are in cultivation. The first typescript checklist, for *Echeveria*, is now available from Miss Panter, address above. Please send a stamped, self-addressed foolscap envelope if you would like a copy.

International Succulent Institute

The 1976 ISI Plant List has 17 cacti and 43 succulents on offer and can be obtained from the British Representative, Norman Wilbraham, 7 Marlborough Drive, Tytherington, Macclesfield, Cheshire SK10 2JX.

ISI was founded in 1958 and is a non-profit, independent organisation. The Directors include Myron Kimmach, Curator and Superintendent of Huntington Botanical Gardens, and Jay Dodson, Curator of succulents at the University of California, Berkeley. Myron, Jay and Norman Wilbraham are all members of IOS, and as Chairman of the IOS Conservation and Reserve Collections Committees, your editor is pleased to declare his whole-hearted support for ISI aims, especially their work of propagating and distributing new and rare succulents, properly documented with collection and cultural data. This work is a most valuable service both to the hobby and to science.

The species available this year are listed below. Prices range from \$2.50 to \$15.00, but, if these seem high, remember that your money will help to finance botanical expeditions to remote places and the cultivation and propagation of stocks of new and rare plants like those now offered:

Cacti: *Arrojadoa canudosensis* (ISI 930); **Cephalocereus** *dybowskii* (931); *C. royenii* (932); **Discocactus** *boomianus* (933); **Echinocereus** *ochoterenae* (934); **Escobaria** *rigida* (935); **Ferocactus** *rectispinus* (936); **Frailea** *horstii* (937); **Mammillaria** *elegans* var. *schmollii* (938); *M. johnstonii* (939); *M. morricalii* (940); *M. saetigera* (941); **Opuntia** *moelleri* (942); *O. rubescens* (943); **Pediocactus** *simpsonii* var. *simpsonii* (944); **Rebutia** *narvaecense* (945); **Selenicereus** *grandiflorus* (946).

Other succulents: **Aloe** *andongensis* (947); *A. descoingsii* (948); *A. peglerae* (949); *A. pillansii* (950); *A. pratensis* (951); *A.*

rubroviolacea (952); *A. sabaea* (953); *A. zebrina* (954); **Brachystelma** barberiae (955); **Caralluma** dummeri (956); *C. somalica* (957); *C. subterranea* var. *minutiflora* (958); **Ceropegia** rendallii (959); **Dioscorea** dregeana (960); **Dudleya** farinosa (961); *D. trascaeae* (962); **Echeveria** bifida (963); *E. calycosa* (964); *E. longissima* (965); **Echinopsis** montana (966); **Euphorbia** balsamifera var. *adenensis* (967); *E. esculenta* (968); *E. glochidiata* (969); *E. monacantha* (970); *E. platyclada* var. *platyclada* (971); *E. schimperi* (972); *E. uhligiana* var. *furcata* (973); *E. weberbaueri* (974); **Haworthia** fouchei (975); *H. luteorosea* (976); **Hoodia** gordonii (977); **Lewisia** cotyledon (978); **Monadenium** rhizophorum var. *stoloniferum* (979); *M. yattatum* var. *yattatum* (980); **Nerine** sarniensis (981); **Nolina** matapensis (982); x **Pachyveria** paradoxa (983); **Sarcostemma** vanlessingii (984); **Sedum** morganiatum var. or hybrid (985); **Senecio** stapelififormis subsp. *minor* (986); **Stapelianthus** insignis (987); **Stultitia** hardyi (988); **Yucca** filifera (989).

Visiting list

Few members have so far responded to the suggestion that they might welcome other enthusiasts to their collections. However, thank you to the few who did so. Please add these to the list published in the February issue:

The Chairman and his wife will welcome members at Banstead if they write in and make arrangements at least a month before the proposed date and give alternatives, as they are rather busy people!

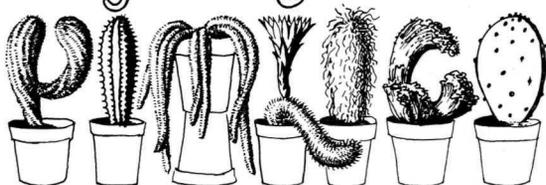
Mr. Ronald Eade, 28 Mirfield Grove, Marfleet Lane, Hull, North Humberside, HU9 4QS, will also welcome visitors to his collection. Please write or telephone (STD 0482-794809) before calling.

Mr. A. G. Westwick, 26 High Bank Road, Winhill, Burton-on-Trent, Staffs, DE15 0HX, hopes that any visitors to the 'Potteries' will find time to arrange a visit to his collection. He has been growing succulents for 25 years and has about a thousand plants.

Mr. John Peniket invites any members thereabouts to an Open Day at his home, 76 Pottery Road, Oldbury, Warley, West Midlands (STD 021 422 6245) on Sunday, 22nd August from 3 p.m. Please let him know in good time if you intend to come; he will also welcome visitors at other times with prior arrangement.

As noted in previous years our Members' Group in Guernsey always welcome visitors if you contact them beforehand. The Publicity Officer will supply an address to contact. There are some fine collections to see on the Island and anyone going over for holidays should certainly find time to visit some of them.

see you on June 12 at



Society Sales

If you are holding a Show or display make sure you have sufficient Society goods available in good time. Please remember you can also have back numbers of Journals and packets of seed on a sale or return basis.

Binders for 3 volumes of Journal—£1 plus 30p postage (Overseas £2 post paid)

Booklets—15p plus 10p postage

Badges—45p plus 7p postage - 10 for £4.75 (including postage)

Ties (Navy)—£1 plus 10p postage

Car Stickers—17p plus 8p postage - 10 for £1.65

Ball point pens (red, blue, green, black)—5p each - 10 for 45p (60p with postage)

Key Fobs (varying colours)—10p each - 10 for 95p (postage 10p)

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

Reflections

by Arthur Boarder

The other day I was looking through some old journals of our Society and came across an article entitled "*On Temperatures*", published in Vol. 2, No. 1, dated September, 1933. One could expect that I could have changed my mind considerably after a period of forty-three years, but what I had written then would be equally relevant today. The amount of cold which most cacti can stand under certain conditions is very surprising and I have up-to-date proof of this.

Many members may remember that I had to part with my large collection of cacti and other succulents before I moved to my present address. However I took with me a few seedlings which were not large enough for disposal. I moved to a bungalow in Polegate in August, 1974. I have no greenhouse now but there is a so-called 'Sun Lounge' at the rear. This is facing directly north and so only gets any sunshine in the summer months when the sun is high enough to shine in mornings and late afternoons. I have no heating whatever in this conservatory and there are large panes of glass which can let in a lot of cold. The first winter was fairly mild but this last one, 1975-6, has been much colder. On the night of 16 December 1975 the temperature in the conservatory fell to -4°C (24°F). During January, 1976, there was a sharp frost on about ten days, when the temperature in the cacti house fell to several degrees of frost.

The young plants I have appear to have come to no harm but of course they have not been watered since the end of October last. Another point worth mentioning is that no sun enters the conservatory during the winter and so there is no fear of frosted plants being

adversely affected by sunshine on frozen cells. My present small collection consists of about twenty species of *Mammillaria*; 40 species of *Lithops*, a *Conophytum*, three *Euphorbia obesa*, a *Dioscorea elephantipes*, an *Epiphyllum* and my seventy-one year old *Echinopsis*. Most of the Mams have flowered and twenty of the *Lithops*, although they are only mostly two-headed.

One plant may be considered a casualty although it appears to have plenty of life as yet. This is a small plant of the Christmas Cactus which I struck last year. It has about twenty very lush stems, bright green, and every stem has dropped off at the joints. Although all these stems are lying on the top of the pot, they are still very green and quite firm. I would have expected to have found them all mushy. They appear to be able to throw out roots as soon as it gets a bit warmer, and so I suppose that they cannot be described as a casualty.

Succulent Snippets

Well, here I am again; I have not got the axe as yet! With our previous Editor I was careful to avoid entomological terms in case I boomed, but it is going to be rather more difficult now we have a botanist wielding the blue pencil! I must keep all my reference books at hand and mind my P's and Kew's!

Pull yer socks up, pommies

Actually, I have been reading overseas journals rather than reference books lately and it really puts us British members to shame when you see the enthusiasm in Australia and New Zealand, for example. They think nothing of a fifty to a hundred miles round trip to a Branch meeting once a month and when it comes to a show, display or even an Annual General Meeting, judging by reports, some members even fly in to be sure of not missing it and many travel a day or so's journey. Perhaps it will make some of our members think again about supporting Society activities. The Pimlico show on 12 June, for instance. For some of you the Saturday morning trip to Pimlico would be a mere hour to hour-and-a-half's journey and well worth the effort to try your plants against members in other parts of the country; or, if you are further afield, how about a cheap-day train journey to see the Show and see some other London sights as well? Is it too much to hope that every one of our Branches will be represented?

Branch-lines

Talking of Branches, why don't more send news of their activities? The officers' meetings at Westminster have

helped Branches around London to exchange ideas, but reports in the Journal would put everyone in the know. In North Surrey, for instance, I hear the 'Cactus Ladies' Coffee Mornings' have now graduated to lunches. What a good idea! More time to chat and no desperate rush to get away afterwards; moreover, the earlier you arrive the more time you have to see the hostess's plants. They had better be careful about the new Sex Discrimination Laws though, lest the Cactus Gents plead malnutrition. 'Cactus Persons' doesn't sound too good so they will probably have to cut out sex altogether and call them 'Cactus Lunches'! Even this is liable to misinterpretation of course. Hopeful participants may think they will be having *Opuntia*-pad soup, *Cereus* slices or even the cactus candy mentioned last time! I must admit I have felt like jazzing-up our Dinner menus in this way—how about some more bright ideas on that line?

Trade descriptions

On a more serious note, have you noticed that many of the commercial seedsmen seem to be trying it on with Mixed Cactus Seed? One packet I saw was clearly marked 'Cactus Mixed' but showed an *Aloe* amongst the pictures on the front. The comment on another packet was 'Grow these as you would ordinary flower seeds and you will have success'—but in a rather long time, I think, which was perhaps the meaning implied in what I consider the prize vague statement of the year: 'Most of these will flower when they are large enough'! The big 'when' and, for that matter, 'IF' . . .

Hard graft

Supporters of grafting seem to be more numerous and vociferous of late. Although I am the sort of person who prefers a challenge, and will therefore go on trying to grow the more difficult plants on their own roots, I readily admit that grafting provides the means for the relatively rapid propagation of less common species. In this respect therefore it has my blessing as a means for helping conservation. However, so far as the alleged advantage of easy growth is concerned, there appear to be exceptions when it comes to flowering. Keeping my ear to the ground, I gather that most plants of *Ortegocactus macdougalii* which have flowered, and quite a number did so in the summer of 1975, are on their own roots. Likewise with *M. dodsonii* and *M. deherdtiana*, although these certainly grow more vigorously when grafted. Maybe I shall have all the pro-grafting fraternity rising in retaliation, but anything that forces members to reply must be for the good of us all!

Sally Cornioides

(ANYTHING? Well, almost . . . but on this occasion we will preserve Sally's diplomatic immunity and insist that retaliators use pens and not pruning knives—Ed.)



It came in an oblong cardboard box. Just nine inches of it, brutally truncated at both ends and, not unreasonably in the circumstances, tinged livid-purple, of the hue peculiar to Anglo-Indian colonels faced with an in-subordinate subordinate. After all, Cacti are a sensitive and prickly people.

Fortunately, a very few pathetic roots were there to distinguish bottom from top, otherwise poor *Selenicerous* might have suffered the final humiliation of being plunged, like an Ostrich, head-first into the sand. Plunged is hardly the word: it was potted as tenderly as a year-old child, in the prescribed compost, sharp sand, a little charcoal, some fibrous loam, a sprinkling of peat, with a smattering of the other carefully chosen trace elements. But the livid hue indicated an essentially sulky nature; warmth, sunlight and fresh (sun-warmed) rain-water made no difference; for some months it just sat, and sat, and sat, to the chagrin of its owner, and to the delight of all mockers, who kept up a dreary round of uncalled-for comments on its uncompromising ugliness. Then, in late August, it got going. No, not in a wild, dramatic, unbalanced way. Just a few more inches of polygonal monotony, and then a long, winter hibernation.

At this rate, I thought, I'll never live to see the day. Why did I not think of *Selenicerous* in my salad days—not that anyone would think of *Selenicerous* and salad.

It survived a mild winter in an inadequately heated greenhouse, turning gradually from vinous-purple to a chilled and sorrowful blue. Then, with the spring, it shot into action, making yard upon yard of growth as the summer advanced, to the alarm and distress of those who had erstwhile been content to scoff. It came through another mild winter, and sprang into action with even greater vigour during the ensuing summer. I began to think the house was too small, and that I had been over-hasty in acquiring such a lusty, serpentine, dangerous-looking pet. The scoffers were now conspicuous by their absence. I reflected on those who unthinkingly adopt baby crocodiles and tiger kittens. Perhaps it would be too much for me, in the end; perhaps there were more positive reasons why I should *not live* to see it *do its stuff*.

In the autumn it subsided into the now familiar lethargy, and I was, frankly, rather relieved. What would happen next spring? That was my secret worry.

With the spring, something queer happened. It did not shoot out its barbed throttlers. It quietly went about producing two little furry bumps, which very slowly

and modestly, and almost bashfully, grew larger and more rotund, their delicate condition concealed under a maternity dress of long, soft, white, springy hairs. July had come and gone before a small, sharp, brown beak poked out of this fuzz, and even then two weeks were to pass before pleasure began to give way to panic. Would it flower during the weekend when I could see it? Would I have to apply for special leave, and if so on what grounds? Could I rely upon unskilled informants to keep me properly posted? All these and a hundred other anxieties gave me sleepless nights and agitated, fretful days.

I was right. My informants *were* unskilled and unreliable. Flower I, programmed to open on Friday night, opened on Wednesday, and was just a sodden mass of tearful over-indulgence when I returned home. But the mockers were now ecstatic, and aggravated my irritation with their silly superlatives, and gross hyperbole. It was "fantastic", "weird", "wonderful", "amazing", "unbelievable", "heavenly", etc. etc. It was now my turn to retire into a livid sulk.

However, the gods are never consistently cruel. Flower II opened on a calm, warm *Friday* night about a week later. Of course, the scoffers said it was not as fine as Flower I. But that was to be expected. It was already at bursting point when I arrived at 8 p.m. and was fully expanded an hour later. One could almost see (and hear) the petals gradually spread and reflex. First the dark tawny outer ones, then the paler inner, and last the glorious silky, feather-like perfection of the central. And the fragrance! It was fantastic, weird, wonderful, amazing, unbelievable, heavenly, etc. etc., and well worth the years of unhopeful waiting.

In the morning Flower II was a sodden mass of debauchery. How long will I wait for flowers III, IV, V and VI? I don't know. I don't care. I have seen it! *I have lived!* And, incidentally, that wonderful vanilla smell comes not from the central purity of the flower, as with the Lily, but from those strange, dark, tawny, reflexed, outer appendages.

Endymion

BACK NUMBERS of the Journal are obtainable from Mr. A. W. Heathcote, Southwold, Station Road, Bishopstone, Seaford, Sussex BN25 2RB, price:

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Report of the Council for the year ended 31st December 1975

It has been the custom over the last few years to start Council's Report with a few paragraphs of what Council hopes is food for thought and this year is no exception.

Despite what was said last year about attendance at Westminster the trend is still a downward one of about 15%.

Surely what is needed in this Society more than anything is more Branches. When an enquiry is received from a potential member if it can be said that there is a branch in the reasonable vicinity the chances of securing that person as a member are considerably increased. Birmingham, Kent, Sussex and the West Country are surely areas which could start the ball rolling.

The programme for the year at Westminster was well balanced and varied and included several new names among the speakers including Dr. P. Brandham and Keith Marlow; other speakers were David Hunt, J. D. Donald, Bill Keen, Bill Stevens, John Pilbeam, Mrs. Stillwell and the Chairman. Another innovation was a slide competition at the December meeting with Miss E. Drage acting as Judge. It is hoped that this will be repeated in future years.

The Chelsea exhibit—this year the work of the Essex Branch—was certainly a novelty and caused much comment both from the public and cactophiles in general. The exhibit gained the Society a well-deserved Silver Flora Medal and received a complimentary reference in the R.H.S. Journal.

Membership continues to increase and Council are particularly pleased by the number of members joining the Society this year either at or as a direct result of our exhibit at Chelsea.

Inflation has struck at the Society as it has everything else and some sympathy must be felt for our new treasurer—Dr. Rolfe—in his unenviable position of having to raise the subscription rate for 1976 in his first year of office. Increases have had to be made in the rates for advertisements in the Journal and in the price of most of the Society's sales goods.

Miss Sullivan has proved an able distributor of the Society's seeds and the total value of seeds sold this year was £83.65.

There was a slight fall in the attendance at this year's Annual Dinner which was rather disappointing for the organiser—Mr. R. H. I. Read—since Council were already aware that this was the last annual dinner for which the Secretary wished to be responsible. However it was a successful evening and Peter Ashby's films were much appreciated.

Another major change was the June Show which was held this year on a Saturday at the St. Saviour's Church Hall, Pimlico. This proved a great success and as the number of entries showed a marked improvement on previous years the event is to be repeated in 1976.

Council expresses a warm welcome to its new Vice-Presidents—Messrs. Harry Auger and Jack Taylor, and offers them congratulations on their appointments.

Likewise David Hunt is warmly welcomed to the Editorial Chair and Council wishes to extend to the retiring Editor—Dr. W. V. Harris, OBE, DSc—its sincere appreciation for all the work which he has put in for the Society and its journal over the five years during which he has held the position.

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

R. H. I. Read
(Honorary Secretary)

TREASURER'S REPORT

Any set of accounts reflect more than just the flow of money from different sources of income towards various items of expenditure; they reflect the Society's activities for the year. Thus the increased sundry sales and purchases are partly a result of a change in show activities. However we must bear in mind when interpreting our accounts that they are cash only. Expenses which arose during the year, for example the cost of the Annual Dinner (£175.50), are not revealed because the invoices were not presented until January 1976. I should add here that as a result of the kind donation by Mrs Shurly the annual dinner made a small profit but the smaller attendance led directly to the smaller receipts.

Subscriptions for the year increased slightly to about £1,162 as against £1,124 for 1974; as the fees were the same for both years we can safely deduce that there has been an increase in membership. The unfortunate effects of inflation are reflected, there was a 23% increase in printing and almost 75% increase in postal costs. Some reduction in costs and improvement in service should accrue however by the removal of sale items from membership forms and having only one person handling sales.

Apart from keeping the books, a second, but I believe more important aspect of a treasurer's job, is to anticipate future costs. This is especially so in the case of specialist societies such as our own which have no other assets apart from the goodwill of its members, cannot depend on loans to tide them over and rely solely on subscriptions to meet their main expenses. In our case the main expenses are the printing and postal costs of the Journal and general postage; most other Society

Shows and Meetings, May - August

Chelsea Show, 25-28 May

Staged by the Royal Horticultural Society in the Grounds of the Royal Hospital, Chelsea, London, S.W.3.

Opening Times: 25 May (Private View) 8.30 a.m.-8 p.m.
26-7 May 8.30 a.m.-8 p.m.
28 May 8.30 a.m.-5 p.m.

The Society has been allocated Stand number 83. Those who have volunteered as stewards please report there five minutes before you are due to start your 'stint'. All rotas should be available by the beginning of May but any further help is always welcome so if you come along to the Show and see the stand is short-staffed or a steward flagging, do not hesitate to give a hand if only for half-an-hour or so. Please wear your badge.

Enquiries to the Publicity Officer, Betty Maddams, 26 Glenfield Road, Banstead, Surrey, tel. no. Banstead (London code 25; STD 073 73) 54036.

Pimlico Show, 12 June

Full details of the Schedule and arrangements were given in the February issue but please apply for your entry form and Schedule (with SAE for reply) to Mrs. Hodgson straight away if you have not done so already. Assistance is needed to prepare the hall from 8 p.m. onwards on Friday, 11 August, and early on the Saturday morning as well as stewarding and helping with refreshments at the Show and clearing afterwards. The Show opens at 2 p.m., the Prize Draw and Presentation of Awards takes place at 5.30 p.m. and the Show closes at 6 p.m. If you can help in any way or would like tickets for the Prize Draw, please contact the Publicity Officer.

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Forthcoming meetings at Westminster

Wednesdays at 6 for 6.30 p.m. at the Royal Horticultural Society's New Hall, Greycoat Street, S.W.1.:

- | | |
|-----------|---|
| 5 May | Plant Auction (Bring & Buy) |
| 2 June | Succulent Climbers and Trailers (Betty Maddams) |
| 14 July | Baja California (Doug Rowland) |
| 11 August | Large-flowered Mammillarias (Mrs. Hodgson) |

Branch Meetings

Branch Secretaries are listed on the inside front cover.

Northern Counties. Social Service Centre, Park Road, Whitley Bay. 3rd Monday in month, 7.30 p.m.

Wirral. 'The Grange', Grove Road, Wallasey. 3rd Thursday in month, 8 p.m.

North Staffs. Contact Mr. J. Wilson, 5 Monkton Close, Dresden, Longton, Stoke-on-Trent, ST3 4BG.

Berks and Bucks. Allotment Holders New Hall, St. Leonards Road, Windsor. 2nd Tuesday in month, 7.30 p.m.

Herts. Friends Meeting House, Upper Latimore Road, St. Albans. Contact Branch Secretary.

Hatfield & District. Hatfield Congregational Church Hall, St. Albans Road East, Hatfield. 4th Monday in month, 7.30 p.m.

Please note that the time of meetings is incorrectly given on the 1976 Membership card.

North London. Capel Manor Primary School, Enfield. 3rd Friday in month, 7.30 p.m.

Essex. Room A3 (film room), Little Ilford Comprehensive School, Church Road, Manor Park, E.12. 1st Saturday in month. 7.30 p.m.

- | | |
|----------|-----------------------------------|
| 1 May | Slide Competition |
| 8 May | Annual Show (East Ham Town Hall) |
| 5 June | Show discussion and plant auction |
| 3 July | To be arranged |
| 7 August | Gymnocalycium Study Evening |

North Surrey. Adult School, Benhill Avenue, Sutton. 1st Tuesday in month. 7.45 p.m.

- | | |
|-------|---|
| 4 May | Murder in the Greenhouse (Dennis O'Neill) |
|-------|---|

- | | |
|--------|--|
| 1 June | Branch Competition |
| 6 July | Mesembryanthemums I grow (Betty Maddams) |

3 August My favourite plants (Mollie Leach)
As usual, the Branch will be holding its Show in conjunction with the Carshalton Show on Saturday, 4 September, at Carshalton Park. Schedules will be available from the Branch Secretary, Dr. T. C. Smale, 28 St. Leonards Road, Epsom Downs. There are about forty classes including Open, Novices and Juniors.

East Surrey. Community Centre, High Street, Caterham. 3rd Tuesday in month, 7.45 p.m.

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The Cactus and Succulent Journal of Great Britain

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Albert Buining

After a year's illness, Mr. A. F. H. Buining, the Dutch specialist on South American cacti, died on 9 May at the age of 74. We send our sincere sympathy to his widow, who writes that her husband tried as much as possible during his illness to complete the papers recording the results of his botanical expeditions. He felt very sorry that his condition in the last period of his life prevented him completing the work to which he was so devoted.

Chelsea exhibit wins Flora medal

This year the Society was allotted a side stand at the Chelsea Show, on which were amassed many plants supplied by fifteen members of North Surrey Branch. Peat and artificial rocks were used to form a slope, and a row of bark slabs laid at the top to make a ledge the width of the stand. *Rhipsalis* and other epiphytic cacti hung down over the bark ledge with a large flowering *Epiphyllum* as the focal point. Plants around and amongst the rocks included Mammillarias, Ferocacti, Aeoniums and Echeverias, and there was an eye-catching specimen of *Echinocereus subinermis*. It was a colourful display with almost every plant in flower or bud. The whole effect was very pleasing and the stand was awarded the Flora Silver Medal.

As always, a great deal of hard work went into the preparation and supervision of the stand for the five days of Chelsea week. The Society's grateful thanks are extended to those who lent their plants and to the enthusiastic band of helpers for their time and effort which was given so willingly to make the stand the success it was.

Pimlico Show

This too was a success, with entries and attendance up on last year. Full results in the next issue.

Editor's long drive in Europe

Covering over 4,000 miles in all, your editor visited many well-known collectors and collections in West Germany, Austria, Hungary, Poland and Switzerland in May and June. The visits to Hungary and Poland were arranged at the invitation of IOS members Peter Kern and Zofia Kabiesz, Presidents of their respective national societies, who send greetings to all their friends in Britain. The Second International Cactus and Succulent Exhibition was one of the many attractions of a great festival in the Silesian Park of Culture near Katowice, Poland, marking the 25th anniversary of the Park and the 10th anniversary of the Polish Cactus Lovers Society. At one of the symposia organized by Mrs. Kabiesz in connection with the exhibition, your editor was one of the speakers, along with IOS Secretary Dr. Heimo Friedrich (Austria) and Dieter Supthut, Director of the City Succulent Collection, Zurich. The audience included visitors from Czechoslovakia and East Germany as well as members of the Polish Society.

Defining Genera and Species

Topics for the IOS British Section symposium at Kew last March were chosen to illustrate the theme of the meeting from a wide cross-section of the succulent plant world. Four of the contributions are printed on pp. 53–66 of this issue. Two are on the problems of the genus and two on the species. The five other papers will appear later.

Seasonal Cactus Care

by W. F. & B. Maddams

Throughout this series of articles we have tried to emphasise that sound basic cultural principles are the cornerstone for success in growing cacti. Most experienced growers, although having their own particular tricks of the trade, follow the same set of tenets. Having said this we realise that there are factors which are largely out of the control of us all and foremost among these is the weather and its effects on flowering. Many plants adapt very well to the unpredictable and sometimes very meagre levels of sunshine in the early spring, and also late in the year, and flower without fail. Others are more temperamental and only give of their best if there are prolonged periods of sunshine in March and October. One that comes to mind so far as the autumn is concerned is *Mammillaria solisioides*, of which we have long experience. Although this is really a spring-flowering species it always buds up again in late September to early October. In an average autumn very few of these buds mature but in the occasional Indian summer we have had a fine show of blooms.

We have also observed interesting behaviour in two plants of *M. microhelix* in the spring. Both of these reside on the floor of our larger greenhouse, which has glass to ground level. The light is less intense than at staging level and although we flower many plants sited on the floor the two plants in question are borderline cases. This year they are well in bud at the time of writing, early in May, as a result of the ample sunshine; in 1975, when the conditions were less favourable, flowers were lacking. Members whose greenhouses unavoidably are in shaded positions may therefore find problems in flowering these marginal species.

Die-back

It must also be admitted that there are some factors which are not understood at present and we have recently had two examples of this in our collection. They both concern the die-back of relatively large and well-established Cerei from the tips of the stems. In one case the plant was *Cleistocactus* 'Palhuaya', one of Ritter's novelties. This grew vigorously for some years and then, one winter, die-back from the top began. It spread downwards for three-quarters of the length of the stem. The following summer an offset appeared near the top of the healthy portion and a good new stem about two feet in length developed over the next three or four years. Last winter die-back on this started and, presumably, the process will be repeated. We also had die-back with a rather fine, striking specimen of another of Ritter's introductions, *Lasiocereus rupicolus*. This has happened within the last month or two and it remains to be seen how far it spreads and if the plant offsets. These two plants, in common with our other

cacti, are kept at a minimum temperature of 7°C (45°F) so the trouble is certainly not the result of cold conditions. They are given a little water at intervals of about a month during the winter, suggesting that dehydration is not the cause of the trouble, either.

This type of behaviour, or rather something obviously related to it, is quite well known with some of the more popular columnar Cerei. It is frequently observed in the case of *Cleistocactus straussii* that when offsets form the main head ceases to grow although it does not usually dry up. We recall the late Mr. Collings saying that the secret was to give the plants plenty of water to keep the main stems in active growth. However, we are not convinced that this is a universal, unfailing remedy. It is also rather common for the stems on *Thrixanthocereus senilis*, a delightful plant, to go dormant as offsets form. In our case the old stems have gradually turned brown and have dried off, and we shall be cutting them away when we have a few minutes to spare. The plant will then resume its former attractive appearance. We have recently resorted to surgery of this type in the case of our large plant of *Hildewintera aureispina* and in this case there is no doubt at all that the stems have a limited life. They cease to bear flowers, take on an unattractive brownish hue and finally die off. Despite these minor problems with a few of our columnar Cerei we find them a thoroughly attractive group, particularly the ones from South America, and would not be without them.

Pest Control

The months of August and September are particularly important so far as pest control is concerned. One should always be vigilant in this matter, and have the maxim 'prevention is better than cure' very much in mind, but if there has been a minor infection in the early summer and it has passed unnoticed it will have built up with the passing weeks. Paradoxically, the fact that pest control is now a good deal easier than was the case fifteen or twenty years ago, together with the fact that the general standard of cleanliness is considerably better both in nurseries and in private collections has made many cactophiles less vigilant and this is when one can be caught napping.

If one had to establish an order of villainy we would put the red spider, which is in fact a mite, at the top of the list. It is an insidious pest and, almost invariably, the damage is done before its presence is suspected. Furthermore, the brownish yellow scars which result from its activities cannot be removed and the only remedy is to wait for the plant to make healthy new growth. This can be a depressingly slow process. Hence, prevention is certainly better than cure in the case of this pest.

For quite some time azobenzene, in the form of smoke cones, was regarded as the best acaricide. However, we never found it very effective and, if anything, its value

lay in revealing unsuspected gaps in the greenhouse roof. Having lit the blue touchpaper, retired and shut the greenhouse door tightly, one was treated to the sight of the reddish fumes pouring from various points of the roof. Fortunately, the newer organophosphorus insecticides have proved more effective. The best known of these is dimethoate which is commonly compounded with malathion in the proprietary systemic insecticides. The term 'systemic' means that the material is not just a contact poison but is absorbed through the roots and circulates in the plant tissues, where it remains active for some weeks. It is therefore very much more effective than the older insecticides which were sprayed on to affected plants. Invariably, they did not touch sheltered crevices and corners which, predictably, harboured colonies of undesirable residents. It is also convenient and a good deal safer to water in an insecticide than to spray it liberally and indiscriminately around the greenhouse.

Although dimethoate has proved very effective against red spider there are clear signs that this pest is building up a resistance to it. It is therefore good practice to use an alternative from time to time and, fortunately, such materials are now becoming available. Three that have been recommended in a recent article in 'The Garden', *The Journal of the Royal Horticultural Society*, are diazinon, fenitrothion and pirimiphos methyl; all are available as commercial preparations. There also seems to be good evidence that something as simple and universal as water can be used as a deterrent; red spider prefers a dry atmosphere and if a greenhouse is generally damped down once a day during hot, dry spells the humidity will, to some extent, act as a deterrent.

By our reckoning the second most dangerous pest is the sciara fly, the larvae of which can devastate pans of seedlings in a short space of time. They have voracious appetites and will eat out the soft interiors on young plants up to an inch in diameter. All too often the trouble is not apparent until the hollow shells collapse. The larvae, a few millimetres in length, are almost transparent and are difficult to detect but if the small flies are seen running rapidly around preventive measures should be taken without delay. Pyrethrum, which is readily available and is not toxic, seems to be the best means of control. As the sciara fly seems particularly fond of peat it has been rather more prevalent since soilless composts came into general use and when these are used for propagation from seed, regular treatment with pyrethrum at intervals of a few weeks is recommended.

We do not regard mealy-bug as a particularly obnoxious pest, not least because its presence is readily apparent at an early stage. It is not difficult to pick a small number of bugs off plants but, almost immediately, there will be eggs hidden by axillary wool or secreted in crevices to initiate a new cycle of infection. Hence,

treatment with one of the proprietary systemic insecticides is recommended and, as yet, there are no obvious signs of a resistance developing. Root mealy-bug, which manifests itself as bluish white patches in the soil and on the roots, is usually only encountered when a plant has not been repotted for two or three years. A few crystals of paradichlorobenzene in the bottom of each pot will certainly act as a deterrent but if there is an attack the treatment advocated for ordinary mealy bug will prove equally effective.

It may also be opportune to give a reminder that we have suggested before. Plants that have been outside in the garden during the summer, particularly Epiphyllums and Schlumbergeras, may have garden insects in the soil or amongst the stems. It is a good plan to soak these plants in a pan of systemic insecticide to the usual strength before bringing them in again before the first frosts, to prevent these insects invading the greenhouse. It is also quite a good time to repot the Schlumbergeras so that they are supplied with good nutriment for their winter and early spring flowering.

Cultivation of Succulents

by Mrs. M. Stillwell

Showing Mesems

With many of the autumn shows soon to take place, it gives us a chance to let the general public see our plants, and to realise that here is something different from the usual run of plants. The stemless mesembryanthemums will be at their best and a good classified display will be a valuable contribution to any show. I have always stressed that plants such as Conophytums and Lithops, etc., should not be on the schedules of the earlier shows, when the plants are resting. They will naturally look far from the good condition expected in a show, and therefore unfair on any judge, but it still happens quite frequently. The unfortunate plants are then forced on, totally out of character, in the effort to get them into what the owner seems to think is show condition, but in fact risking losing several plants.

I like to see all the dead skins removed and a light top dressing to show the plants to advantage. One should avoid the lush green look of over-feeding and concentrate on a good firm colourful texture by only watering when the plant really needs it, and forget the daily routine habit. If in doubt, leave without, as the saying goes. I still think some of the best mesems I have seen are those grown in clay pots, and in a good, coarse, very gritty compost. Break up and re-root all plants that have got past their prime and developed ugly woody stems that give the appearance of large gaps between the heads. Cut back to the fresh green stem, and such things as *Pleiospilos*, *Faucaria*, bilobed Conophytums, *Fenestrarias*, etc., will soon root up if the operation is



Pleiospilos simulans (photo: Margaret Martin).

performed just at the beginning of the growing season, which must be ascertained, as they vary considerably.

Haworthia hints

September is the best month for repotting and dividing Haworthias, as at this time the new thick white roots are just coming through. While I like to keep a sample of most of the commoner ones I can see no point in large pots of these, and when endeavouring to find more space I remove a lot of the offsets and in many cases keep just the one large head. Given fresh compost it soon increases again. I grow mine on trays of sand under the staging together with the smaller growing Aloes and selected plants among the Gasterias. Aloes, by the way, do not like certain insecticides, particularly systemics and malathion, as I found when some accidentally ran on to the leaves from a shelf above and caused large black patches to appear.

Haworthia truncata and *H. maughanii*, and other slow-growing choicer species should have a layer of coarse sand or grit around the neck of the plant, so that only the actual roots are in the compost. This prevents any over-watering causing damage. The same applies to the *bolusii* and *setata* groups which often have a habit of losing their roots completely, which slows up growth till the new ones appear. In this case one must repot and remove all the dead roots, and place the rosette on a good layer of sand until it has firmly rooted again. Avoid too much water, but give a fine mist spray.

Caring for stapeliads

Stapeliads are at their best in the autumn and for plenty of flowers should be given ample strong light and not put under the staging, where they make a lot of growth but are more likely to succumb during the winter than those hardened off with a reasonable amount of sunshine. Good healthy plants are seldom attacked by disease but often one gets troubled with mildew and what is commonly called 'black rot'. This should be cut away at once as it spreads very quickly. Again, a good open compost is necessary. A mixture that suits them well is one-third John Innes, one-third sharp sand and one-third Levingtons. Water from the base at all times. Species which come from nearer the equator will of course need extra warmth in the winter.

Book Review

R. T. Clausen. *Sedum of North America north of the Mexican Plateau.* 742 pp. with 102 half-tones, 60 line-drawings, 22 maps. Cornell University Press, Ithaca, and London, 1976. Price £42.25.

Although the declared purpose of this book is to provide information 'for the many people who grow the plants for ornament' as well as those who use them in experiments, its very high price seems likely to restrict its circulation, at least in Britain, to the most serious of collectors, whether of stonecrops or of succulent literature. With over 740 pages and despite relatively non-technical language, it is a heavyweight among monographs, covering only the 30 species that are native to the USA and Canada, plus a few naturalised and allied species. There are all the usual ingredients and decorations of a scholarly and comprehensive monograph, and much analytical and statistical data. Those who have used and enjoyed R. Lloyd Praeger's handbooks on *Sempervivum* and *Sedum in Cultivation* might be forgiven for wishing that Clausen had also given us an inexpensive handbook on these lines, with his descriptions and distributional data much condensed, his identification keys and Elfriede Abbe's useful line-drawings. But the scope of Clausen's book is much wider than this. Like his earlier book *Sedum of the Trans-Mexican Volcanic Belt* (1959), it represents not only many years of work in the field, experimental garden and herbarium, using a genus with inherent advantages of easy cultivation and propagation, but a life-time's thoughtful enquiry into taxonomic methodology, techniques of sample and data-collection and hypotheses concerning the mechanisms of evolution and speciation. Judged from this point of view, it is a remarkable and valuable text, whether one is interested in *Sedum* or not.

D.R.H.

In Quest of the Genus

by Gordon Rowley

Introduction

'A group of allied species more closely related to each other than to the species of any other genus' is about as far as most taxonomists are prepared to go in defining the genus. It is assumed that we know what our basic units—species—are, and leaves open-ended the exact degree of 'alliance' or 'relation'. As with many words in common usage, everyone has a working notion of what a genus is, but no one can precisely define it. We shall hardly expect to solve problems today that baffled Linnaeus and filled two extended conferences on the genus concept in 1937 and 1952. I can only indicate some basic beliefs and areas of controversy.

Much has been said and written about the reality of genera: whether they are actual units of evolutionary divergence, or mere concepts invented to aid classification. Individual plants are real enough, but how about species and the higher categories? Linnaeus stated that 'Species and genera are always the works of nature. The varieties are often due to cultivation, but the classes and orders are partly natural and partly artificial.' (Rose, 1775, p. 234). De Candolle and Lindley considered that species alone had any real existence, and yet others, the 'nominalists' of Mayr (1968), believe that 'Our species, genera, families and orders are well known to be mere abstract terms of successive groups, formed by a synthetic operation of our mind, in order to study more conveniently such collective groups of individuals.' This quotation might be credited to the Gilmour/Walters school of the 1950's—but it is actually much earlier: Rafinesque, *Flora Telluriana* 1: 12 (1836). In many ways, it seems, the pursuit of the genus is rather like the pursuit of the Loch Ness Monster. Some people consider that it doesn't exist at all. Of those that do believe in it, each has his own idea of what it looks like. When we come to demand evidence, all that can be produced amid a plethora of rumour and speculation is a few smudgy photographs.

What does the practising taxonomist of today think? If he considers the philosophical side at all, he turns to that bible of taxonomists, Davis & Heywood (1963), to consult the excellent guidelines laid down there on p. 104. At first, it seems, the authors have a foot in both camps. They tell us that genera should be monophyletic—that is, having descent from one common ancestor. This, surely, implies some real existence: a figment of the imagination cannot have a phylogeny. We are led to imagine that at some finite time in the past two lines diverged as a result of a major mutation of some sort and the resultant populations subsequently were seen to differ so markedly as to merit recognition as two separate genera. However, a further admonition recom-

mends avoiding generic changes that would lead to too much upheaval of existing nomenclature. Nobody would dispute the soundness of this advice—indeed, we all wish that it were heeded more often—but such a compromise would be unthinkable if what we are doing is to unravel the works of Nature. It is almost like saying: 'Don't discover any new species of *Euphorbia* or *Senecio*—we have too many names already!' But overall I think there is no real contradiction here. Davis & Heywood are merely accepting that, whatever the nature of our taxonomic categories, ignorance of their past history should make us wary to avoid sweeping changes just to satisfy a hunch, especially where much renaming would result. To give one example, it is becoming increasingly clear that the genus *Eriosyce* Phil. has much in common with the *Neoporteria* complex, and some would say that the two should be united. This would be easy enough if *Eriosyce*, with few, rarely grown, species could be sunk in *Neoporteria* with over 60 mostly well-known species. Unfortunately the name *Eriosyce* (1872) has priority under the Code, so that instead all species of *Neoporteria* B. & R. (1922) would have to be recombined under *Eriosyce* (unless a case could be made out for conservation of the later name). So far nobody has had the temerity to do this. It is one fault of our otherwise admirable Linnean system of naming plants that when the classification changes the names often have to change as well.

Characters used in defining genera

Linnaeus classified genera 16 years before he classified species (1737, 1753) and founded them strictly on characters derived from the flowers and fruits. He stated (Lee, 1760, p. 140): 'There are so many genera as there are similarly constructed fructifications of distinct natural species . . . All vegetables that agree in their parts of fructification are to be put together under one genus . . . When the characteristic mark of any genus is wanting in a particular species, we should proceed with caution. *Aloe* and *Agave* had been blended until it was observed that in the latter the stamens were inserted in the corolla and not in the receptacle.' (i.e. ovary inferior rather than superior.) This precept has in general stood the test of time. It was carried to the logical extreme by Constantin Samuel Rafinesque (1836) who regarded any single minute floral difference as adequate ground for establishing a separate genus. As the most ruthless atomiser of them all, Rafinesque blessed botanical literature with some 2,700 new generic names, most of which we would be happy to forget today, but, alas, we cannot.

Davis & Heywood (1963), by contrast, maintain that vegetative characters are no less eligible for defining genera, and cite the example of Linnaeus's *Cotyledon*, now acceptably split into *Adromischus*, *Kalanchoe*, *Umbilicus*, etc. mainly on differences in habit. With the demands put upon us by numerical taxonomy to compute as many characters as possible, hardly any field of botanical inquiry has been left unexplored in the search: anatomy, cytology, biochemistry and others all being pressed into service. Ability to intergraft or intercross has also been invoked in an attempt to quantify 'affinity' between allied genera. Thus Rollins (1953) wrote: 'One would not want to unite *Gasteria* and *Aloe* on only the evidence produced by Riley (1948) that a hybrid between these genera occurs. But his evidence, plus that given by Berger (1908) showing that there are eleven hybrid-producing combinations between them, makes one doubt the validity of one of these genera'. Löve (1963) was even more emphatic, and bluntly states: 'Whereas hybridisation is possible between species of a genus, hybridisation between genera should be excluded.' Accepting Löve's view would lead to a great reduction in the number of genera in Cactaceae, Crassulaceae and Stapelieae, and make nonsense of their classification, as does over-reliance on any one character given preference over all others.

How many and how much?

Turning to mathematics as an aid to the generic concept, we find that, even if we cannot define a genus in measurable terms, we can at least compare genera on a basis of percentages of common characters. No taxonomic revision nowadays is considered complete, it seems, unless accompanied by a phenogram or phenetic diagram such as can be seen in Rowley (1967, p. 73, fig. 2) for Aloineae and Bramwell (1970, p. 51) for Sempervivoideae. In these tree-like figures, the data were fed into a computer which has been programmed to arrange the genera in clusters, beginning with the two showing the greatest percentage of characters in common and proceeding stepwise downwards to end up with clusters having least in common. But the computer is doing no more than function as a sophisticated type of adding machine: the choice of characters, weighting, programming and interpretation of results remain as subjective as ever.

Clayton (1972) made an analysis of genera in terms of their size (i.e. number of species) and 'index of diversity'. Starting off with a selection of the larger families, he showed that there was a certain common picture throughout despite the diversity of botanists and opinions regarding their classification. This uniformity at least helps to retain our faith in the system: intuition does not do too bad a job after all! In each family there is a large number of small genera and a small number of large. Fitted to a logarithmic curve, the match is good—except for an unexpectedly high number of

monotypes. Why should there be this surfeit of monotypic genera? Being no mathematician, I think I can provide the answer from psychology: the way in which the taxonomist approaches his task. When confronted by a genus that appears to be overweight, it is always easier for him to split off fragments composed of unique combinations of rare characters than to put an axe to it and divide the whole into two or three. Thus *Chamaealoe* and *Guillauminia* were segregated from the *Aloe* complex on the strength of unique floral characters. To do this demands more limited knowledge, and the 'splinter groups' can be given a satisfactory unambiguous diagnosis. To divide up the whole, however, demands knowledge of all the included species, and even then the subdivisions tend to overlap and defy simple definition. It has rightly been pointed out by Mayr (cited in *Taxon* 21: 396, 1969) that the gap separating genera is in inverse ratio to the size of the genera.

Patching and matching

While it is often impossible to say exactly what something is, it is always easier to say what it is not. The classification of flowering plants that emerged during the nineteenth century out of Linnaeus's pioneer work, despite its flaws and gaps and controversial areas, has altered but little in its major features and can be taken as the norm by which to judge our own efforts. In adding a patch to a piece of fabric, the aim is to match the pattern all around. Uniformity across the board should be our watchword. Non-uniformity shows up particularly clearly on a phenogram. It would be folly, for instance, to merge two genera having only 70% of shared characters and yet retain as separate others with 80% or more in common.

Cases of non-uniformity are not difficult to find in current systems. Table 1 represents two classifications of substantially the same North America cacti produced simultaneously by two botanists. One takes a broad Schumannian concept of the columnar cerei while accepting Britton & Rose's small segregate genera for globular cacti. The other includes all these under *Echinocactus* sensu Schumann but recognises small segregate genera for the columnar species as did Britton & Rose, Backeberg and Buxbaum. Clearly neither system is satisfactory overall because of this internal imbalance.

Another type of imbalance results from a distortion of the taxonomic hierarchy of categories. Britton & Rose made a large number of finely separated genera, but took a broad, almost Linnean concept of species, and abolished infraspecific categories (subspecies, varieties and forms) altogether. In this light Backeberg shows up favourably, since at least his genera, species and varieties were all uniformly narrow.

Close study of many groups of succulents reveals jarring inequalities in the size of units. Linnaeus's

NORTH AMERICAN CACTACEAE
AS CLASSIFIED BY

L. BENSON 1969

D. WENIGER 1970

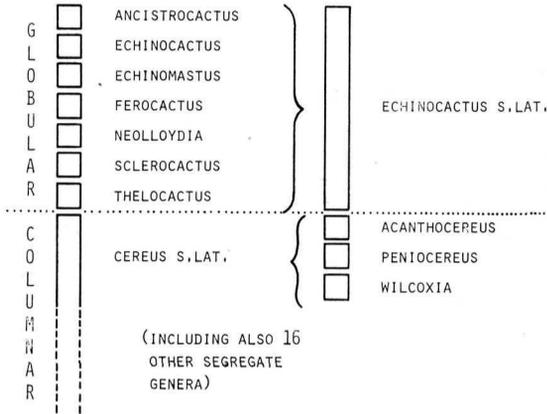


Table 1. Divergent classifications of the North American Cactaceae by Benson and Weniger.

Cotyledon has already been mentioned. In spite of the removal of the genera named, the residual species kept within *Cotyledon* s. str. still fall into two sharply defined groups—one for the shrubby species like *C. orbiculata* with persistent, decussate leaves, the other for the caudiciform species with deciduous, spiralled foliage like *C. paniculata*. Species within each group intercross freely in the wild, but there appears to be no record of a cross between the two groups. To be consistent, these two groups should be raised to generic level.

We hear much about 'splitters' and 'lumpers'; the botanists who favour many, small, narrowly circumscribed units and those who prefer few, large, broad-based taxa. If there were no more to it than merely raising every variety to species rank, every species to a section and every section to a genus, there would be no more to say than *Chacun à son goût*. However, there is more to splitting and lumping than this, since not only are nomenclatural changes involved but also taxonomic.

A good example of a group that may be said to be at the cross-roads taxonomically is the Aloineae, one of 28 tribes of Liliaceae as outlined by Hutchinson in 1959. I shall be giving a more detailed study of generic concepts in Aloineae in a separate paper, so I will present merely a summary here. As will be seen from Table 2, the Aloineae began as a single genus *Aloe* L. with nine species in 1753 and has increased today to over 350 species with two large and many small segregate genera. The pattern follows more or less that indicated for large families by Walters in 1961: the two best defined and largest segregates, *Gasteria* and *Haworthia*, were split off early, and the small splinters mostly belong to

the present century. What the figure does not show is the amount of variation still concealed within *Aloe*. Removal of small segregates like *Chamaealoe*, *Guillauminia*, etc. based on unique floral structures has merely thrown emphasis on the large number of remaining flower forms—syndromes of characters adapted to specific pollinators—that equally justify recognition (*Aloe descoingsii*, *A. compressa*, *A. bellatula* to mention but three). Which way do we turn now? Towards a multitude of small units, or back to a few (three) large ones with the variation recognised at subgeneric or sectional level? I hesitate to pass judgment yet because of the influx of new characters from many promising fields of research: anatomical studies of leaf epidermis by Cutler (1972) and Newton (1972); cytology by Brandham (1971); seed structure by Kamstra (1968) and yet unexplored fields of pollen sculpturing, biochemistry and anthecology. With new characters to work on, the picture may become a little clearer to perceive.

Epilogue

We define a genus, not by measurable parameters, but by reference to past standards in the particular group in which we are working, bearing in mind that families of great economic or horticultural interest like grasses and orchids have been more studied and more finely dissected than those of interest only to botanists. A genus lies somewhere between the extremes set by Rafinesque and Löve, and the best we can hope to do is to avoid gross inconsistencies in our chosen unit.

Theodor Just in 1953 considered that the genus is the most effective and workable of all taxonomic units. He might have added that it is probably the oldest. The names of plants preserved in the earliest folk botany are closer to genera than to any other rank in the hierarchy as seen today. As for that great circle of collectors who grow and preserve succulents with such fervour and skill, it might be noted that many, wearied by the monotony of so many near-identical species, turn to collecting genera in order to add diversity to their glasshouses.

If I were looking for a moral with which to round off this brief introduction, I think I would return to the analogy of the hunt for the Loch Ness Monster. Perhaps it is not a bad thing that we continue to peer into the waters of the loch. We may never see our monster, but we may gain a little from closer study of the reflection of ourselves.

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Year	Authority	Aloe	Haworthia	Gasteria	Astroloba	Lomatophyllum	Chamaealoe	Chortolirion	Poellnitzia	Leptaloe
1753	Linnaeus	9								
1768	Miller	23								
1789	Aiton	13								
1799	Willdenow	17								
1801	Haworth	60								
1809	Willdenow	25								
1809	Duval	—	9	6						
1811	Willdenow					1				
1812	Haworth	31	24	12						
1817	Salm-Dyck			19						
1819	Haworth	44	48	16	5					
1821	Salm-Dyck			20						
1824	Haworth						1			
1825	Sprengel	87				2				
1827	Haworth			42						
1840	Dietrich	174								
1880	Baker	86	59	45	7					
1883	Bentham & Hooker	80	59	30	7	2-3				
1888	Engler	85	59	35	7	3				
1896	Baker	—	64	46	8					
1908	Berger	182	60	44	9	3	1	4		
1926	Perrier					10				
1930	Krause	180	60	45	9	4-5	1	4		
1933	Stapf									6
1936	Poellnitz		119							
1938	Poellnitz			71						
1940	Uitewaal								1	
1951	Phillips	250	60	63	11			4		6
1950	} Reynolds	325								
1966										
1963	D. Torre & Harms	100	59	85	7	3				
1964	Engler	250	80	75	—	5				
1975	Jacobsen	359	161	76	10	14	1	4	1	

Table 2. Generic concepts in the Aloineae. Not all authorities or generic names are included, only the most important. Numbers indicate the total species recognised by each authority.

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Why Not Chilita?

by D. R. Hunt

Of the various segregates of *Mammillaria*, *Cochemia* and *Mamillopsis* are almost as widely accepted as *Coryphantha*. Objectively there is a better case for *Chilita* but this genus, briefly resurrected by Buxbaum, has gained no acceptance whatever. What governs 'public opinion' and to what extent should taxonomy be democratic?

The case for Chilita

The genus *Chilita* was proposed by Charles Russell Orcutt* in a pamphlet entitled 'Cactography' published in California in 1926. His intention was to segregate the *Mammillarias* with watery sap and black seeds from those with milky sap and brown seeds. The name *Chilita* refers to the scarlet clavate fruits, known in Mexico as 'chilitos' because they resemble small chili peppers. The type of the genus is *Mammillaria grahamii*, which is allied to *M. microcarpa*.

No one took much notice of Orcutt's idea, until Professor Buxbaum again proposed to divide *Mammillaria* on the basis of seed characters, and called the main group with black seeds *Ebnerella*. He had overlooked *Chilita* which, of course, must take priority.

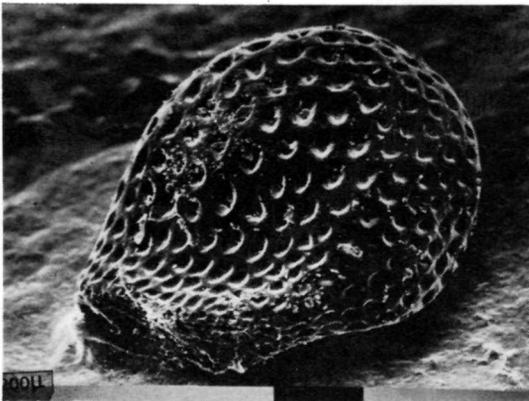


Fig. 1. Black seed of *Mammillaria dioica* (Hunt 8702). This is a *Chilita*. The pits are deep, relatively uniform in shape, and the cell-walls separating them straight. The black band below the seed is a scale-marking equivalent to 0.2 mm. (SEM photo by B. Leuenberger, courtesy of Prof. W. Rauh).

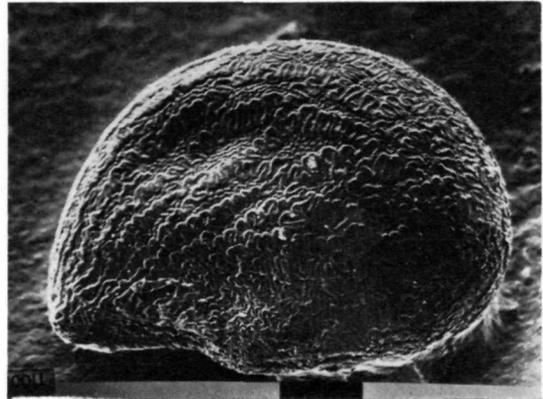


Fig. 2. Brown seed of *M. zuccariniana* (H.8536), a 'true' *Mammillaria*. The pits are shallow, the surrounding walls sinuate. (SEM photo: B. Leuenberger).

Buxbaum produced a complex hypothetical evolutionary tree for the North American *Cactaceae* which is too speculative for many of us to swallow. It is a fact, however, that the *Mammillaria* group does divide more or less down the middle on the basis of at least three characters besides seed colour.

First, there is the structure of the seed-coat wall. This is dramatically different in the black- and the brown-seeded species (figs. 1 and 2). The cells are polygonal with regular pits in the 'black' group and sinuate-walled with more or less collapsed pits in the 'brown'. Secondly there is the nature of the sap, watery in one group, milky in the other; and thirdly, hooked central spines, which are characteristic of one group but not the other. Now it would be interesting if only two of these characters were correlated, but the fact is that all four go together, with very few species breaking the rules.

On this character basis, the grounds for recognising *Chilita* as a good genus seem to me pretty strong. It would mean, for instance, that *Mammillaria nana* (fig. 3) and *M. compressa* (fig. 4) would belong to different genera, and is that so unreasonable?

But what about *Mamillopsis*, *Cochemia* and the other more widely accepted segregates like *Bartschella*, *Krainzia* and *Phellosperma*? Logically, you would think that their character-basis should be stronger than for *Chilita*. Actually, it is just a case of having odd flowers,

* For a note on Orcutt's life, see Jepson in Madroño 1: 273-4 (1929).

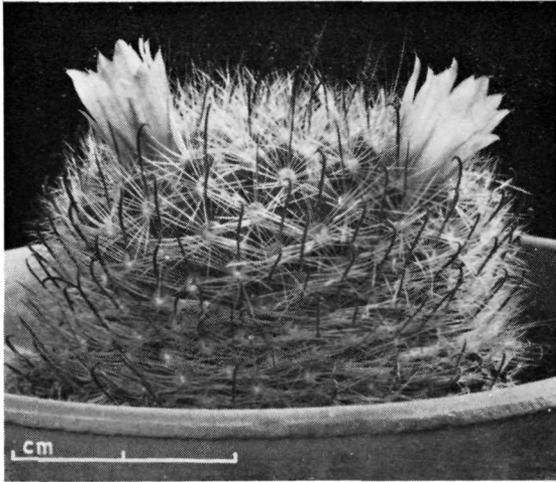


Fig. 3. *Mammillaria nana*, which is a 'Chilita'. (photo: R. Zabeau).

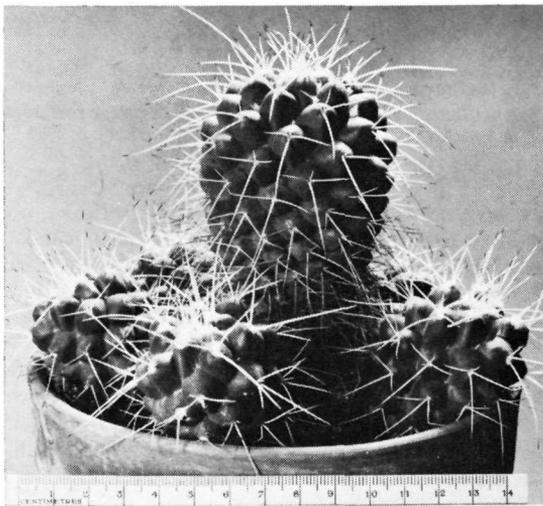


Fig. 4. *M. compressa*, a 'true' *Mammillaria*. (photo: R. Zabeau).

odd seeds, or odd fruit. All their other characters are the same as in *Chilita*, and you could think of them as just eccentric or aberrant *Chilitas*. They actually strengthen the case for separating *Chilita* and *Mammillaria*, since they appear to be more closely related to *Chilita* than *Chilita* is to *Mammillaria*.

Now if you don't like the idea of calling all the hooked-spine *Mammillarias* which have black seeds *Chilita*, but you aren't prepared to sink *Cochemiea*, the logical thing to do would be to transfer all these *Mammillarias* to *Cochemiea*, which is the oldest generic name

for *Mammillarias* with black seeds. We should then have about 100 species of *Cochemiea* instead of five and the *Mammillaria* Society could call itself *THE MAMMILLARIA AND COCHEMIEA SOCIETY!*

What governs public opinion?

Of course, I am not *seriously* expecting anyone to go home and change any labels as a result of what I have said so far. However many dyed-in-the-wool *Cochemiea* addicts there are about, I have yet to meet anyone who would accept *Chilita*. Even Buxbaum eventually retreated in face of strong opposition from Mr. Shurly and others, and seems to have burnt his fingers so badly that he subsequently left *Mammillaria* well alone.

So why is it that *Chilita* fails where *Cochemiea* and *Mamillopsis* survive? As we've seen, there is not much taxonomic logic to it. My theory is that, *however sound and objective a classification is, psychological factors will determine whether it is adopted or not*. This is what I call *psychotaxonomy*, or the taxonomy of persuasion.

Basics of psychotaxonomy

The principles are rather technical, but we ought to skim over them very briefly:

1. Old names never die

We all know that once a name, however useless, has appeared in print, every subsequent monographer has to cite it or risk being accused of falling down on the job.

2. Old habits rarely change

I notice that cactus collectors are reluctant to change names on their labels, even when they are obviously wrong. When you've been calling a plant by one name it is difficult to get used to another. At one extreme, once a *Euphorbia*, always a *Euphorbia*; and at the other, once a *Cochemiea*, always a *Cochemiea*.

3. Advertising pays

Publish your work in an elegantly bound monograph or learned journal and it will be much more highly thought of than if you print it yourself on two sheets of foolscap, which is more or less what Orcutt did.

4. Looks count most

Conspicuous features, like an odd-shaped flower, make more impression than the hidden clues that are to be found in seeds or sap, regardless of their relative taxonomic significance.

5. Eccentrics attract attention

It is simple human nature to classify by a process of elimination or purification, taking out first this and then that small group which does not quite fit with the rest. In the words of one of my colleagues, 'taxonomists have an obvious predilection for the excision of solitary

outliers, thus exposing further outliers which they are tempted to chip off next' (Clayton in Kew Bull. 29(2): 278: 1974). This way of working is epitomised by Britton & Rose's approach to the Cactaceae, where they established or recognised some 86 genera with five species or fewer, including 48 genera that were monotypic and mostly remain so. The eccentrics and oddments of the family actually account for more than two-thirds of their 124 genera.

6. Things look bigger close up

Everyone who specialises in one group tends to see its features in a different perspective from the non-specialist and workers on different aspects of the same group, such as seed morphology or cytology, are the same. They see things a bit larger than life—in more ways than one—and often over-value the characters they themselves are studying. Hence, by and large, specialists tend to be splitters.

7. Gobstoppers are hard to swallow

If you split off one or a few species from a big genus the odds are that no one will protest; but if you try to split the genus in half as Orcutt did with *Mammillaria*, no one will take any notice. Try to assemble several small genera into a larger one and no one will take any notice either. All the new names are too much of a mouthful.

8. Coalescence is catching

If you try to lump genera together you soon find, as John Donald has done with *Echinopsis*, *Lobivia* and *Rebutia*, that it is difficult to arrive at any practical way of defining the larger units. The limits of each genus become blurred by the species that don't fit conveniently into one or other of them.

Taking all the principles together, it is apparent that the dice are heavily loaded in favour of splitters (numbering as above):

1. Once proposed, a segregate can never be altogether erased from the literature; lump it with something else and it still tends to retain its identity.
2. Once established, segregates stand a good chance of survival; and in the Cactaceae splitting has been the order of the day since Britton & Rose's time.
3. Chief sources of segregate genera have been the grand monographs of Britton & Rose and Backeberg and the latter's very copious pre-monograph publications.
- 4,5. Segregates tend to gain acceptance if they have conspicuous or odd features.
6. Progress is made by specialists and specialists tend to have a narrow taxonomic perspective.
- 7,8. Both of these operate against lumping.

To see the truth of all this you have only to compare the success rate of splitters as compared with lumpers:

	Accepted
Britton & Rose (124 genera)	Yes
Backeberg (233 genera)	Yes (±)
Vaupel (26 genera)	No
Berger (41 genera)	No

Of other lumpers, Benson (who has broadened *Pediocactus*, *Coryphantha*, etc.) and Kimmach (*Borzicactus* and *Disocactus*) have made little headway with enlarged concepts of individual genera. No one takes any notice of Weniger with his back-to-Schumann approach, nor, I suspect, of Byles & Rowley and their *Pilosocereus*. *Islaya* and *Neochilenia* seem to thrive in spite of Donald & Rowley and I suspect *Trichocereus* will thrive despite Friedrich & Rowley. *Cochemia* and *Mamillopsis*, needless to say, thrive in spite of Hunt.

Going back to *Cochemia* and *Mamillopsis* for a moment, it's easy to see why they succeed where *Chilita* fails:

<i>Cochemia</i> and <i>Mamillopsis</i>	<i>Chilita</i>
Old habits . . .	Lack of seniority
Recognition by Britton & Rose	Bad PR by Orcutt and Buxbaum
Looks count most . . .	Seed characters too obscure to seem important to the layman; others too ordinary to attract attention
Eccentrics attract attention	Too much to swallow
Things look bigger . . .	

Taxonomy is a free country

The case of *Chilita* seems to me to illustrate a moral which is obvious enough in other walks of life: Ideas, and people for that matter, do not always succeed on their merits. Taxonomy is a free country, anyone can have their say, and we are free to choose whatever system of classification we prefer. To prevent anarchy there is an agreed hierarchy of categories, (genus, species, etc.) but there are few other taxonomic rules. The rules of *nomenclature* are merely there to regulate the *names* of the items we classify. For instance, under the International Code of Botanical Nomenclature, Article 19, '*Coryphanthanae*' is incorrect as the name of a subtribe; it should be *Coryphanthinae*. But the Code does not prescribe what should or should not be included in the subtribe, except *Coryphantha* of course, which is common sense.

As in all things where there are no set rules, there is a thin dividing line here between doing as you like and being anti-social. In taxonomy, research is continually throwing new light on the inter-relationships of plants

and helping to refine and improve ideas on their classification. So freedom and flexibility are needed to express the new ideas. The trouble is that frequent changes of classification (and especially poorly reasoned ones) bring instability to the names we use. Added to this, the lower the general level of the genus (the more a group is split up), the less grounds are needed to make changes and the more scope there is for difference of opinion and individual changes of mind. The results of all this can be positively anti-social and chaotic, as in the following example of generic shunting, which is by no means atypical of the *Cactaceae*, except that Backeberg's name doesn't come into it anywhere:

CEREUS luetzelbergii	Vaupel, 1923
PILOCEREUS luetzelbergii	Werdermann, 1923
CEPHALOCEREUS luetzelbergii	Borg, 1937
PILOSOCEREUS luetzelbergii	Byles & Rowley, 1957
PSEUDOPILOCEREUS luetzelbergii	Buxbaum, 1968
COLEOCEPHALOCEREUS luetzelbergii	Buxbaum, 1972

I don't suppose anyone is in favour of this sort of nonsense, and so I will stress once again my point that *the lower the general level of the genus—the more a group is split up—the less grounds are needed to make further amendments or change one's mind, and the more the scope for disagreement.* Coupled with the fact that extraneous factors favour splitting, i.e. the lowering of the generic level, I can only say . . . *Down with Splitters!*

Democracy or bureaucracy?

Despite the disadvantages of taxonomic freedom, it is difficult to see how anyone could define what constitutes its abuse, or frame rules to limit it. Taxonomists would certainly never agree amongst themselves. It is more likely that we shall gradually be forced to conform, as in other things, by the weight and inertia of creeping bureaucracy.

On one level, the age of large-scale regional floras has begun with Flora Europaea, now almost completed. This has begun to eliminate national discrepancies in the naming and classification of plants which cross political boundaries. One day we may even see a World Flora—if there is any flora left to classify. Such large scale works must eventually produce *standardisation* which will have the practical advantage of making names stable but the scientific disadvantage of making classification rigid. Standardisation is certainly desirable for horticulturists, conservationists, and all those who require names to be universally understood and permanent, but while taxonomists are arguing the bureaucrats may actually settle things for them. Those at work include our own Plant Variety Rights Office and the EEC Terminology

Bureaux, IUCN (which is listing threatened species worldwide), and the orchid growers with their system of horticultural equivalents which aims to protect them from endless name-changes.

Taxonomists ought to make the most of the inherent capacity of the system for flexibility before it is too late. This means making much more use of the intermediate categories like the subgenus, section and so on within more broadly conceived genera. Using these categories, minor changes of classification do not mean changes of name, and differences of opinion do not mean synonyms. One can always continue to use the names of minor genera in popular parlance, as we do for instance in the case of *Azalea*, which is technically a subgenus of *Rhododendron*. I maintain that the alternative of lots of small genera is already responsible for the chaos of synonyms in the Cactaceae and that when a particular set of names becomes standardised throughout the world it will impose on us a system which may or may not be positively unsatisfactory but will certainly be inflexible.

So finally back to *Mammillaria*. Within a broad concept of the genus, there is endless scope to reflect differing phylogenetic and other ideas in varying systems of subgenera, sections and series without tampering with the formal scientific names we use. I shall be the last to accept *Chilita*. But trying to be consistent and logical, I cannot accept *Cochemia* and *Mamillopsis* either. For me they remain, as they were originally proposed, subgenera, like *Azalea*.

More SEM pictures by Beat Leuenberger

Two of Dr. Leuenberger's micrographs of *Mammillaria* seeds are reproduced in the above article, and readers of the Cactus and Succulent Journal of America will already be familiar with the very high standard of his work from the article 'Testa Surface Characters of Cactaceae' published there in 1974 (Cact. Succ. J. Amer. 46: 175-180).

Dr. Leuenberger's important inaugural dissertation on the pollen morphology of the Cactaceae was published earlier this year in *Dissertationes Botanicae*, vol. 31. It has 321 pages and copious illustrations. Students of the taxonomy and phylogeny of the family will find the work invaluable.

Dr. Leuenberger has now prepared an English summary of the main results, and this will be published with over 100 SEM micrographs as the principal feature of our November issue.

Caralluma 'in vivo et in vitro'

by D. V. Field

Species problems in Caralluma are looking more complex and yet nearer resolution thanks to expanding resources of herbarium collections and live material in cultivation.

Introduction

Caralluma decaisneana and its allies provide a good example of the problems of defining Stapeliad species and the importance of material preserved in spirit and living specimens for study purposes. To the title of this talk one might almost add: *in vino veritas!*

White & Sloane (1937) in their monumental work 'Stapeliaceae' regarded *C. decaisneana* (Lem.) N. E. Br. (1892), *C. sprengeri* N. E. Br. (1895), *C. commutata* Berger (1910), *C. hesperidum* Maire (1922), *C. venosa* Maire (1931) and the imperfectly known *C. angu* (A. Rich.) N. E. Br. (1892), as separate species.

In the most recent work on this group by Bullock (1963) all these names were regarded as synonyms under *C. decaisneana*, which was treated as a single species with a wide distribution reaching from Tropical West Africa to Southern Arabia. It was stated that all the available material at Kew had been re-examined but no list of specimens seen was given and from a comment concerning a single specimen collected from Ethiopia and grown and flowered at Pretoria in 1943, I believe that we can assume no living specimens were studied.

M. G. Gilbert, who has gained a unique and detailed field experience of Stapeliads during his stay in Ethiopia, has found several plants allied to *C. decaisneana*. He has cultivated them in Addis Ababa and been able to make direct comparisons, take colour photographs and prepare voucher specimens in spirit. It has become clear to him that Bullock's treatment was inadequate. From a study of specimens received at Kew for identification, I have come to a similar conclusion. As well as Mr. Gilbert, other collectors in Africa have sent specimens and spirit material to Kew. There is obviously more than a single taxon involved but before we can decide which have to be described as new, the old treatment has to be unscrambled.

C. decaisneana

We can get a fairly good idea of the original concept of *C. decaisneana* from the figure published by Lemaire in 1844 when he first described this species as *Boucerosia decaisneana*, from which fig. 1/1-2 is copied. The original plant came from W. Africa (Senegal). Fig. 1/3

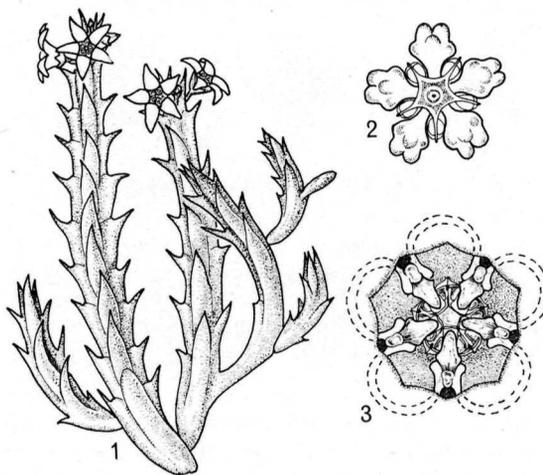


Fig. 1. *Caralluma decaisneana*. 1, habit; 2, detail of corona and gynostegium; 3, corona and gynostegium (partly obscured by corolla tube), $\times 4$. (1 and 2 after Lemaire; 3 from Robbie in Bally S.139, specimen preserved in spirit).

shows the corona in more detail drawn from a recently collected specimen.

C. sprengeri and *C. commutata*

C. sprengeri was described by N. E. Brown from a living plant sent from Eritrea and though superficially like *C. decaisneana* has a different corona. Allied to it is *C. commutata* Berger which had been misidentified as the unrelated *C. aaronis* until distinguished by Berger in 1910. Berger published comparative drawings of *C. commutata* and *C. sprengeri* and fig. 2 is a copy of some parts of these. *C. sprengeri* has a very conspicuously swollen rim to the outer corona while that in *C. commutata* is thin or more or less absent. Mr. Bally and Miss Bruce (1947) wrote an account of *C. sprengeri* accompanied by a coloured figure of a plant collected by R. J. Darvall in Sudan. A duplicate collection preserved in spirit is in the Kew Herbarium. They stated that *C. commutata* differs from *C. sprengeri* in the smaller flowers, narrower, more acute corolla lobes, larger corolla tube and rather different coronal structure. Some of these differences are rather at variance with Berger's figures. However, recent collections show considerable

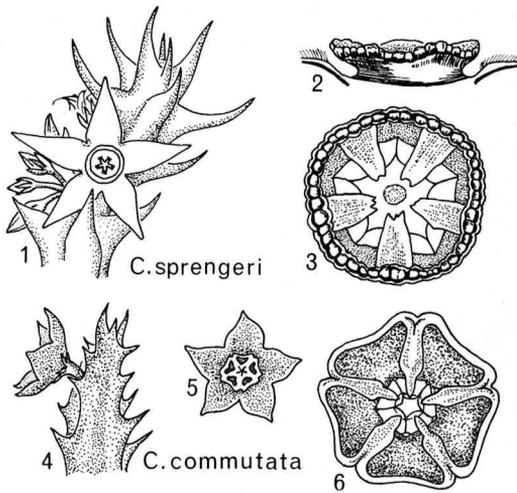


Fig. 2. 1-3, *C. sprengeri*: 1, tip of flowering shoot, $\times \frac{3}{8}$; 2, side view of corona and gynostegium, $\times 4$; 3, corona from above, $\times 4$, 4-6, *C. commutata*: 4, tip of flowering shoot, $\times \frac{3}{8}$; 5, flower, face view, $\times \frac{3}{8}$; 6, corona and gynostegium, $\times 2$. (After G. Schweinfurth in Berger).

variation in the corolla lobes. Within the broad division based on the presence or absence of the thickened outer corona there are a number of variations in structure which may be regarded as worthy of specific recognition. Mr. Gilbert considers colour and texture of the corollas and the colour of the stigmatic disk as characters which are of diagnostic significance.

C. venenosa and *C. hesperidum*

The difference between the flowers of *C. sprengeri* and *C. commutata* with fairly short corolla tubes and coronas completely obscuring it, and that of *C. venenosa* with

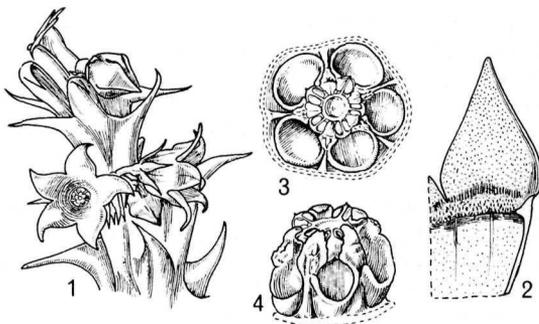


Fig. 3. *C. venenosa*. 1, flowering shoot, $\times \frac{3}{8}$; 2, corolla lobe with part of tube, $\times 2$; 3, corona and gynostegium from above with cut edge of corolla tube, $\times 2\frac{3}{8}$; 4, corona, from the side, $\times 2\frac{3}{8}$. (After S. Ross-Craig).

its longer corolla tube containing the corona are fairly obvious. A figure and a detailed account of *C. venenosa* was published by Miss E. A. Bruce (1939) emphasising these differences. Fig. 3 is a copy of part of this figure, drawn from a specimen collected by J. Robbie in the Sudan. While studying another specimen (a single flower) also collected by Robbie in the Sudan, and determined as *C. hesperidum*, I decided it was identical to *C. venenosa*. The lower part of the outer corona was hidden in the corolla tube and it reminded me of Lemaire's figure of *C. decaisneana* (fig. 1/2). In this drawing, the corona looks odd but I think that this is due to the bowl shape of the outer lobes being left out by the artist because they were obscured by the throat of the corolla tube (fig. 1/3). I believe therefore, that *C. venenosa* can be considered together with *C. hesperidum* as synonyms of *C. decaisneana*.

When a new treatment of this group of closely related species is prepared based on the increasing amount of material preserved at Kew and grown by the Living Collections Division, it will be essential that the drawings of the corolla and corona structure should be undertaken by a single artist in order to avoid apparent differences being introduced due to artistic interpretation. So it is, literally, back to the drawing board!

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David Field, M.Sc., is a Senior Scientific Officer at the Herbarium, Royal Botanic Gardens, Kew. His thesis on the anatomy of the Stapeliceae was completed in 1967. He is now working on an account of the Asclepiadaceae for the major Kew publication 'Flora of Tropical East Africa'.

Susan Carter, M.Sc. (Mrs. Holmes), is also a Senior Scientific Officer at Kew, working on a part-time basis. She has contributed accounts of several families to the 'Flora of Tropical East Africa' and is now preparing the treatment of Euphorbia and allied genera in collaboration with Dr. Peter Bally.

The Succulent Tree Euphorbias

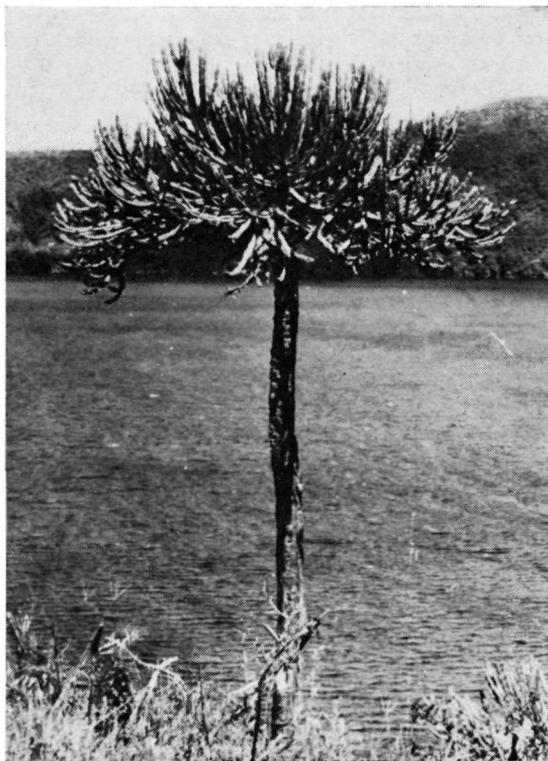
by Susan Carter

The value of field-work and photography as an aid to defining and identifying the succulent tree species of Euphorbia cannot be over-emphasised.

The problems facing the botanist who is working with the succulent species of *Euphorbia* in the herbarium, are many. We can readily appreciate that to anyone not very interested in these plants, with their copious acrid latex and often vicious spines, the collection of representative herbarium specimens accompanied by descriptive notes, can hold little appeal. Because of their succulent nature it is extremely difficult to prepare good dried specimens, so that in the herbarium the number and quality of those available often leave much to be desired. This is especially true of the tree species. As a result of such inadequacies, N. E. Brown, in the early 1900's, increased the number of trees described by Boissier as occurring in Africa from ten to nearly fifty, with all but eight of these from the tropical regions. All his information came from the specimens in front of him, from descriptions already published by other authors, and from observations made from the few living plants in Kew. Over half his descriptions were made from single specimens.

The cultivated plants created their own special problems. Berger had already described three species from his own plants in La Mortola, and after considerable correspondence and discussion, N. E. Brown added a further three. All were from individual sterile specimens (except one, at Kew, which produced some immature cymes), and all from 'a country unknown'. No account was taken of the possible effects cultivation in an alien environment might have. Such effects are admirably illustrated by the changes which occur when that familiar tree of the African scene, *Euphorbia candelabrum* Kotschy, is grown in a European hothouse. In its natural environment the branches are compact, almost square in section, with closely-set spine-shields bearing very short spines. But in cultivation, in Kew for instance, the branches become loosely arranged, often developing only three angles which are thinly winged, bearing weak widely-spaced spine-shields with long slender spines.

In the preparation of their book on the succulent species of *Euphorbia* in southern Africa, published in 1941, White, Dyer & Sloane recognised the value of extensive field-work. As a result they were able to resolve very satisfactorily the number of species occurring



Euphorbia quinquecostata. A small tree with a compact crown of narrow branches. (photo: Peter Bally).

there, supplying full descriptions with ample illustrations for their identification.

As for the tropical regions, the number of tree species from west tropical Africa appears to be small. In 1958 Keay described only two, after field investigations of his own.

In southern tropical Africa, Larry Leach has done a great deal of valuable work, all of it beginning with research in the field. He always stresses the importance he places upon working out his taxonomy in the field, and afterwards bringing specimens into the herbarium for comparison with existing material and descriptions.

But still this leaves the majority of the tree species described by N. E. Brown, numbering more than thirty, and all from eastern tropical Africa. His descriptions were as full as possible, of course, compiled from the sources available to him. All too often essential information was missing.

Since the late 1930's, Peter Bally has devoted much of his energy towards investigating the succulent species of *Euphorbia* from this region. His primary task was to collect more material of the published species, so that the many inadequate descriptions could be completed. Some of the tree species proved fairly easy to

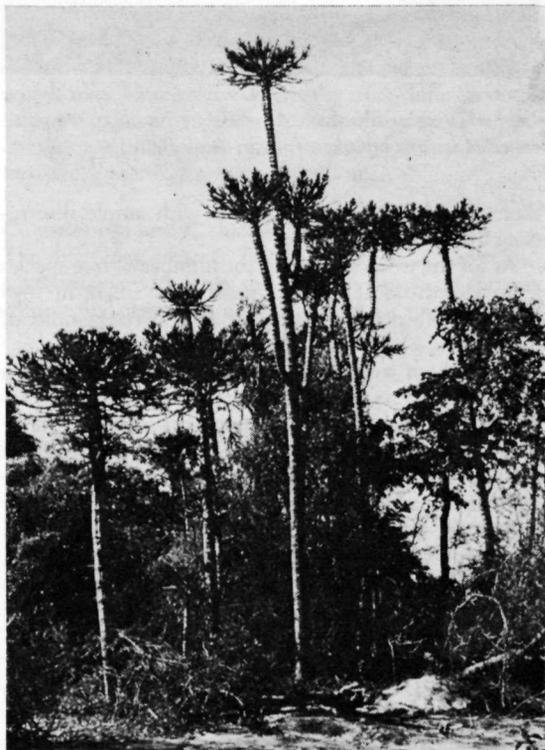
trace, for at least it was known they were trees, and also the original locality of their collection could be precisely pin-pointed.

E. quinquecostata Volkens was first collected at Lake Challa in 1893, but although quite common within a fairly small area, was not collected again until 40 years later. Now its description, originally made from a single specimen with immature flowers, can be completed.

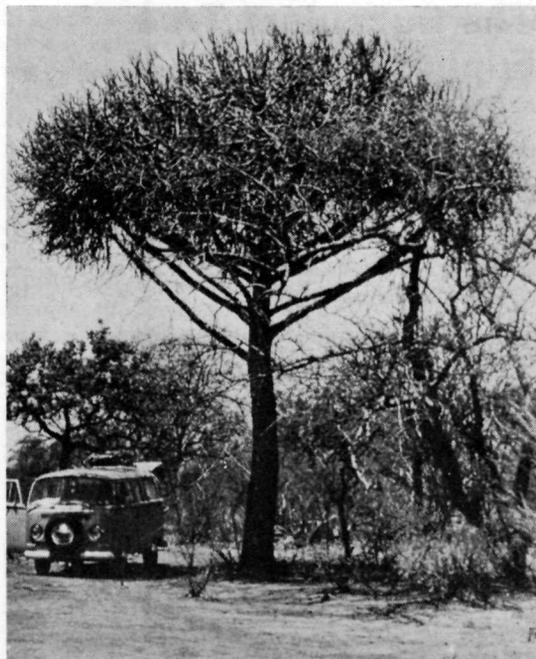
E. quadrialata Pax was first collected from Handeni in Tanzania in 1900 and described from a sterile gathering. It was not until 1948 that it was collected again, when Bally searched for, and found it, in the same locality. Since then other collections have been made and an amplified description published.

By 1899 Goetze made a sterile gathering of a tree which Pax very briefly described, giving it the invalid name *E. platycantha*. This was never seen again until only a few years ago when it was rediscovered at the same locality in the Ruaha Gorge in Tanzania. Now we have flowering material, so that a full description and a valid name can be published.

N. E. Brown's description of his species *E. wakefeldii* had been made from a single sterile specimen. It appeared to be a dwarf spiny succulent, described by him as 'a branching perennial'. Bally searched for many years for



Euphorbia quadrialata. A much taller tree with a small crown, again of narrow branches. (photo: Susan Carter).



Euphorbia robecchii. A distinctive tree with almost horizontally spreading branches. (photo: Susan Carter).

such a plant, but without success. He was not surprised, for the type locality, Ribe in Kenya, is situated in lush coastal forest, hardly the habitat for dwarf species. By chance, in 1947, not far from Ribe, he came across a stand of plants with seedlings and young plants identical with the specimen. The mystery was solved, for these belonged to trees up to 25 feet high.

Another mystery surrounded the identity of *E. robecchii*. This was first described by Pax in 1897 as being a cactus-like shrub with recurved branches bearing pairs of hooked spines. When N. E. Brown examined the specimens Pax quoted, he found that one of them consisted of a few fragments of spineless branch, which he decided must represent a distinct species. Chiovenda described *E. ruspolii*, from this and another specimen, together with a photograph of a tree, from Somalia.

In the meantime Pax had described yet another new species, *E. pimeleodendron*, a tree with spineless branches from much further south, near Taveta in Kenya. In the late 1930's Bally hunted for this tree, and when he found it was able to examine it from all stages between a seedling and a mature tree. He found that the seedlings and curving branches of young plants do, indeed, bear hooked spines as described for *E. robecchii*, but that these are completely absent from mature trees.

The largest tree species is a widely distributed one of high altitudes, *E. obovalifolia* A. Rich., which can reach

a height of 100 feet. It was one of the earliest species known from tropical Africa, being first collected in Ethiopia. Subsequently, other collections were made from widely separated localities and new species described. The most southerly of these was from the Livingstone Range of southern Tanzania. Pax described it as *E. winkleri* from a specimen collected by Goetze, together with a photograph. It is not difficult to reconcile this photograph with others of trees growing in the same region, which are certainly *E. obovalifolia*.

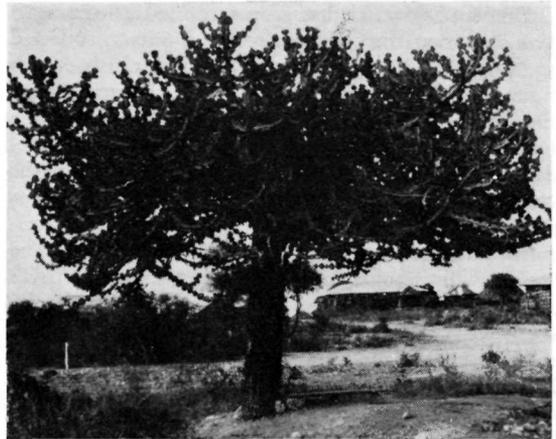
The tree had also been introduced, from Ethiopia, into cultivation, which led N. E. Brown, once again, to describe a distinct species, *E. neglecta*, from a single sterile individual growing at Kew. He distinguished it by its wide, very thin wings and large leaves. What he had was a young plant grown from a cutting. An unbranched seedling 10 feet high, in its natural environment, can have wings and leaves some six inches in dimension.

During all these field investigations, more new species were bound to be discovered. Such a one is *E. cussonioides*, described by Bally from a limited region not far from Nairobi. Like *E. obovalifolia*, it is distinctive amongst the tree species by its exceptional height, up to 80 feet.

Two new species have recently been discovered in the semi-desert area of north-eastern Kenya. A widespread shrubby species which occurs there is *E. breviarticulata* Pax, closely allied to the southern *E. grandicornis* Goeb. ex N. E. Br. Since it is a fairly common species and because of its low habit can be collected easily, it is well represented in the herbarium. But amongst more recently acquired specimens at Kew, was one describing it as a tree 20 feet high. On an expedition two years ago, a search was made for this tree and without too much difficulty it was found in several widely dispersed localities.

Another similar instance was presented by two sterile gatherings from the Kenya-Ethiopia border, collected in 1952. No real search was necessary for this tree, for it was found to be extremely common in the semi-desert of northern Kenya, occurring on almost every hill and rocky outcrop. With its narrow branches and small spines it cannot be confused with any other species.

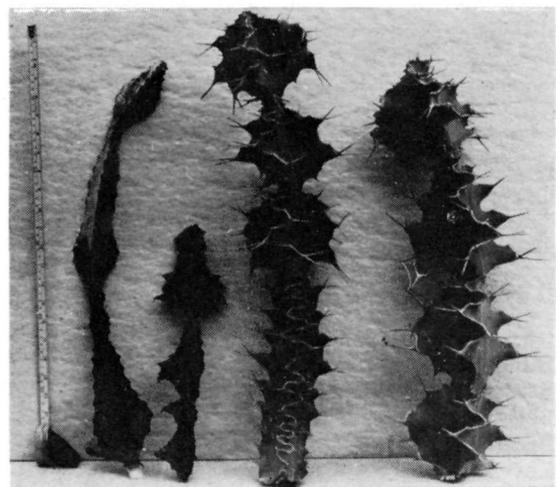
The closest relative of this species is the widespread *E. kibwezensis* N. E. Br., which extends northwards as far as these semi-desert areas. Its spinescence and segmentation of the branches are very variable, even on a single individual. This can be carried to extremes, and from investigation of populations in many localities, appears to be affected by habitat and the age of the individual. A mature tree growing in the open, or one with its crown borne above the surrounding vegetation, bears the typically segmented branches of the species. A young tree or seedling growing perhaps only a few yards away, but in thick bush, bears branches showing



Euphorbia kibwezensis. A mature tree with a tangled crown of regularly segmented branches. (photo: Peter Bally).

considerable variation in the size of its segments and spines. It is virtually impossible to prepare herbarium specimens demonstrating fully this variation, but photographs accompanying perhaps a couple of segments from a branch of a mature tree are an invaluable aid in the herbarium.

Another tree species bearing distinctively segmented branches is *E. ussanguensis* N. E. Br., discovered by Goetze in southern Tanzania. It bears a close resemblance to the South African *E. cooperi* N. E. Br. ex Berger, of which Leach has made it a variety. Its range extends northwards, within Tanzania, at higher altitudes than most of the tree species. It also shows some variation in segmentation, especially between young plants and mature trees.



E. kibwezensis. Variation in branch segmentation of young trees growing in dense bush. (photo: Peter Bally).

One species which has long remained a mystery is *E. nyikae*, described by Pax from a specimen collected at Magila, a German mission station in north-eastern Tanzania. The specimen was destroyed in Berlin during the last war, so that now all our information must come from a drawing of it, together with Pax's very brief description and some published notes made by the collector, Volkens. Unfortunately, N. E. Brown considered it to be identical with a number of other specimens, so that his description is a composite one. The species is distinguished by its mostly 2-angled branches and separated spine-shields. A search for it at the type locality has proved of no avail, for the area for many miles around Magila has long been under cultivation. However, after a great deal of searching in similar, unaffected areas not far to the south, trees answering to Pax's description and with branches matching the drawing, have been found.

A somewhat similar tree has been described by Leach as a new species from Mozambique, *E. halipedicola*. He had found it as far north as the Ruvuma River, so it was not surprising when it was discovered on the Tanzania side of the river, less than 12 months ago. It has distinctive sinuate margins to the wings of its branches, and slender spine-shields which are joined, not separate as are those of *E. nyikae*.

Undoubtedly, the most difficult species taxonomically are those related to this last group, allied to *E. kibwezensis* and *E. nyikae*, and all of which occur in the dense lowland bush areas behind the coasts of Kenya and Tanzania. Intensive field-work, followed by examination of the now numerous herbarium specimens and many photographs, have allowed the separation of one or two possibly distinct species. One of these appears to occur within only a few miles of the sea and often on coral cliffs along the shoreline. It is a small sprawling tree, almost a shrub, and until recently was always dismissed as a young form of *E. kibwezensis*. We now know that its 2 or 3-angled branches, smaller segments and smaller flowering parts, are all constant features.

But the more variable populations of this group, especially those in Tanzania, suggest that hybridization may be involved. Examination of these in the field, and indeed of all the tree species, cannot be bettered; and photographs serve far more than the most copious notes, in presenting a picture of herbarium specimens as they were in the living state.

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Appendix: A new name and some new synonyms.

Euphorbia dumeticola Bally & S. Carter, **nom. nov.**
Type as for *E. platyacantha* Pax.

E. platyacantha Pax in Engl. Bot. Jahrb. 34: 84 (1904), **nom. illeg.**, non Drake in Bull. Mus. Hist. Paris 9: 45 (1903). Type: Tanzania, Uhehe, by Ruaha River, 10 Jan. 1899, Goetze 465 (B, holotype †; K, drawing). When Pax published his description of *E. platyacantha*, the name had already been used by Drake for a species from Madagascar. The new epithet is proposed jointly with Dr. P. R. O. Bally of Nairobi.

E. obovalifolia A. Rich., Tent. Fl. Abyss. 2: 239 (1850). *E. winkleri* Pax in Engl. Bot. Jahrb. 30: 342 (1901), **synon. nov.** Type: Tanzania, Lipanye Mt., Kinga Range, 4 June 1899, Goetze 1000 (B, holotype †; K, fragment and drawing).

E. neglecta N.E.Br. in Fl. Trop. Afr. 6(1): 593 (1912), **synon. nov.** Type: plant cultivated at Kew, origin unknown, coll. 19 April 1911 (K, holotype).

Descriptions and specimens of both these species match *E. obovalifolia* A. Rich., the range of which is thus extended from Ethiopia to southern Tanzania.

List of other species mentioned in the text

Euphorbia breviarticulata Pax in Engl. Bot. Jahrb. 34: 84 (1904).

E. candelabrum Kotschy in Mitt. Geogr. Ges. Wien 1: 169 (1857).

E. cooperi N.E. Brown ex Berger, Sukk. Euphorb., 83 (1907).

var. **cooperi**

var. **ussanguensis** (N.E. Brown) Leach in S. Afr. Bot. 36: 31 (1970).

E. ussanguensis N.E. Brown in Fl. Trop. Afr. 6 (1): 587 (1912).

E. cussonioides Bally in Bothalia 7: 29 (1958).

E. grandicornis Goebel ex N.E. Brown in Hook. Ic. Pl. 26: tt. 2531, 2532 (1897).

E. halipedicola Leach in J. South Afr. Bot. 36: 42 (1970).

E. kibwezensis N.E. Brown in Fl. Trop. Afr. 6(1): 586 (1912).

E. nyikae Pax in Engl. Pfl. Ost-Afr. C, 242 (1895); Volkens in Notizbl. Königl. Bot. Gart. Berlin 2: 265 (1899).

E. quadrialata Pax in Engl. Bot. Jahrb. 33: 286 (1903); Bally in Kew Bull. 28: 322 (1973).

E. quinquecostata Volkens in Notizbl. Königl. Bot. Gart. Berlin 2: 266 (1899).

E. robecchii Pax in Ann. Istit. Bot. Roma 6: 186 (1897); Bally in Cact. Succ. Soc. Amer. 38: 6 (1966).

E. pimeleodendron Pax in Jahresber. Schles. Ges. 89(2): 1 (1911).

E. ruspolii Chiov., Result. Sci. Miss. Stefan.-Paoli Somal. Ital. 1: 159 (1916).

E. wakefieldii N.E. Brown in Fl. Trop. Afr. 6(1): 583 (1912); Bally in Candollea 21: 369 (1966).

More Self-Incompatibility in Cacti

by N.P. Taylor

The article by Fred R. Ganders in the May 1976 issue of the Journal on Self-Incompatibility in the Cactaceae has stimulated me to report on some findings made over the past six years in my own collection of these plants.

My collection of 500 cacti and other succulents includes at least 200 cacti that flower regularly. I take no precautions to isolate plants when in flower, since this is only important if one is trying to prove self-compatibility as opposed to self-incompatibility. Most species are represented by one plant only, and so my findings are necessarily of limited scientific value. It would be more meaningful to have a selection of habitat collected specimens showing the distribution range of each species, and to self-pollinate these individually in isolation, before stating that any given species was wholly self-incompatible.

I am reasonably satisfied as to the identity of the taxa mentioned below, since their correct identification has been my major preoccupation to date. My nomenclature for these plants follows the check list published in 'Ashingtonia' over the past eighteen months, and where a name may be unfamiliar to some I have included a synonym in brackets.

In addition to the taxa reported on by Ganders, I believe the following may be self-incompatible:

Astrophytum asterias, *A. capricorne*, *A. myriostigma*; *Copiapoa hypogaea*; *Coryphantha (Neobesseyia) missouriensis*; *Echinocereus adustus*, *E. pentalophus*, *E. pulchellus*, *E. reichenbachii* var. *fitchii*; *Echinopsis ancistrophora*, *E. obrepanda*; *Gymnocalycium andreae*, *G. anisitsii*, *G. baldianum*, *G. bruchii*, *G. damsii*, *G. guerkeanum*, *G. occultum*, *G. quehlianum*, *G. schickendantzii*; *Lobivia culpinensis*, *L. densispina*, *L. jajoiana*, *L. wrightii*; *Mammillaria boolii*, *M. brandegeei*, *M. campotricha*, *M. durispina*, *M. erythrosperma*, *M. gilensis*, *M. gracilis*, *M. hahmiana*, *M. heyderi*, *M. humboldtii*, *M. johnstonii*, *M. magallanii*, *M. microhelix*, *M. (Solisia) pectinifera*, *M. pennispinosa*, *M. plumosa*, *M. solisioides*; *Neobesseyia wissmannii*; *Neoporteria napina*; *Normanbokea (Pelecyphora) pseudopectinata*; *Notocactus buenekeri*, *N. mueller-melchersii*; *Parodia penicillata*; *Pediocactus (Toumeyia) papyracantha*; *Rhipsalidopsis rosea*; *Selenicereus grandiflorus*; *Strombocactus (Turbinicarpus) schmeidickeanus* var. *klinkeranus*; *Wilcoxia poselgeri*, *W. schmollii*.

All of the above were selfed in at least two growing seasons and have never produced seed-pods. There are a few plants that regularly produce seed and I feel sure that some of these must be self-compatible, although I take no isolation precautions. Among these are *Lophophora williamsii*, *Gymnocalycium gibbosum* vars., *Frailea asterioides*, *F. cataphracta*, *F. phaeodisca*, *F. pumila*,

Notocactus scopa var. *machodoensis*, *Rebutia senilis* vars. The Fraileas are nearly entirely cleistogamous in my greenhouse, and show this extreme form of inbreeding mechanism in other people's collections. One further observation I should like to make concerns a specimen of *Pelecyphora aselliformis* in my possession, which has flowered profusely for three years, producing only effectively male flowers with very small abortive stigmas. It would be interesting to know whether there are other specimens of this species in cultivation showing this phenomenon, which if so would be an indication of gynodioeciousness in this plant.

In conclusion I would like to make a plea to members who possess rare or difficult plants that flower for them, to co-operate amongst themselves in cross-pollinating self-incompatible species so that they may be conserved (at least in cultivation) and enjoyed by other cactophiles.

Society Sales

If you are holding a Show or display make sure you have sufficient Society goods available in good time. Please remember you can also have back numbers of Journals and packets of seed on a sale or return basis.

Binders for 3 volumes of Journal—£1 plus 30p postage (Overseas £2 post paid)

Booklets—15p plus 10p postage

Badges—45p plus 7p postage - 10 for £4.75 (including postage)

Ties (Navy)—£1 plus 10p postage

Car Stickers—17p plus 8p postage - 10 for £1.65

Ball point pens (red, blue, green, black)—5p each - 10 for 45p (60p with postage)

Key Fobs (varying colours)—10p each - 10 for 95p (postage 10p)

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

The Cactus and Succulent Journal of
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1964 to 1968

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5 Wilbury Avenue, Cheam, Surrey

Succulent Snippets

I hope you and your plants have not suffered too much from the long drought (at least in southern parts). Tales are going round of plants being watered with the drainings from vegetable cooking, washing machines and even the bath. Only time will tell what results these efforts will have!

'Cactus from Heaven'

A recent story from America tells of a young girl who looked down from a flat to see someone being mugged below. She immediately pushed her mother's best cactus off the window-sill and straight on the assailant's head. Needless to say, he tried to make a getaway but was soon captured with that 'evidence' on his head. The young girl was congratulated and rewarded for quick thinking by the police but history does not record what her mother said about the loss of her best cactus!

A Sunday newspaper recorded the tale of a man in south London with cacti in his front garden, of particular interest a *Cereus* which was growing higher and higher every year and he was wondering what to do next. Apparently he tried to carefully cover it every winter and even put an oil heater below but the height was getting too much. It is a wonder North Surrey Branch did not rush to look at this phenomenon but I feel they would have surely suggested he either built a greenhouse round it or dug it up and sent it to Kew!

What's in a Name?

Have you noticed lately that the titles of articles and talks cactus-wise are becoming rather 'fancy'. 'Christmas Day in the Greenhouse' sounds distinctly better than 'My Plants in Winter' but what about 'The Reluctant Dragons' or 'The Day of the Trog'? It no doubt spurs one to read these articles just to see what they are all about. Similarly, 'Murder in the Greenhouse' sounds much more interesting for a talk than 'Plant Pests and Diseases' and 'Freaks' than 'Abnormal Plants'. The 'Succulent Climbers and Trailers' Betty Maddams talked about at Westminster in June were plants after all, but as she's our Publicity Officer I wondered if she was going to draw comparisons with some of our members—the keen types (all too few) who try to do everything, and those who just relax and enjoy the benefits of membership!

Overheard at Society's Chelsea exhibit

'Do you think they've had these in the freezer to get them all flowering at the same time?'

Sally Cornioides

Unwelcome Guests

by Grace Boswell

Standing in the greenhouse in a reverie, admiring the Spring display of clean new spines at the tips of the cacti, my eye was drawn to movement on the surface of a pan. Sure enough, out wriggled the brown body of a leaf-cutter bee!

So early in the season! This was only April. For the past three years I have been plagued by these visitors, and this year they were starting sooner than I had remembered. As the bee rose to the roof I flapped about trying to send it on its way, but it evaded me at all points. In fact far from trying to escape it made a point of settling on many of the pots in turn, trying to confuse me about the actual one it had chosen, perhaps.

I have found by past experience that they use more than one pot for a nest. When the pot is tipped out there are almost always about six neat rolls of leaves, sealed at each end with an exact size circle, and each one contains a grub.

I have always been very reluctant to kill anything which resembles a bee, in fact I revive the fluffy ones with honey on a matchstick, but these cutter bees come back again and again, in through the top vent, homing on to the chosen pot. I have tried playing games with them by changing the pots around, even by removing them altogether, but they know, and they won't be put off. If the pot has vanished it merely means a fresh start, and although I have destroyed all the grubs and reluctantly the bee itself, another one arrives and the game begins all over again.

Where did they nest before I provided them with such warm homes?

NORTH LONDON BRANCH

Annual Show 22-23 May

North London Branch held their Annual Show on 22-23 May at Capel Manor Horticultural Centre, Enfield, with Mr. & Mrs. Brewerton judging. Entries were up on last year and there were some very fine flowering specimens. Senior prizewinners included Mr. R. Dale, Mrs. Guirl, Mr. & Mrs. Hankin, Mrs. Massey, Mr. & Mrs. Pearson, Mr. J. Shipman and Mr. N. P. Taylor. Novice and junior classes were won by Mr. & Mrs. Day, Mrs. P. Drummond, Derek Shaw and Daniel Rubin. The Championship Cup for most points in the Show was won by Mr. N. P. Taylor.

Correction

The new A.S.P.S. editor is Mrs. Wendy Adcock (formerly Asst. Editor) and not Will Tjaden as reported in our last issue. Apologies to Mrs. Adcock, and congratulations and best wishes on her promotion!

Shows and Meetings, August-November

Forthcoming Meetings at Westminster

Wednesdays at 6 for 6.30 p.m. at the Royal Horticultural Society's New Hall, Greycoat Street, S.W.1.:

- | | |
|-------------------------|--|
| 11 August | Large-flowered Mammillarias
(Mrs. Hodgson) |
| 8 September | South American Cacti (Dr. T. C. Smale) |
| 12 October
(Tuesday) | Talk by a Judge (Autumn Show
12-13 October) |
| 3 November | Asclepiadaceae (Alf Woodward) |

Autumn Show

As this is being written before the Pimlico Show we can only hope that those who support the latter event will also support the Autumn Show at the R.H.S. New Hall, Westminster, on 12-13 October. One good reason is that for several awards it is the prizes from both shows that are counted for the highest total. The Banksian Award, for example, is for the highest total prize money in both Shows and the Sir William Lawrence Cup for the highest points in the cactus classes in both Shows. The Evelyn Theobald Cup is the same for other Succulent classes. The aggregate points system applies to the Junior Shield too, so, Juniors, we hope to see enough entries to warrant a special class for you.

The classes are practically the same as last year and so probably need little explanation. It may be pointed out that an interesting selection of genera is useful and there is quite a wide scope with *Coryphantha*, *Thelocactus* and *Gymnocactus* for example in Class 2 and in the classes for 'Echinocactanae' it is best to select suitable plants for the pot-restricted class.

In succulents other than cacti of recent years, surprisingly enough it is the class for Asclepiadaceae which has been poorly supported. Surely most members have such plants as *Stapelia variegata*, Hoyas or Huernias? The latter would in many cases also be eligible for the six South African Succulents if they were in 4½" pots and it is worth consulting one of the reference books, or even last year's prize list to see some of the other interesting genera that could be shown here. There is again an Intermediate (for members who have not won a First Prize in the Open Classes for Succulents) and a Beginners Class (for those who have not won a First prize in any class for other succulents).

The seedling class should be well supported judging by the number of seeds ordered by members during the last three years. It cannot be that none of them germinated at all! Miniature gardens and the decorative groups particularly attract the general public so enter these classes if you can.

Branch Secretaries should have Schedules available or you can send a stamped addressed envelope direct to

the Show Secretary, Mrs. H. Hodgson, 16 The Braid, Chesham, Bucks as soon as possible. Exhibitors are reminded that they can stage until 10 p.m. on Monday, 11 October, and before 10 a.m. on the Tuesday morning and exhibits must be cleared by 8 p.m. on Wednesday.

Branch Meetings

Branch Secretaries are listed on the inside front cover.

Northern Counties. Social Service Centre, Park Road, Whitley Bay. 3rd Monday in month, 7.30 p.m.

Wirral. 'The Grange', Grove Road, Wallasey. 3rd Thursday in month, 8 p.m.

North Staffs. Contact Mr. J. Wilson, 5 Monkton Close, Dresden, Longton, Stoke-on-Trent, ST3 4BG.

Berks and Bucks. Allotment Holders New Hall, St. Leonards Road, Windsor. 2nd Tuesday in month, 7.30 p.m.

Herts. Friends Meeting House, Upper Latimore Road, St. Albans. Contact Branch Secretary.

Hatfield & District. Hatfield Congregational Church Hall, St. Albans Road East, Hatfield. 4th Monday in month, 7.30 p.m.

Please note that the time of meetings is incorrectly given on the 1976 Membership card.

North London. Capel Manor Primary School, Bulls-moor Lane, Enfield. 3rd Friday in month, 7.30 p.m.

Essex. Room A3 (film room), Little Ilford Comprehensive School, Church Road, Manor Park, E.12. 1st Saturday in month. 7.30 p.m.

7 August Gymnocalycium Study Evening
(bring plants)

4 September Members' Slide Evening

2 October The Riviera, Part II (Fred Braun)

6 November Talk by Bill & Yvonne Tree

North Surrey. Adult School, Benhill Avenue, Sutton. 1st Tuesday in month. 7.45 p.m.

3 August My Favourite Plants (Mollie Leach)

4 September Annual Show (see below)

7 September Out and About (Lucy Wickham & Ray Knight)

5 October Progress at Ashington (Terry Hewitt)

2 November A Visit to Peru (John Hughes)

As usual, the Branch will be holding its Show in conjunction with the Carshalton Show on Saturday, 4 September, at Carshalton Park. Schedules will be available from the Branch Secretary, Dr. T. C. Smale, 28 St. Leonards Road, Epsom Downs. There are about forty classes including Open, Novices and Juniors.

East Surrey. Community Centre, High Street, Caterham. 3rd Tuesday in month, 7.45 p.m.

Slide Competition, 1976

A competition will be held in conjunction with the Westminster Meeting on 8th December. As in last year's event, there will be two divisions: Div. 1 for beginners or inexperienced photographers with simple cameras, Div. 2 for reasonably experienced photographers. In fairness to everybody please enter in whichever division you think suitable.

In each division there will be 4 classes.

Class A A general view of a cactus or other succulent.

Class B A close-up of a cactus or other succulent. This would show a detail of a part of the plant, e.g. spines or flowers.

Class C A group of cacti or succulents, or a mixed group, if preferred.

Class D A photograph of any subject.

Class D is an experiment to give an opportunity for those not specialising in plant photography to show something.

An entrant may submit slides in one division only. Up to three slides may be submitted in each class, except Class D in which only one slide per entrant may be submitted. For entries in Classes A-C, please indicate your own order of preference on each slide in case the entry is too large to accept them all, and also the division and class.

A few tips

Slides will be judged on their technical quality, information content and pictorial appeal. The latter is difficult to define, but attention should be paid to the quality and direction of lighting, and the arrangement within the frame.

If a slide is 'masked down' to exclude unwanted detail, make sure it is done neatly.

Watch for dust in glass-mounted slides.

Consider the background and exclude anything not a part of the subject.

The 'group' class should be well-contained and do not cut plants in half at the edges.

Slides will be judged by P. R. Chapman, A.R.P.S. and should be handed to Betty Maddams at the meeting on 3rd November or posted to her so as to reach her by that date.

Library List

Gilbert Leighton-Boyce, our Hon. Librarian, has revised the list of books, journals, etc., in the Society's Library and this has been printed as a separate leaflet. We hope to send out copies with this issue of the Journal.

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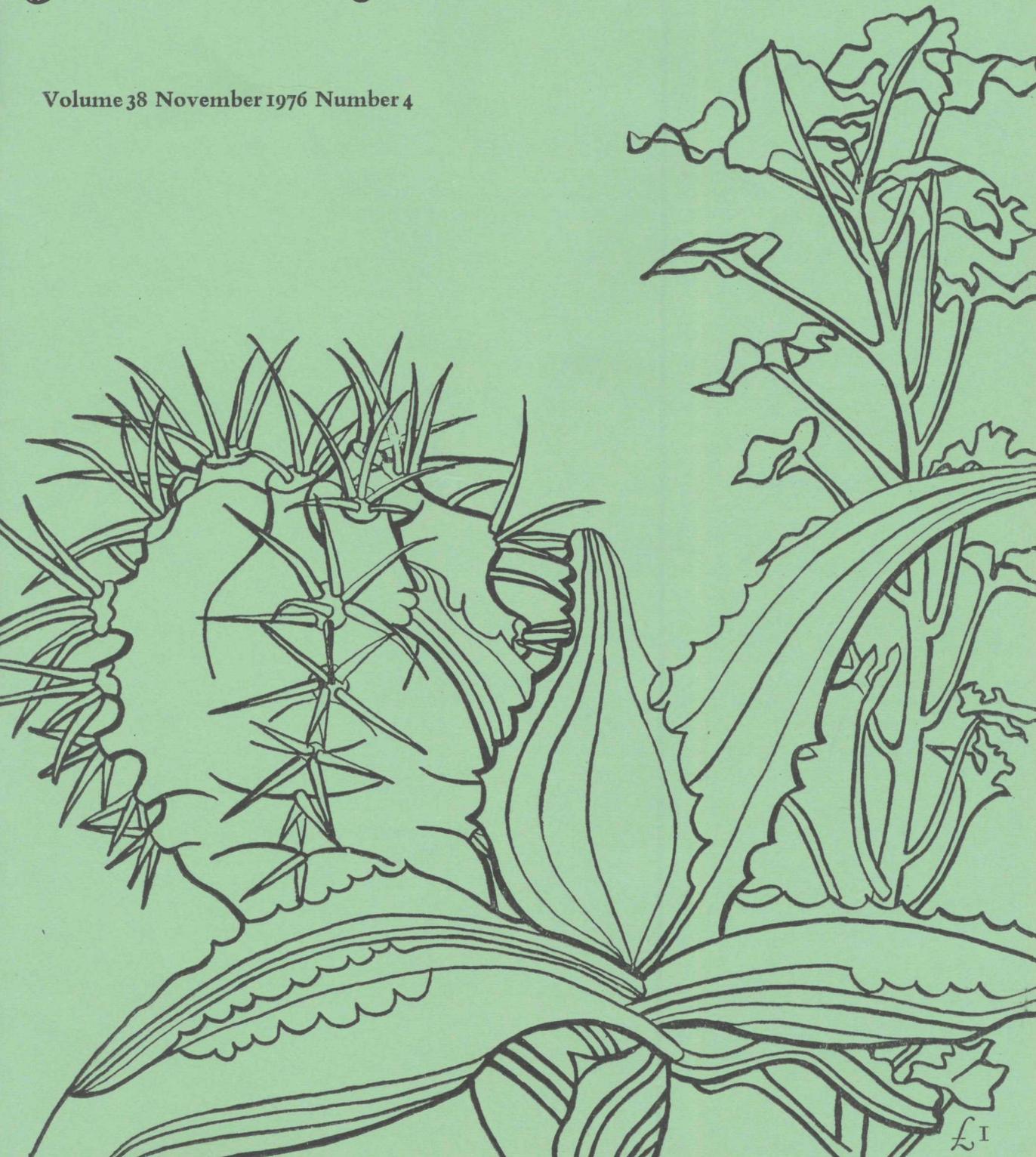
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The Cactus and Succulent Journal of Great Britain

Volume 38 November 1976 Number 4



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*Please see the Chairman's message (page 73).

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The Cactus and Succulent Journal of Great Britain

Volume 38 November 1976 Number 4

Subscription Rates, 1977

A message from the Chairman

I think it will be useful if I say a few words about the present and anticipated future financial position of the Society, as I hope it will enable members to appreciate why we must raise the subscription rates, yet again, in 1977. When we did so at the beginning of 1976 it was in the hope that it would ensure financial stability for at least two years. However, with further increases in the cost of printing and posting the Journal, we now find ourselves in the position when we must increase our income, or cut our services to members. We are sure the latter course of action is not acceptable, although we have gone to some lengths to ensure that there is no unnecessary spending.

We estimate that the minimum subscription income for 1977 must be £2,800. We are also well aware that each increase leads to a small but wholly unwelcome drop in the membership. It would probably be possible to raise the above-mentioned sum by choosing one of several sets of subscription rates. For example, 700 members might be prepared to pay £4 or about 550 the sum of £5. Council, very wisely, has decided to keep the increase down to an absolute minimum as it regards the maintenance of the present membership almost as important as solvency. Hence, the ordinary subscription rate for 1977 has been set at a *minimum* of £3.50 (for other rates, see panel on inside cover). We hope some members will find it possible to make an additional donation and, more generally, that everyone who currently enjoys the benefits of membership will continue to do so in 1977. This is your Society; please back those you have elected to run it on your behalf and thus ensure that it continues to thrive.

W. F. MADDAMS

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Cover design

Our new cover design is by Miss Marion Wilds, a student at the Middlesex Polytechnic, London. The drawing is one of several executed by students as a competitive project during their course in scientific illustration.

Pollen and Classification

The scanning electron microscope (SEM) is possibly the most valuable new tool to come the way of the biologist in the last decade or so and a vast assemblage of data has been amassed by its use in many fields of research, including anatomy, morphology, microbiology, palaeontology and palynology, the study of pollen.

Thanks to the high resolution power and great depth of focus of the SEM we are now able to see a wealth of surface detail invisible or only dimly discerned under the conventional light microscope used hitherto. Much of this detail proves to be valuable to the taxonomist at all levels of his work, from the identification of uncertain specimens to the classification of species and genera and the study of evolution and phylogeny. One example of the application of SEM studies to the taxonomy of succulent plants is Len Newton's work on *Aloe* cuticles (see *Nat. Cact. Succ. J.* 27(2): 40-42. 1972), and another the preliminary survey of seed testa structure in the *Cactaceae* by Beat Leuenberger (in *Cact. Succ. J. Amer.* 46: 175-180. 1974). Dr. Leuenberger's principal work as a post-graduate student at the University of Heidelberg has been on the pollen of cacti, and his doctoral thesis on this subject was published

earlier this year. Previous studies with the light microscope seemed to suggest that cactus pollen has few features of taxonomic interest, but Leuenberger's conclusions are more optimistic. We are very pleased to publish as the main feature of this issue a copiously illustrated paper by him in which he draws attention to some of the taxonomic implications of the variety of pollen structure in the family. Financial assistance from one of our members towards the cost of printing this paper is gratefully acknowledged.

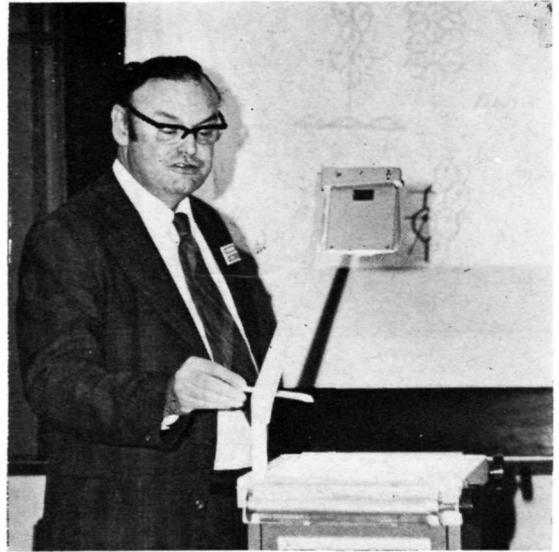
An SEM survey of the pollen of the Mesembryanthemaceae was the subject of a very interesting paper delivered by Mme. S. Dupont at the recent IOS Congress. Mme. Dupont's observations seem to point to a need for radical reappraisal of the classification in that family. The resemblance of cactus and mesem pollen is striking, incidentally, and seems a further confirmation of the now widely accepted view that the *Cactaceae* are allied to the group of families known as *Centrospermae* which includes the *Mesembryanthemaceae*.

IOS meets at Barcelona

The International Organisation for Succulent Plant Study met at Barcelona, Spain, on 6-11 September for its Fourteenth Congress. Seventy members and guests from 16 countries were present and public sessions



At Pinya de Rosa: Fernando Riviere de Caralt with Heidi Hartmann, the specialist on Mesembryanthemaceae (photo: David Hunt)



John Donald, newly-elected President of I.O.S., addressing the British Section Symposium at Kew last March (photo: Peter Chapman)

during the week were also attended by staff and students from the School of Horticulture of the Municipal Parks and Gardens service, in whose lecture theatre the meetings were held.

The Congress was organised by Sr. Fernando Riviere de Caralt and Sr. Juan Panella Bonastre, the head of the School of Horticulture, and included business meetings and three days of lectures, with two day excursions, one to Don Fernando's famous Jardin d'Acclimatacion, Pinya de Rosa, at Blanes on the Costa Brava, the other to Mallorca to the splendid S'Avall Gardens of Sra. Carmen de March. Participants also saw the impressive Costa y Llobera Gardens overlooking the harbour of Barcelona, with massed plantings of cacti, euphorbias, yuccas, mesems, aloes, palms and so on.

Congratulations to John Donald who is the new President of IOS, succeeding Louis Vatrican, and to Professor Werner Rauh who succeeds Dr. Willy Cullmann as Vice-President. The other members of the executive board are Dr. Heimo Friedrich, Secretary; David Hunt, Asst. Secretary; Dieter Supthut, Treasurer; and Charles Glass, Heidi Hartmann and Hernando Sanchez-Mejorada, Board Members. Of 27 new members elected at the Congress six are from Great Britain, including our Hon. Librarian, Gilbert Leighton-Boyce and his co-author James Iliff, Echeveria specialist Les Carruthers, Mrs. Lois Glass, translator of Jacobsen's Lexicon, Euphorbia specialist Susan Carter, and Gymnocycium expert Geoff Swales. Future Congresses are planned for Monaco (1978) and Mexico (1980).

Seasonal Cactus Care

by W. F. and B. Maddams

Much has been written and spoken about the long hot summer of 1976, not least by cactophiles, and we have no particular wish to add to this spate of words unnecessarily. However, there are two points which we would like to mention. The British weather is fickle and it would be wrong to assume that two good summers presage a change in our climate, even though one or two sages have been bold enough to suggest this. Nevertheless, if this type of summer does occur more frequently in the future then a change of attitude towards the shading of greenhouses will be necessary. We were brought up in the belief that greenhouses should be sited so that they utilised every scrap of available light and that shading was wholly unnecessary in the somewhat murky atmosphere of Britain. Clearly, some reconsideration is necessary. Just why scorching occurs in some instances is still far from clear. It may be no more than inadequate ventilation but even in the best of greenhouses, once they become full, there is a tendency to place plants unwisely close to the glass and, we suspect, pockets of stagnant air occur, particularly in corners. In these circumstances, and given the sort of weather we experienced during June, July and August, some shading is almost certainly beneficial. The tender plants will be protected and the more resistant ones will not suffer.

The second point relates to possible interesting side-effects of the prolonged sunshine and a perusal of our plants suggests that there are some of these in evidence. Apart from a prolongation of the flowering season of a number of plants, and among these the *Gymnocalycium*s come to mind, other plants seem to be having a second crop of flowers. One or two *Rebutias* come into this category but we have noted other and more unexpected examples, such as *Thelocactus saussieri*. This is a plant which we have had for some years and can, incidentally, thoroughly recommend. It produces its purplish-pink flowers quite early in the season, in late March or April, and it did so as usual this year. When more blooms appeared in July it was to our surprise and delight and in view of its hitherto regular behaviour we can only ascribe this effect to the prolonged sunshine and high temperatures. If readers can produce other examples we shall be interested to hear of them, preferably through the correspondence column of this Journal.

Artificial lighting

Turning from summer to incipient winter our main topic on this occasion is something new. While we are primarily concerned with describing well-established cultural techniques for the benefit of newer cactophiles we are firm believers in new approaches when they are advantageous and when we can discuss them from



Thelocactus saussieri (photo: Betty Maddams)

practical experience. The raising of seedlings under artificial light comes into this category. It is a subject which attracted our attention several years ago, for a number of reasons. There was the purely pragmatic one that space for a propagator in the greenhouse was no longer available but there was a spare room indoors given that there was sufficient light. Furthermore, it had the seeming advantage that it enabled one to create a microclimate to order and permitted sowing at any convenient time during the year. Finally, it interested us as a fundamental new approach.

At that time there was little on the topic in the literature and we pursued a somewhat tentative path, the only problem being the level and type of illumination required. We did not set about assessing these in a wholly scientific way but as fairly experienced hands at raising from seed by the conventional method. We therefore had a yardstick by which to assess progress. Fortunately, we found suitable conditions almost from the outset and we have not modified these greatly, although we realise that we may not be using the best possible conditions.

It was clear that fluorescent lighting tubes, with their relatively high light output and relatively low heat dissipation, offered a convenient source of artificial illumination and rather than give a detailed history of our experiments it will suffice to indicate our preferred arrangement. Our propagators, home built as we have noted on a previous occasion, have the approximate dimensions of two feet six inches and two feet and are designed to take oblong plastic seed trays. During the early stages of growth the surface of the compost, and hence the small seedlings, are two and a half to three inches below the glass cover of the propagator. Two, or preferably three fluorescent tubes are sited lengthways above the glass, with their lowest surfaces about five

inches above it. We suspect that the distance is not too critical nor have we firm evidence that the type of fluorescent tube is of over-riding importance. The special types of tube, such as Gro-Lux which have a higher energy output in the red end of the visible spectrum, may well give rather better results but we have been perfectly satisfied with the growth rates obtained using domestic warm white tubes. The illumination period each day is best set for English summer conditions and this can be done automatically by using a time-switch set to operate between say, seven in the morning and eleven in the evening.

We have grown plants covering a range of genera and species by this method and find it to be generally applicable. We have achieved particularly good results in the case of the more difficult hooked spine Mammillarias of the Series *Ancistracanthae*, such as *M. mainae*, *M. microcarpa* and *M. wrightii*. A tendency to elongation has been noted in some instances, particularly in the case of *Rebutia* species. This may be the result of somewhat forcing conditions, which the Mammillarias seem to enjoy, rather than an inadequate level of illumination. Nevertheless, there is scope for more information on this approach to seed raising, one we would recommend to those who wish to sow at their convenience rather than as a palliative to the perennial space problem. In fact, it can certainly add to it! It must also be pointed out that it is a relatively expensive way of raising seedlings as there is the initial capital outlay for the fluorescent tubes and the time switch, together with the replacement of the tubes which, in our experience, have an average life of about a year. The cost of the electricity consumed is not a serious problem. One final point: once the seedlings reach the pricking out stage they can be grown on normally. When they are first brought out into natural light gentle shading is advised for the first few days, particularly if the weather is hot and sunny. We shall be interested to hear of other members' experiences with seed raising by this method.

Cultivation of Succulents

by Mrs. M. Stillwell

Vintage summer

This has been a wonderful year for flowers on our plants. Growth has been excellent also, but a lot more care has been needed to prevent scorching and drying out of the roots, and the plants have needed watering a lot more frequently than usual. Many of the mesembryanthemums flowered with me at least a month earlier than usual. I have repotted a large number of these just at the start of their growing period, which is the time to break them up if necessary. Never hesitate to do this if a plant shows no sign of new growth from one year to another. If you can afford the space take cuttings each year of those plants that tend to get woody at the base,

and grow them on to take the place of those that are past their prime and have lost a lot of their former beauty.

A whole lot of my common succulents were grown out of doors this summer and not only flowered profusely, but developed some beautiful colourings and a strong firm growth not seen under glass. *Faucarias* in particular make really handsome plants standing along the top of a low brick wall. The large Aloes grow very strong and send up their tall stems of red flowers; they must, of course, be brought under cover in October before the frosts start. Most of my plants are housed under the staging for the winter. It does give one a chance to thin out the collection for the summer and to have a general clean-up in comfort. Adult Aloes make a tremendous lot of long roots which should always be carefully untangled and pruned back hard when re-potting.

The *Mitrophyllums* have started to come to life after their long dormant rest during the summer, and will need careful watering preferably from the base. Peel off the old dead skins when they are papery dry. *Cheiridopsis peculiaris* will soon be looking at its best, with its two unusual growths side by side—one the flower bud and the other next year's body. This species also rests most of the summer and should flower early in the year. The tall-stemmed yellow flower lasts well over a month. It is a good precautionary idea to water the collection with a systemic insecticide in the late autumn to prevent any stray pests increasing during those winter months when we perhaps do not visit the greenhouse as much as in the summer.

Unusual succulents

I was recently given a cutting of *Dorstenia hildebrandtii* and told to root it by standing it in a solution of weak phostrogen and water, leaving it for at least two weeks until the hairlike roots appeared on the stem. It took about three weeks to produce enough roots to safely pot it up. It grew very rapidly in a mixture of John Innes No. 3 and Levington compost. It seemed to need water almost every day and produced its characteristic flowers at intervals all up the stem, round with purple bracts. The leaves are oblong-oval, 4-6 cm. long. It should develop a small caudex which should be planted slightly above soil level. This is a native of Tanzania and Kenya and therefore will need some extra warmth in the winter. I rooted it in my shady house, but have now removed it to the other one where it will get some sunshine to harden it off for the winter. I am also cutting down on the water.

If you like unusual plants look out also for *Frerea indica*, commonly known as the 'leafy Stapeliad'. It belongs to the *Caralluma* group and has similar flowers. It is of Indian origin and therefore again appreciates some extra winter warmth. It rots very easily during the cold weather, so keep it on the dry side.

Results of the Summer Show, Pimlico, June 1976

Judge: K. H. Grantham

Class 1 Six Cacti. 4 entries

- 1st J. E. Taylor. *Echinocereus knippelianus*, *Echinopsis kermesina*, *Gymnocalycium eytianum*, *Mammillaria elegans*, *Mamillopsis senilis*, *Notocactus leninghausii*.
2nd R. Worrall. *Echinocactus grusonii*, *Echinopsis ritteri*, *Leuchtenbergia principis*, *Mammillaria celsiana*, *Oreocereus trollii*, *Parodia maassii* var. *carminatiflora*.
3rd D. Bowdery. *Cephalocereus euphorbioides*, *Echinocactus grusonii*, *Echinofossulocactus arrigens*. *Ferocactus* sp., *Parodia maassii*, *P. mairanana*.

Class 2 Three Rebutias and/or Lobivias. 4 entries

- 1st J. E. Taylor. *Lobivia wrightiana*, *Rebutia muscula*, *R. spiniflora*.
2nd D. Bowdery. *Rebutia albiflora*, *R. minuscula*, *R. pseudodeminuta*.
3rd Dr. & Mrs. Randall. *Aylostera pulvinosa*, *Rebutia albiflora*, *R. senilis* hybrid.

Class 3 Three Mammillarias. 5 entries

- 1st J. E. Taylor. *M. plumosa*, *M. spinosissima*, *M. zeilmanniana*.
2nd Dr. & Mrs. Randall. *M. bocasana* (pink), *M. bombycina*, *M. schiedeana*.
3rd D. T. Best, M. discolor, *M. plumosa*, *M. zeilmanniana*.

Class 4 Six Mammillarias, in pots not exceeding 4½ in. diam. 5 entries

- 1st Dr. & Mrs. Randall. *M. aureilanata*, *M. ericantha*, *M. herrerae*, *M. humboldtii*, *M. magallanii*, *M. theresae*.
2nd J. E. Taylor. *M. aureilanata* var. *alba*, *M. guelzowiana*, *M. herrerae*, *M. insularis*, *M. spinosissima*, *M. vaupelii* var. *flavispina*.
3rd R. H. I. Read. *M. boolii*, *M. ericantha*, *M. herrerae*, *M. mazatlanensis*, *M. napina*, *M. theresae*.

Class 5 One Notocactus. 6 entries

- 1st Mrs. Leach. *N. arachnites*.
2nd D. T. Best. *N. submammulosus*.
3rd Dr. & Mrs. Smale. *N. herteri*.

Class 6 Three Notocacti, in pots not exceeding 4½ in. diam. 4 entries

- 1st Dr. & Mrs. Randall. *N. buiningii*, *N. haselbergii*, *N. magnificus*.
2nd D. A. Stevenson. *N. apricus*, *N. leninghausii*, *N. scopia* var. *glauserianus*.
3rd Dr. & Mrs. Smale. *N. fuscus*, *N. graessneri*, *N. musgelianus*.

Class 7 Three 'Echinocactanae'. 6 entries

- 1st Dr. & Mrs. Randall. *Epithelantha micromeris*, *Lophophora williamsii*, *Obregonia denegrii*.
2nd D. T. Best. *Astrophytum ornatum*, *Echinocactus grusonii*, *Parodia mutabilis* var. *carneispina*.
3rd N. P. Taylor. *Gymnocalycium schickendantzii*, *Lophophora williamsii*, *Notocactus leninghausii*.

Class 8 Three Gymnocalyciums and/or Weingartias. 4 entries

- 1st J. E. Taylor. *G. lafaldense*, *G. mostii*, *G. sp.*
2nd Dr. & Mrs. Randall. *G. gibbosum* var. *nigrum*, *G. monvillei*, *G. zegarrae*.
3rd D. Bowdery, *G. marsoneri*, *G. mostii* var. *kurtzianum*, *G. zegarrae*.

Class 9 Two Echinocerei. 6 entries

- 1st J. B. Robinson. *E. subterraneus*, *E. triglochidiatus*.
2nd D. Bowdery. *E. gentryi*, *E. subinermis*.
3rd N. P. Taylor. *E. pentalophus*, *E. reichenbachii* var. *adustus*.

Class 10 One Specimen Mammillaria. 4 entries

- 1st J. E. Taylor. *M. hahniana*.
2nd D. T. Best. *M. centricirra*.
3rd R. Worrall. *M. schelhasae*.

Class 11 One Cactus. 5 entries

- 1st R. H. I. Read. *Ferocactus acanthodes*.
2nd Mrs. Dennard. *Echinocactus grusonii*.
3rd J. E. Taylor. *Rhipsalis cereuscula*.

Class 12 Six Cacti, in pots not exceeding 6 in. diam. 10 entries

- 1st Dr. & Mrs. Smale. *Ariocarpus lloydii*, *A. retusus*, *Melocactus neryi*, *Notocactus buiningii*, *Parodia maassii*, *Submatucana myriacantha*.
2nd Dr. & Mrs. Randall. *Echinofossulocactus hastatus*, *Escobaria runyonii*, *Gymnocalycium saglione*, *Mammillaria baumii*, *Neochilenia napina*, *Notocactus schumanniana*.
3rd J. E. Taylor. *Astrophytum myriostigma*, *Echinocactus grusonii*, *Homalocephala texensis*, *Mammillaria longiflora*, *Stenocactus* sp., *Thelocactus lophothele*.
VHC Mrs. Leach.

Class 13 Three Cacti, in pots not exceeding 4½ in. diam. 9 entries

- 1st N. P. Taylor. *Mammillaria louisae*, *Pediocactus papyracanthus*, *Strombocactus lophophoroides*.
2nd Dr. & Mrs. Randall. *Coryphantha elephantidens*, *Neochilenia paucicostata*, *Neolloydia grandiflora*.
3rd Mrs. Leach. *Encephalocarpus strobiliformis*, *Solisia pectinata*, *Sulcorebutia tarabucensis*.

Class 14 Cacti from seed. 4 entries

- 1st Miss I. Jones
2nd Mrs. Leach
3rd D. Bowdery

Class 15 Three Cacti (for Juniors). 1 entry

- 1st N. Randall. *Cochemiea poselgeri*, *Gymnocalycium monvillei*, *Mammillaria zeilmanniana*.

Class 16 Three Rebutias (for Juniors and members who have not won a first prize in any cactus class). 2 entries

- 1st Miss I. Jones. *R. fiebrigii*, *R. muscula*, *R. senilis*.
2nd D. Stevenson, *R. heliosa*, *R. kupperiana*, *R. muscula*.

Class 17 Three Gymnocalyciums (for Juniors and members who have not won a first prize in any cactus class).

- 1st N. Randall. *G. brevistylum*, *G. mihanovichii*, *G. m.* var. *friedrichii*.
2nd Miss I. Jones. *G. baldianum*, *G. hyptiacanthum*, *G. mihanovichii*.

Class 18 One Succulent. 5 entries

- 1st D. Bowdery. *Crassula portulaca*.
2nd R. H. I. Read. *Euphorbia* sp.

3rd R. Worrall. *Agave parrasana*.
VHC Mrs. Dennard.

Class 19 Three Euphorbiaceae. 3 entries

1st N. P. Taylor. *Euphorbia bupleurifolia*, *E. stellata*, *E. stellispina*.
2nd Mrs. Leach. *E. globosa*, *E. onoclada*, *E. polygona*.
3rd R. Worrall. *E. canariensis*, *E. squarrosa*, *E. trichademia*.

Class 20 Three Liliaceae. 3 entries

1st Mr. & Mrs. Maddams. *Aloe jucunda*, *Gasteria armstrongii*, *Haworthia truncata*.
2nd D. Bowdery. *Aloe dichotoma*, *A. humilis*, *A. pratensis*.

Class 21 Three Asclepiadaceae. 2 entries

1st N. P. Taylor. *Ceropegia stapeliiformis*, *Diplocyatha ciliata*.
2nd Mr. & Mrs. Maddams. *Fockea crispa*, *Luckhoffia beukmannii*.

Class 22 Two Crassulaceae. 5 entries

1st N. P. Taylor. *Crassula columella*, *C. deceptrix*.
2nd Mrs. Leach. *Adromischus festivus*, *Crassula columella*.
3rd Mrs. Edmunds. *Cotyledon undulata*, *Echeveria shaviana*

Class 23 Three Succulents in pots not exceeding 6 in. diam. 6 entries

1st D. T. Best. *Euphorbia squarrosa*, *Haworthia truncata*, *Pachypodium succulenta*.
2nd Mrs. Dennard. *Euphorbia groenwaldii*, *Jatropha berlandieri*, *Raphionacme hirsuta*.
3rd Mrs. Leach. *Adromischus cooperi*, *Euphorbia obesa*, *Faucaria tigrina*.
Commended N. P. Taylor

Class 24 Three Succulents in pots not exceeding 4½ in. diam. 7 entries

1st Mrs. Leach. *Crassula teres*, *Euphorbia bupleurifolia*, *Tavaresia grandiflora*.
2nd Dr. & Mrs. Smale. *Dorstenia foetida*, *Euphorbia buruana*, *Pterodiscus speciosus*.
3rd N. P. Taylor. *Haworthia truncata*, *Huernia hystrix*, *Lithops pseudotruncatella*.
VHC R. H. I. Read. *Aloe haworthioides*, *Euphorbia tuberosa*, *Haworthia viscosa* var. *concinna*.

Class 25 Three Succulents (for Juniors). 1 entry

1st N. Randall. *Adromischus cooperi*, *Crassula tecta*, *Echeveria affinis*.

Class 26 One Liliaceae (for Juniors and members who have not won a first prize in a succulent class). 1 entry

1st Miss I. Jones. *Haworthia truncata*.

Class 27 One Cactus and one Succulent. 7 entries

1st D. T. Best. *Parodia chrysacanthion*, *Euphorbia bupleurifolia*.
2nd D. Stevenson. *Mammillaria hahniana*, *Caralluma europaea*.
3rd Mrs. Edmunds. *Melocactus matanzanus*, *Beaucarnea recurvata*.

Class 28 Miniature Garden. 3 entries

1st Dr. & Mrs. Randall.
2nd Mrs. Leach.
3rd D. Bowdery.

Class 29 Group of Cacti and/or Succulents. 3 entries

1st Mrs. Dennard.
2nd Mrs. Leach.
3rd D. Bowdery.

Awards

Ibbotson Cup, Sarah Cutler Cup and Luty Wells Cup: J. E. Taylor.
Shurly Cup: Miss I. Jones.
William Denton Trophy: Mrs. Dennard.
Best Cactus Spoon: Dr. & Mrs. Smale (*Ariocarpus retusus*).
Best Succulent Spoon: Mr. & Mrs. Maddams (*Gasteria armstrongii*).

Branch Show Reports

BERKS & BUCKS BRANCH

Annual Show

The Annual Show, in conjunction with the Royal Windsor Rose & Horticultural Society, held in the private grounds of Windsor Castle, was once more a great success. Many of the flower and vegetable exhibits were down in entries owing to the drought, but our Cacti and Succulents were looking at their best. We even appeared on a TV film for Britain's Heritage Year which is due to be shown next year, when they are expecting to have a large market for it in America. The main Cupwinners were Mrs. C. Marshall, for six large mature Cacti; Mr S. C. King, for a very colourful group; Mr. S. C. King, for the Best Cactus; and Mrs. M. Stillwell, for the Best Succulent. The Cup for Novices went to Mr. P. Sleight. The Judges were Mr. & Mrs. P. Whicher.

This was the 27th Annual Branch Show. On August 28th a somewhat smaller Show was staged at the Windsor Allotment Holders Show. The Cup for most points went to Mrs. C. Marshall with Mr. M. Colgate a close second.

NORTH SURREY BRANCH

Carshalton Show

The Branch Annual Show, in conjunction with the Carshalton Show, was another successful event although the entries were slightly down owing to some members with larger collections being unable to compete. However, the judges, Mr. & Mrs. R. C. Holt, commented on the general high standard of the entries which made the selection of prizewinners very difficult. They were particularly impressed with some fine specimen plants in the classes for other succulents, including *Pachypodiums*, *Testudinarias* and several good clumping plants of *Haworthia truncata*. The Banksian Medal was awarded to Dr. & Mrs. Smale who gained the highest monetary total and Ian Blacklee won the Chuter Award for highest points in the Novice classes.

Repertorium Plantarum Succulentarum

Copies of the latest issue of the IOS Repertorium, no. XXV (for 1974), are now available from David Hunt, price £1.80 post free.

Pollen Morphology of the Cactaceae

An SEM-Survey of exine sculpturing and its tentative implications for taxonomy and phylogeny
by B. E. Leuenberger*

Introduction

A survey of pollen characters of nearly all genera of the Cactaceae has been undertaken with the help of a Scanning Electron Microscope (SEM). The author's original paper based on this survey (Leuenberger, 1976) treats the subject from various points of view but with illustrations chosen to demonstrate the morphological spectrum of the exine characters. In the present paper, a summary of the main results is presented together with SEM pollen-micrographs representing 92 genera.

Papers by Kurtz (1948, 1963) and Tsukada (1964) showed some basic facts of cactus palynology, such as the striking difference between pollen types of the sub-families Opuntioideae and Cactoideae. Kurtz, working with simple methods, presented a few data relating to exine and aperture characters for a very large number of samples in tabular form according to the system of Britton & Rose and without any comment. Tsukada gave a very detailed account of a smaller selection of species and genera with a brief discussion of the possible evolutionary significance of his findings and those of Kurtz's first paper. Other papers dealing with pollen characters of smaller groups or single species have been published by Anderson & Stone (1971), Kozar (1974), Barthlott (1974, 1975), and Barthlott & Rauh (1974, 1975).

Materials and methods

Our own investigation covered 630 species (about 700 samples) from 157 of the 160 genera in Buxbaum's system (210 of 233 in that of Backeberg). Pollen size, NPC-data (Number, Position and Character of the apertures), size, quality and density of exine surface and structural elements were examined by light microscopy and scanning electron microscopy in over 300 samples and, for another 300 species, pollen size and NPC-data only were tabulated according to the system of Buxbaum (1962, 1975). Taxa given generic rank by other authors were also listed to facilitate a comparison of the data.

The material studied was obtained from living collections and several herbaria, namely the Botanical Garden of the University of Heidelberg (plants collected mainly by Prof. Dr. W. Rauh), the Städtische Sukkulentensammlung Zürich, the Kew Herbarium, the U.S.

National Herbarium and many other institutions and collectors.

Although the basic pollen analysis was undertaken by light microscopy, much additional data for surface details was obtained by scanning electron microscopy. This work was carried out within a research programme of the Deutsche Forschungsgemeinschaft. Pollen samples either non-treated or preferably acetolysed (the standard method in palynology), were coated with ca. 500 Å of carbon and gold and examined with a Cambridge Stereoscan 600 at the Institut für Systematisch Botanik und Pflanzengeographie of the University of Heidelberg. The author wishes to thank Prof. W. Rauh and Dr. R. Schill for their generous support. All SEM-micrographs were made by the author.

Observations

(i) *NPC-characters*. The spectrum of NPC-characters in the three subfamilies of the Cactaceae is illustrated in fig. 1. In the Pereskioideae pollen with three furrows (tricolpate) is observed in species with small leaves, which are generally considered to be highly evolved, while the forms hitherto presumed to be primitive have pollen with many furrows (polycolpate). As tricolpate pollen in the Angiosperms is generally believed to be more primitive than polycolpate and polyporate pollen, the Pereskioideae may be heterobathmic in floral, vegetative and palynological characters. Reduction of aperture number cannot be excluded completely, however, as many cactus species show polymorphism of aperture number within one sample.

In the Opuntioideae polyporate grains are typical, and the highest aperture numbers were unexpectedly observed in the genus *Pereskia* (with up to 31 pores) while the lowest aperture number was found in *Opuntia macbridei* and *O. glaucescens*. These two species show transitions between hexacolpate and hexaporate grains (6-pantoporate), which may have to be interpreted as reduction forms of the 12-pantoporate grains common to most *Platyopuntias*.

In the Cactoideae (Ceroideae) there is an even greater diversity of pollen sizes (36 to 120 µ) with aperture numbers varying between 3 and 15(-18), mostly with furrows (colpate), rarely with pores (porate). A few species have irregular apertures (more or less syncolpate and asymmetrical arrangement of colpi), a character which in several cases is combined with, or a consequence of, polyploidy (*Mammillaria prolifera*, *Notocactus*

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submammulosus). A single band-like furrow (2-syncolpate) was observed in *Leptocladodia elongata* var. *stella-aurata*, as well as in smaller percentages in samples of other species of various taxa. Tetrad pollen occurs in *Pseudorhipsalis alata* and *P. himantoclada* (fig. 37) and is not otherwise known in the family (see also Barthlott, 1975).

(ii) *Exine Structure*. A tentative classification of the exine characters has been given in full in the original paper (Leuenberger, 1976). In all the pollen samples studied, three layers of the pollen wall or exine could be observed, i.e. a nexine, and a sexine consisting of columellar layer and tectum. The tectum may be reduced to the muri of a reticulum (fig. 27) and, with a few exceptions, bears spinules varying in height from 0.3 to 3.0 μ . Perforations in the tectum are called *puncta* if their diameter is below 1 μ , and *foveolae* if greater than 1 μ . There

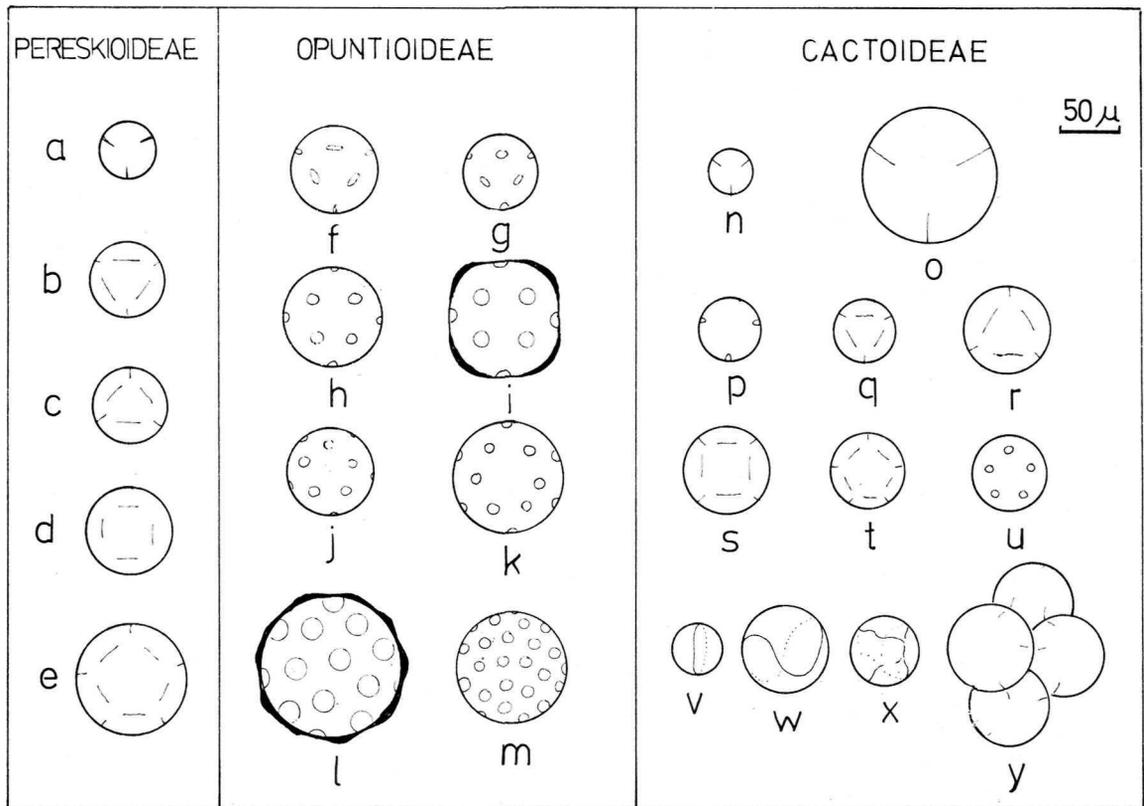
are transitions from punctate to foveolate to reticulate exines with increasing diameter of the perforations.

Implications for Taxonomy

The taxonomic and evolutionary implications of the data presented in tabular form in the original paper will now be summarised and a selection of SEM-micrographs (figs. 2-119) presented to illustrate the general tendencies.

a) *Pereskioideae*. In the Pereskioideae (figs. 2-10) punctate to foveolate exines with spinules of different size are observed. The crater-like tectal perforations, with a low rim (*Cereus* type, fig. 38), occur in several centrosperous families and are widespread in the Pereskioideae and many genera (mainly the cereoid ones) of the Cactoideae (figs. 38ff.). Variability of both aperture and exine characters is considerable within the subfamily.

Fig. 1. Pollen size and aperture configuration in Cactaceae.



a, *Rhodocactus antonianus*; **b**, *Pereskia aculeata*; **c**, *P. aculeata* (some grains); **d**, *P. portulacifolia*; **e**, *P. sacharosa* (some grains); **f**, *Opuntia macbridei*; **g**, *Opuntia glaucescens*; **h**, *Pterocactus tuberosus*; **i**, *Opuntia macrocentra*; **j**, *Marenopuntia marenac*; **k**, *Austrocylindropuntia inarmata*; **l**, *Opuntia decumbens*; **m**, *Pereskopsis porteri*; **n**, *Gymnocalycium mihanovichii*; **o**, *Nopalxochia konzattiana*; **p**, *Wilmattea minutiflora*; **q**, *Erythrorhispalis pilocarpa*; **r**, *Arthrocerus microsphaericus*; **s**, *Discocactus mamillosus*; **t**, *Astrophytum capricorne*; **u**, *Obregonia denegrii*; **v**, *Leptocladodia elongata* var. *stella-aurata*; **w**, *Wigginsia fricii*; **x**, *Mammillaria prolifera*; **y**, *Pseudorhispalis himantoclada*.

N.B. Nomenclature used in this paper does not necessarily reflect the author's personal opinion. Several generic names listed by Backeberg (1966) were used in order to facilitate palynological comparisons between taxa of questionable rank.

b) *Opuntioideae*. Apart from having polyporate pollen grains, the *Opuntioideae* are palynologically a heterogeneous group. The exines of *Pereskioipsis*, *Brasiliopuntia* and *Quiabentia* show relationships with the *Pereskioideae* while those of other genera are more specialised. *Opuntias* with cylindrical stems have an exine sculpturing clearly different from *Platyopuntia*, but in *Nopalea* and *Tacinga* the tectal perforations are very small in size and different from all other genera of the subfamily. *Consolea* is similar to *Opuntia polyacantha* but lacks spinules.

From the present data, as yet rather limited, we find it probable that the generic status of *Pereskioipsis*, *Quiabentia*, *Tacinga*, *Brasiliopuntia*, *Nopalea*, *Consolea*, *Platyopuntia* and *Cylindropuntia* s.l. can be supported by palynology. *Pterocactus* needs further investigation concerning aperture number, but exine characters agree with *Cylindropuntia*.

c) *Cactoideae*. In the *Cactoideae* exine characters are fairly constant in several of the tribes. As a general tendency, the spinules are smaller in the more specialised groups, e.g. *Notocactaceae*, *Cactaceae*, *Rhipsalinae*. The dominant type of tectal perforation in the cereoid tribes is that mentioned above (*Cereus* type). A tentative line of evolution may have led from this type to rimless perforations of medium size, from which both the finely punctate (figs. 84, 111) and reticulate (figs. 104, 109) type of exine may have evolved in separate lines in both North and South America. Although pollen data sometimes supports and in many cases does not positively disagree with Buxbaum's classification, the results of this study occasionally suggest re-evaluation of taxonomic and phylogenetic concepts (e.g. in *Discocactus*, *Schlumbergera*).

In the tribe **Leptocereae** (according to Buxbaum's concept), exine characters are of the type illustrated in fig. 38, which is characteristic of several of the following groups also.

In the **Hylocereae** an exine type with large spinules of 1–3 μ height and puncta of the *Cereus* type predominates. Smaller spinules occur in *Brachycereus* (fig. 39). *Wilcoxia* has no palynological relationship with *Peniocereus* (fig. 40–42) and *Wilmateia*, placed by Buxbaum as a subgenus within *Hylocereus*, is completely different, with triporate, irregularly foveolate and spinule-lacking pollen (fig. 49). *Werkleocereus*, *Weberocereus* and *Ecremocactus* appear to be closely related as far as pollen characters are concerned. In *Epiphyllum*, *Nopalxochia* and *Discocactus* large pollen grains with coarse exine of the *Cereus* type occur. The *Pseudorhipsalis-Wittia* group is not homogeneous in pollen data. Two species (*P. alata* from Jamaica and *P. himantoclada* from Costa Rica) have tetrad pollen—a unique feature within the family. *Wittia panamensis*, studied from the preserved type specimen, differs from other *Hylocereae* by its smaller spinules and simple perforations. In the *Rhipsalinae*, small spinules and perforations of

varying size mostly with an indistinct rim are characteristic, but the pollen of the Christmas Cacti (*Schlumbergera*) has more in common with the *Disocactinae* than with *Rhipsalinae*, a fact which was speculatively interpreted by Barthlott (1975) as a convergence due to ornithophily. For the family as a whole, however, no correlation between exine sculpturing and ornithophily is evident. (Also, there is apparently no evidence for such a correlation in other partly bird-pollinated families like *Bromeliaceae*, *Liliaceae* and *Malvaceae*. We are therefore tempted to believe that the pollen characters of *Schlumbergera* suggest a closer phylogenetic relationship with the *Disocactinae*–*Epiphyllinae*–*Hylocereinae* and that the genus may not be derived from the *Rhipsalinae*).

The tribe **Pachycereae** is relatively homogeneous with tricolpate pollen of the *Cereus* exine type (figs. 59–63). There are minor differences which are difficult to interpret and do not always agree with Buxbaum's infra-tribal arrangement. They need to be evaluated together with further data from other investigations.

Pollen grains in the tribe **Browningieae** share exine features with most *Pachycereae*, *Cereaceae* and *Trichocereae* (fig. 64).

Within the **Cereaceae** an increase of the basal diameter of the spinules is observed along the line of evolution proposed by Buxbaum (1975), leading from *Pracereus* and *Pseudopilocereus* to *Coleocephalocereus* and *Buiningia* (figs. 65–68).

In the **Trichocereae**, the subtribe *Trichocereinae* is again dominated by the *Cereus* exine type (figs. 70–72). In the new subtribe *Leocereinae*, *Arthrocareus* (fig. 73), *Pygmaecereus* and *Setiechinopsis* (fig. 74) share similar aperture configurations but differ widely in exine sculpturing. The genera of the *Borzicactinae* are difficult to distinguish, as the *Cereus* type of exine predominates again (figs. 75–81). *Oroya* is noteworthy for its smaller exine elements in increased number, and *Micranthocereus* (fig. 81) and *Arrojadoa* because of spinules with a broad base (verrucae) which may indicate parallelism or relationship with *Coleocephalocereus* and *Buiningia*. In the *Rebutiinae* the genus *Lobivia* and *Chamaecereus* are palynologically very close to *Echinopsis* (of the *Trichocereinae*). In *Rebutia* (fig. 82) the spinules and perforations are smaller and more numerous and the aperture number is higher in several species.

Within the tribe **Notocactaceae** only *Corryocactus* (fig. 83) and *Discocactus* (fig. 98) show cereoid pollen. In the case of *Corryocactus* this is fully in agreement with the phylogenetic scheme of Buxbaum (1963) (*Corryocactus* as 'genus primordioides' of the tribe). In *Discocactus*, the palynology suggests a different, as yet undetermined, position within the subfamily. *Erdisia* seems to be different from the one *Corryocactus* species studied. *Copiapoa* and *Gymnocalycium* have an 'intermediate' exine type (fig. 86), and so does *Islaya* as to the size of the spinules (fig. 85). *Austrocactus*, *Pyrrhocactus*, *Eriosyce*, *Eulychnia*

and *Neoporteria* s.l. have much in common (figs. 88, 89) but *Reicheocactus* is dissimilar (fig. 90). The exine sculpturing found in the genera *Notocactus* s.l. (fig. 91), *Frailea*, *Parodia* (fig. 94) and *Blossfeldia* (fig. 95) is mostly fine. *Uebelmannia* differs by its tectal perforations and slightly larger spinules (fig. 92), *Astrophytum* (fig. 93) has striking similarities with *Frailea*, but the same exine type occurs independently in many North and South American taxa, and without a detailed analysis of all possibly related groups the controversy concerning the position of *Astrophytum* cannot be properly resolved. *Weingartia* and *Sulcorebutia* (fig. 96), another taxonomic problem group, are more similar to *Rebutia* in exine characters than to the *Notocactaceae*, and the pollen of *Neowerdermannia* (fig. 97) is reminiscent of that of *Parodia*. Little material of *Melocactus* was studied, and the exine characters observed could be derived from several lines of evolution, but a connection with *Discocactus* seems unlikely on palynological grounds (fig. 98).

Amongst the small tribe **Echinocereae**, the pollen data for *Bergerocactus* (fig. 99) is difficult to interpret. *Morangaya* (*Echinocereus pensilis*) (fig. 100) is different from *Echinocereus*, which is palynologically variable in its aperture number, with exine elements of the same dimensions as e.g. *Notocactus* and *Mammillaria*.

In the **Cactaceae** spinule size is always below 0.8 μ , and usually about 0.4 μ . For this reason no spinules were observed by Kurtz and Tsukada. Aperture number and size of tectal perforations show greater diversification within the group, even within genera, than in most of the tribes, and delimitation of genera is usually difficult palynologically, except e.g. for *Rapicactus*, *Neolloydia*, *Oehmea*, *Obregonia* and *Epithelantha*. *Sclerocactus* and *Echinomastus* have similar pollen, and *Obregonia* was found to differ from all other genera by polyporate pollen grains with tectal perforations of a transitional type (fig. 101), quite unexpected for the tribe. Further studies are needed to document *Obregonia* pollen, because the pollen in *O. denegrii* was reported to be tri-colpate by Anderson (1968). The *Mammillaria* group, although insufficiently studied, includes a spectrum of exine characters that are also found in controversial genera like *Pseudomammillaria*, *Mammilloidia*, *Leptocladodia* and others. The significance of these observations cannot be fully evaluated yet. Direct phyletic relationship may be involved as well as parallel evolution in separate lines.

General conclusions

The investigation generally suggests that pollen characters can be helpful in the discussion of taxonomic and evolutionary problems. In the case of 'problem genera' a greater spectrum of pollen samples is needed as a basis for such a discussion. The study of cactus pollen by light and scanning electron microscopy will not usually present a solution to problems of classification by itself, but it can and should be used as one source—and

probably not the least important—of taxonomic characters.

Bibliography

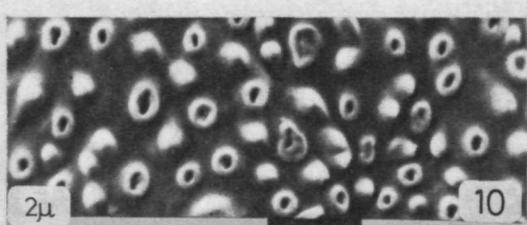
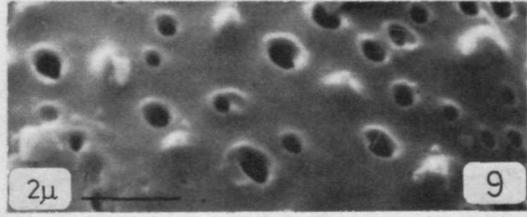
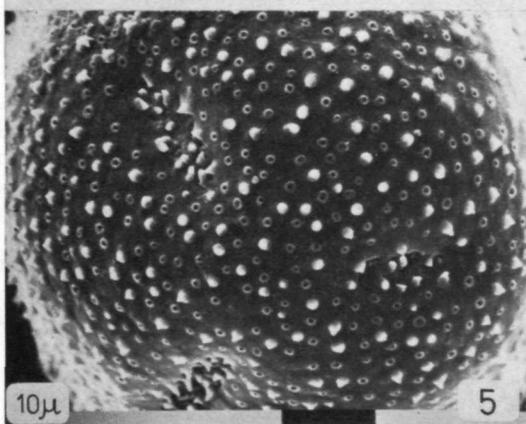
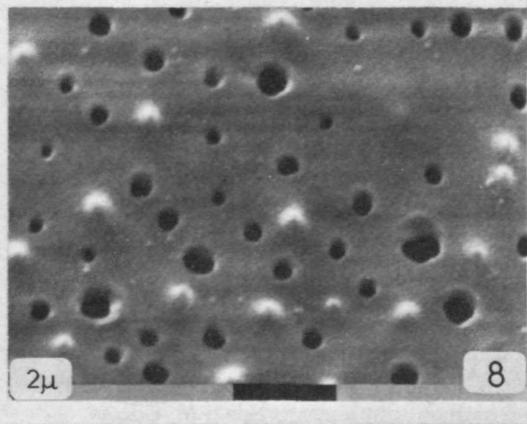
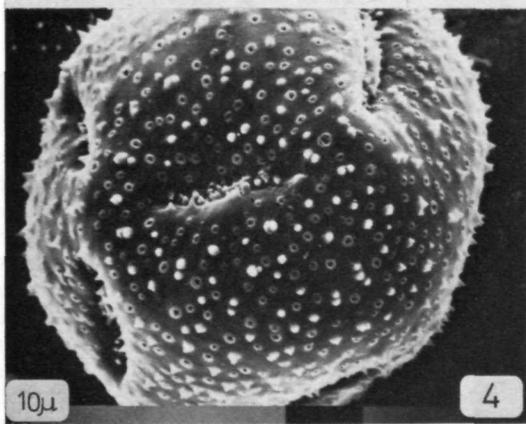
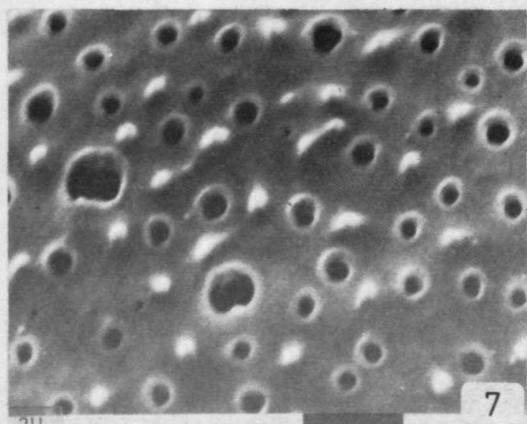
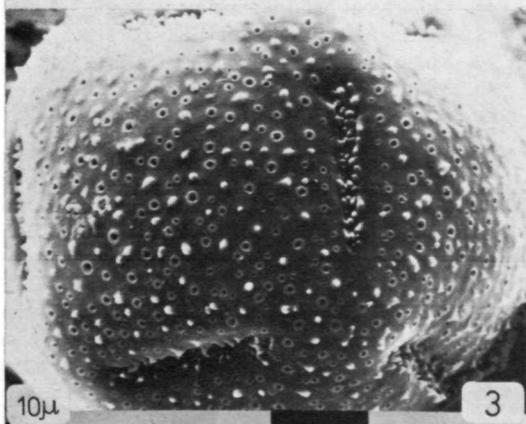
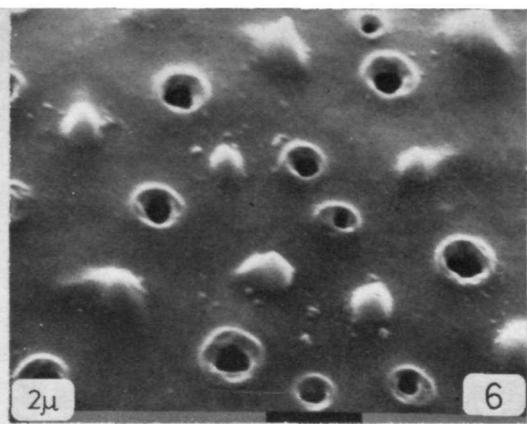
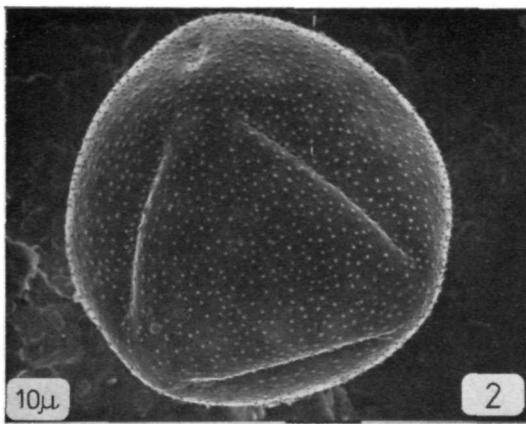
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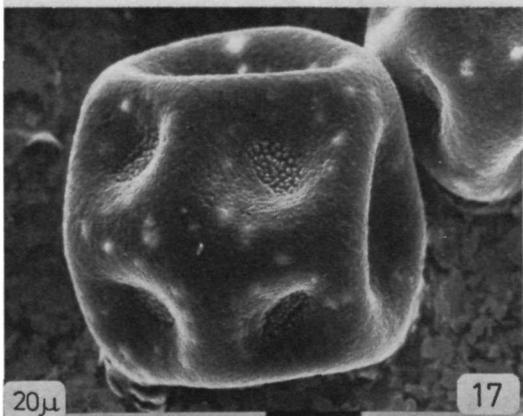
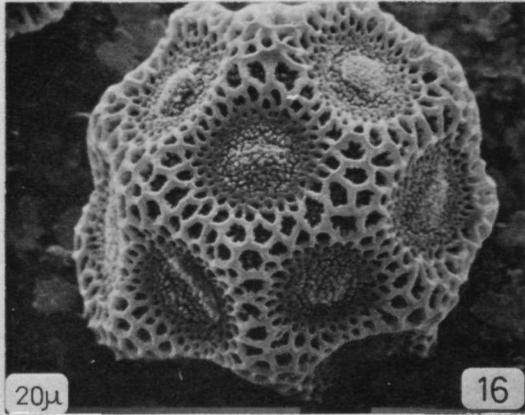
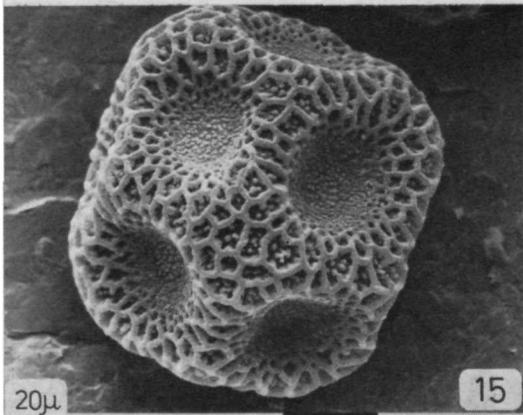
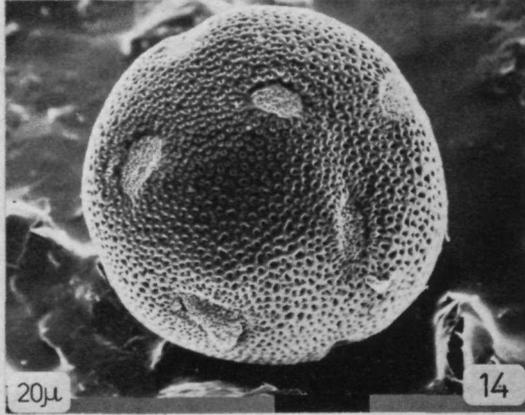
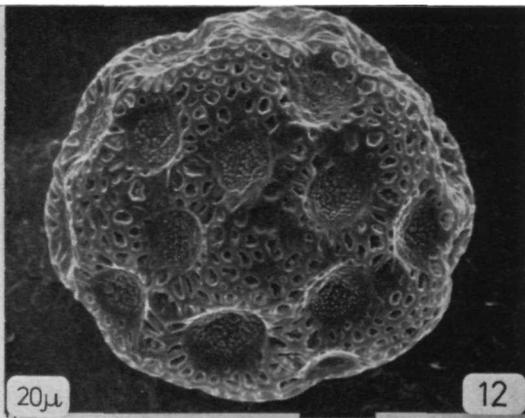
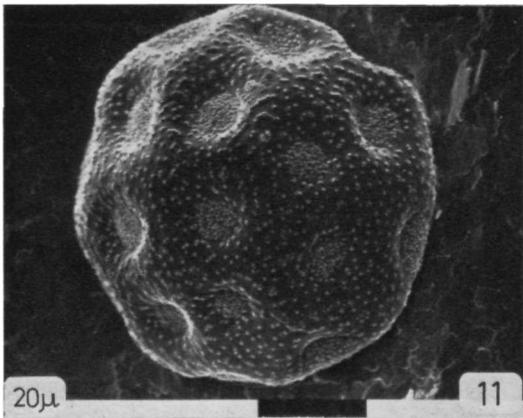
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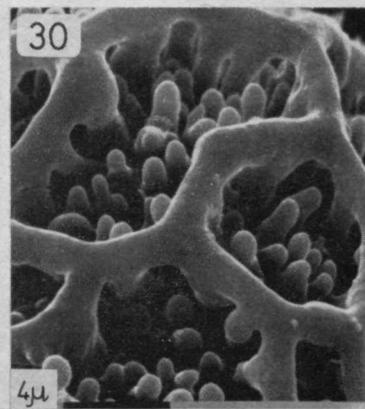
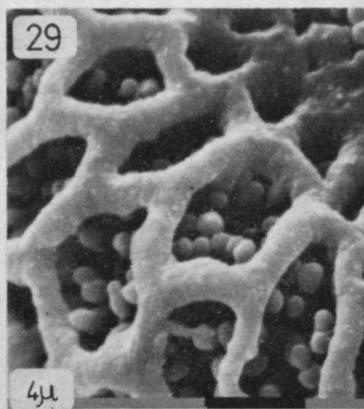
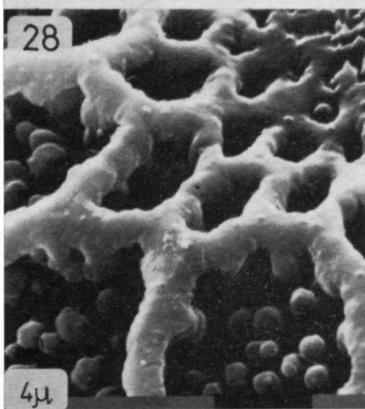
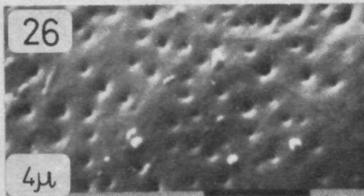
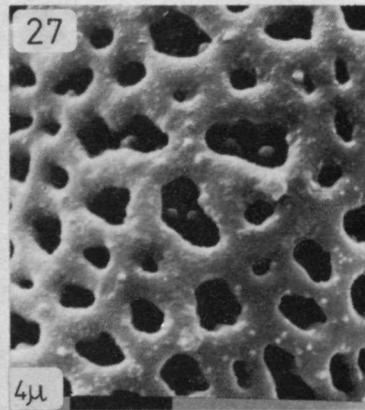
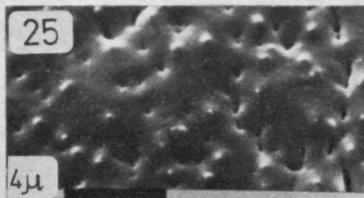
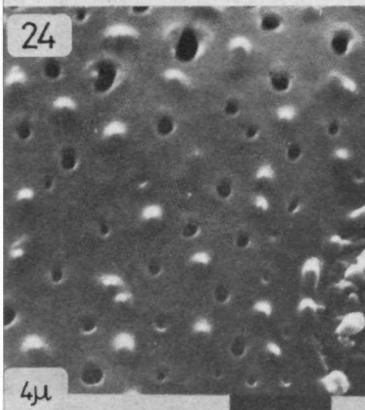
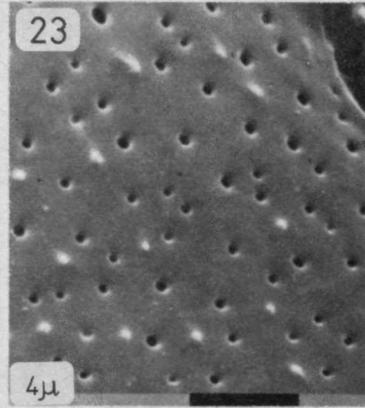
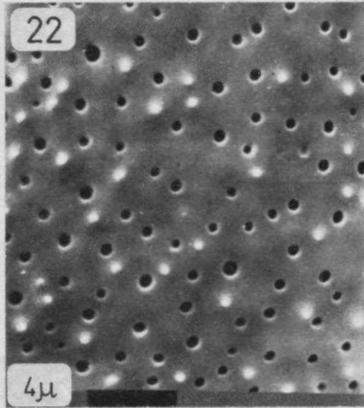
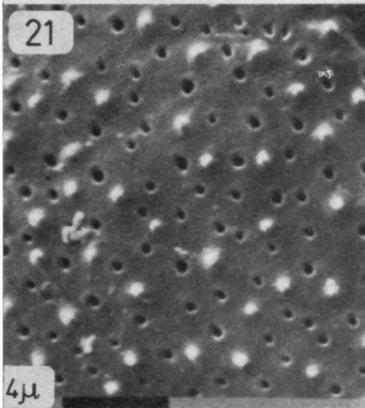
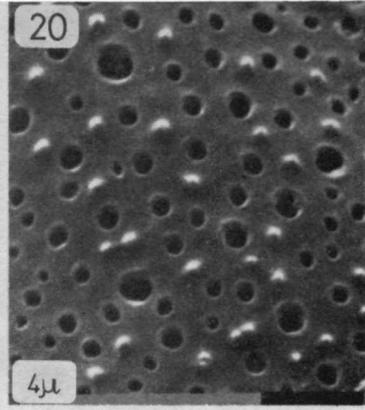
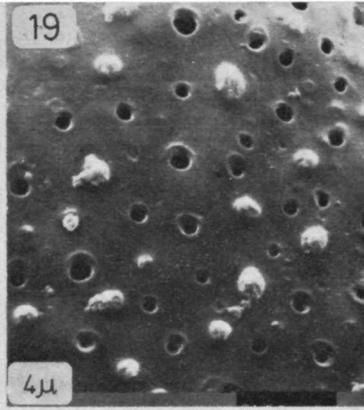
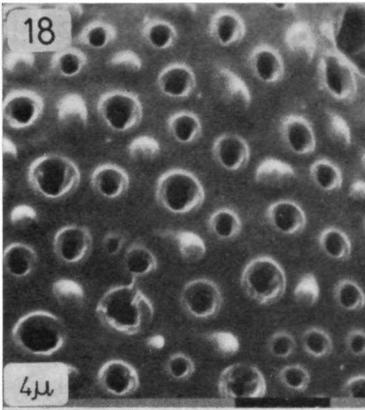
Figs. 2-119. Pollen micrographs (pages 84-94). Scale is indicated by a bar or line at the base of the photograph whose length is given in the left-hand bottom corner.

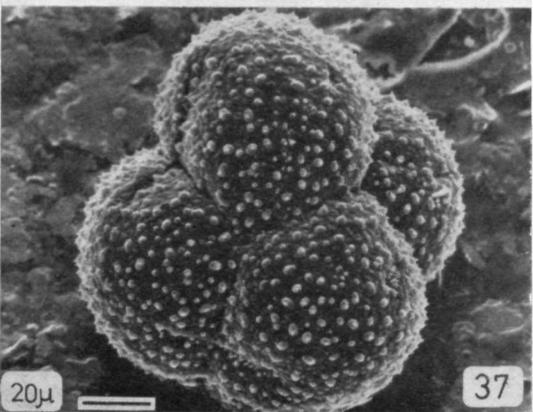
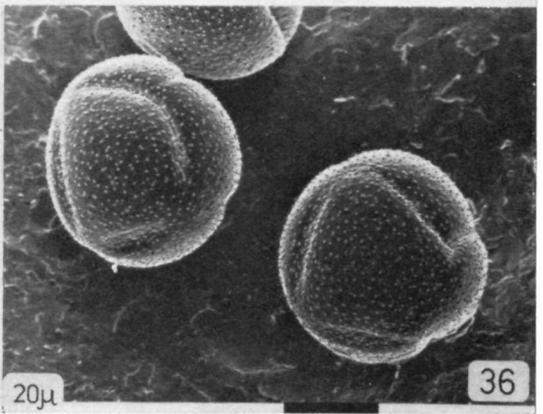
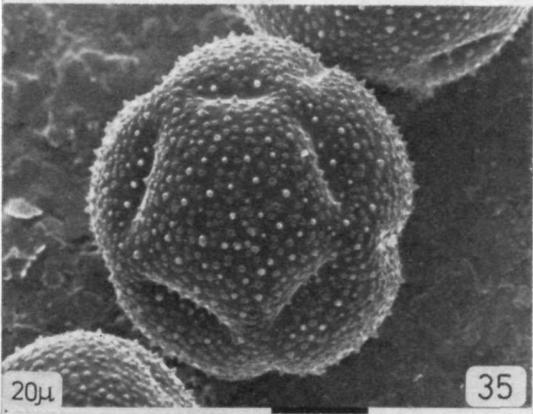
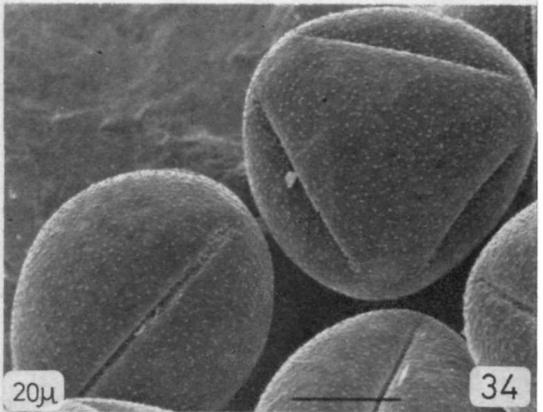
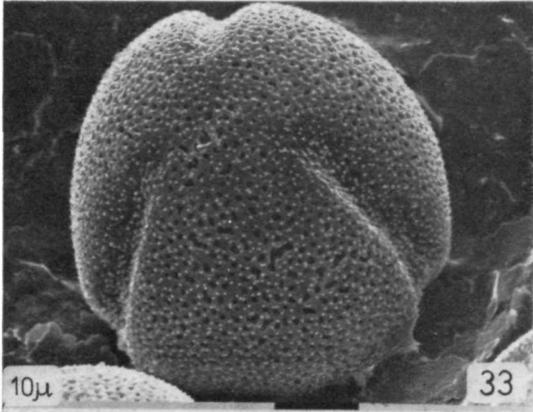
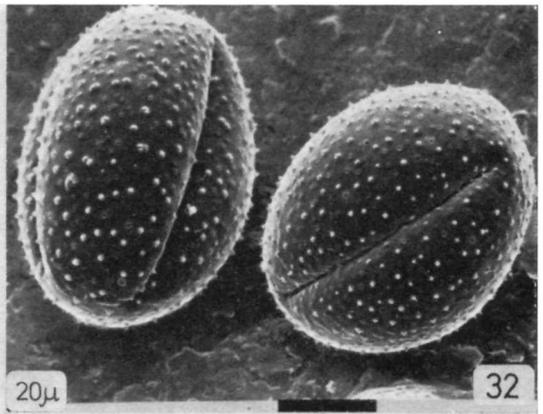
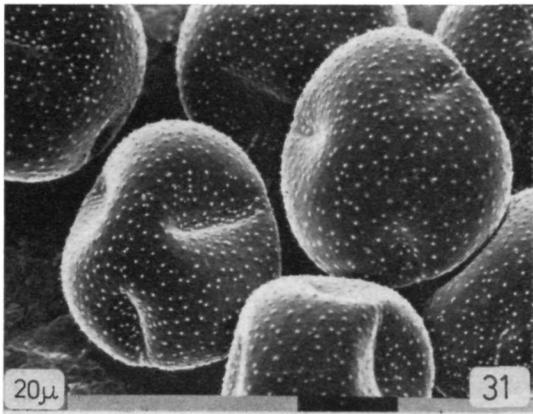
2. *Pereskia aculeata* Mill.
3. *Pereskia colombiana* B. & R.
4. *Pereskia cubensis* B. & R.
5. *Pereskia portulacifolia* (L.) Haw.
6. *Pereskia colombiana* B. & R.
7. *Rhodocactus antonianus* Backeb.
8. *Pereskia* H.233
9. *Pereskia* H.233
10. *Pereskia* aff. *humboldtii* B. & R.
11. *Austrocylindropuntia inarmata* Backeb.
12. *Opuntia* aff. *bella* B. & R.

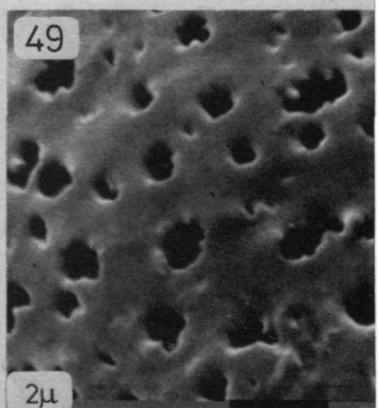
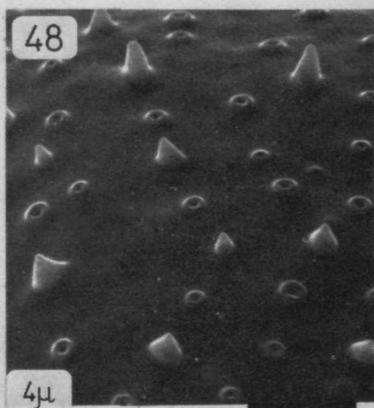
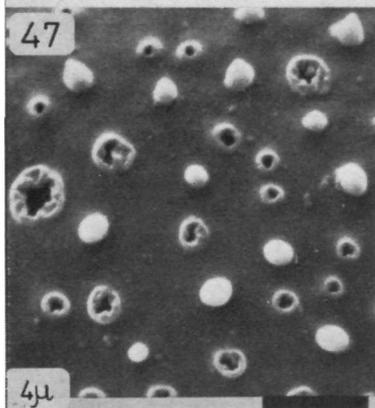
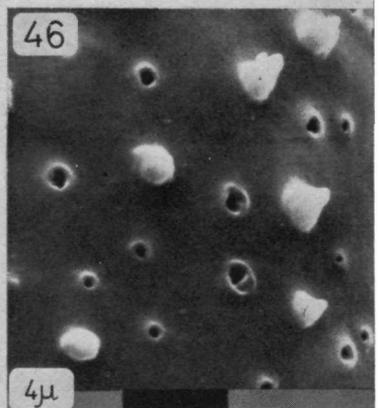
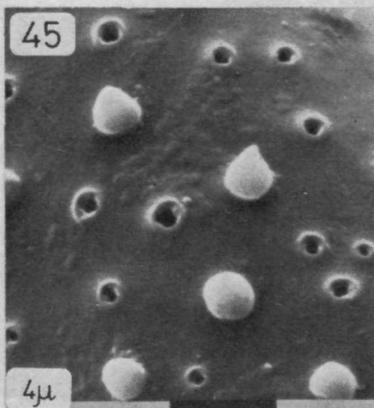
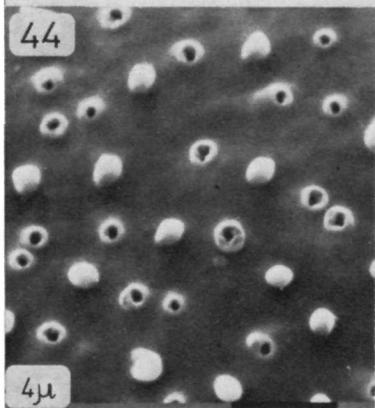
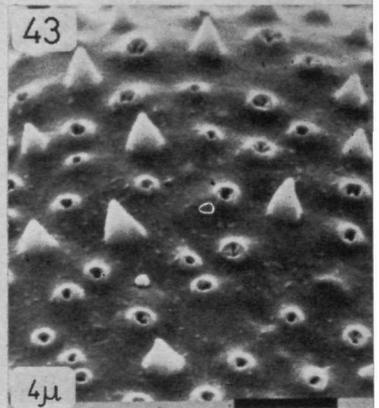
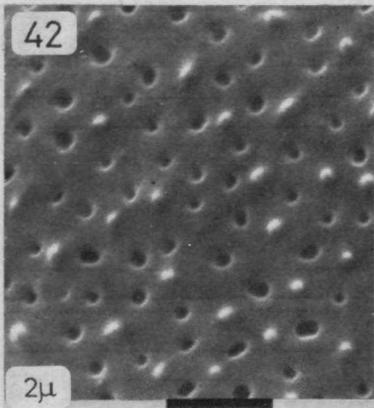
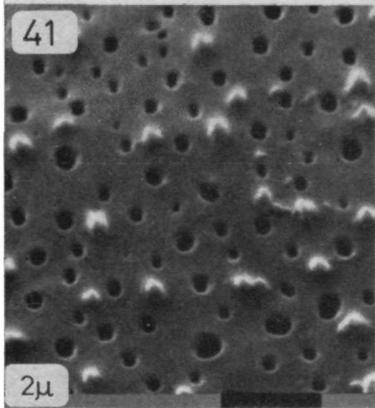
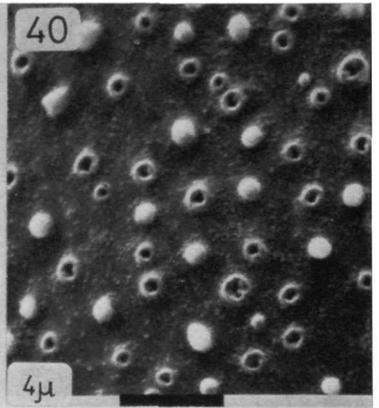
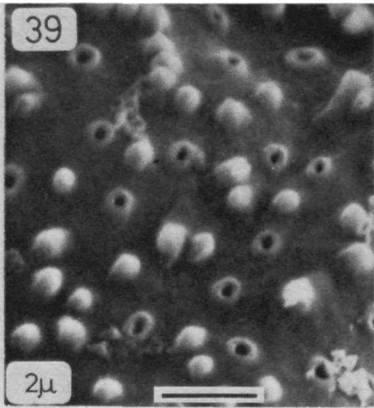
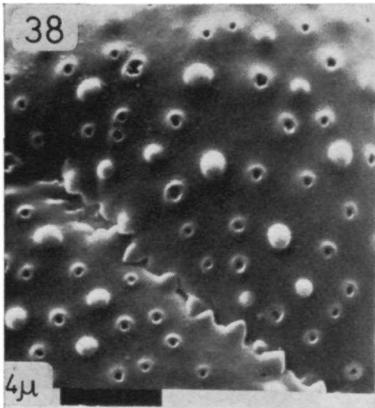
13. *Opuntia macbridei* B. & R.
14. *Consolea rubescens* (S.-D.) Lem.
15. *Opuntia microdasys* (Lehm.) Pfeiff.
16. *Opuntia decumbens* S.-D.
17. *Nopalea auberi* (Pfeiff.) S.-D.
18. *Pereskiaopsis velutina* Rose.
19. *Quiabentia chacoensis* Backeb.
20. *Corynopuntia stanlyi* (Engelm.) Knuth var. *kunzei* (Rose) Backeb.
21. *Cylindropuntia imbricata* (Haw.) Knuth
22. *Cylindropuntia hamiltonii* Gates nom. nud. (?:)
23. *Austrocylindropuntia subulata* (Mühlenpf.) Backeb.
24. *Pterocactus tuberosus*. (Pfeiff.) B. & R.
25. *Tacingia atropurpurea* Werd.
26. *Nopalea dejecta* (S.-D.) S.-D.
27. *Opuntia bergeriana* Web. ex Berger
28. *Opuntia microdasys* (Lehm.) Pfeiff.
29. *Opuntia gosseliniana* Web. (sample SSZ)
30. *Opuntia gosseliniana* Web. (sample BG HEID)
31. *Cleistocactus ritteri* (Backbg.) F. Buxb.
32. *Matucana weberbaueri* (Vaupel) Backeb.
33. *Ariocarpus agavoides* (Castañeda) E. F. Anderson
34. *Copiapoa haseltoniana* Backeb.
35. *Weberocereus biolleyi* (Web.) B. & R.
36. *Lophophora williamsii* (Lem.) Coult.
37. *Pseudorhipsalis himantoclada* (Rol.-Goss.) Woods. & Shery
38. *Neoabbotia paniculata* (Lam.) B. & R.
39. *Brachycereus nesioticus* (K. Sch.) Backeb.
40. *Peniocereus rosei* Ortega
41. *Wilcoxia poselgeri* (Lem.) B. & R.
42. *Wilcoxia schmollii* (Weing.) Backeb.
43. *Dendrocereus undulosus* (D.C.) B. & R.
44. *Eriocereus aff. guelichii* (Speg.) Berger
45. *Aporocactus flagelliformis* (L.) Lem.
46. *Aporocactus konzattii* B. & R.
47. *Selenicereus grandiflorus* (L.) B. & R.
48. *Hylocereus polyrhizus* (Web.) B. & R.
49. *Wilmattea minutiflora* B. & R.
50. *Weberocereus biolleyi* (Web.) B. & R.
51. *Epiphyllum phyllanthus* (L.) Haw. var. *pittieri* (Web.) Kimmach
52. *Nopalxochia konzattiana* T. MacDougall
53. *Pseudorhipsalis himantoclada* (Rol.-Goss.) Woods & Shery
54. *Wittia panamensis* B. & R.
55. *Pfeiffera ianthothele* (Monv.) Web.
56. *Erythrorhopsalis pilocarpa* (Loefgren) Berger
57. *Rhipsalidopsis rosea* (Lag.) B. & R.
58. *Rhipsalis capilliformis* Web.
59. *Pterocereus gaumeri* (B. & R.) MacDoug. &
60. *Escontria chiotilla* (Web.) Rose [Miranda]
61. *Heliabrayoa chende* (Gosselin) Backeb.
62. *Stenocereus beneckeii* (Ehrenb.) Backeb.
63. *Rathbunia alamosensis* (Coult.) B. & R.
64. *Rauhocereus riosaniensis* Backbg. var. *jaenensis* Rauh & Backeb.
65. *Gymnocereus amstutziae* Rauh & Backeb.
66. *Pseudopilocereus pentaedrophorus* (Lab.) F. Buxb.
67. *Pseudopilocereus superfloccosus* Buin. & Brederoo
68. *Coleocephalocereus fluminensis* (Miq.) Backeb.
69. *Coleocephalocereus goebelianus* (Vaupel) Ritter
70. *Trichocereus thelegonus* (Web.) B. & R.
71. *Soehrensia formosa* (Pfeiff.) Backeb.
72. *Weberbauerocereus winterianus*, Ritt.
73. *Arthrocerus microsphaericus* (K. Sch.) Berger
74. *Setiechinopsis mirabilis* (Speg.) Backeb.
75. *Cleistocactus tenuiserpens* Rauh & Backeb.
76. *Akersia roseiflora* Buin.
77. *Oreocereus hendriksenianus* Backeb.
78. *Seticereus humboldtii* (HBK.) Backeb.
79. *Matucana aureiflora* Ritt. var. *incaica* Ritt.
80. *Matucana myriacantha* (Vaupel) F. Buxb.
81. *Micranthocereus violaciflorus* Buin.
82. *Rebutia minuscula* K. Sch.
83. *Corryocactus brachypetalus* (Vaupel) B. & R.
84. *Austrocactus patagonicus* (Web.) Backeb.
85. *Eriocyce ceratistes* (Otto) B. & R.
86. *Islaya paucispina* Rauh & Backeb.
87. *Copiapoa haseltoniana* Backeb.
88. *Neochilenia krausii* (Ritt.) Backeb.
89. *Horridocactus tuberisulcatus* (Jac.) Y. Ito.
90. *Reicheocactus pseudoreicheanus* Backeb.
91. *Wigginsia fricii* (Ar.) D. M. Porter
92. *Uebelmannia buiningii* Donald 'var. nigra'
93. *Astrophytum myriostigma* Lem.
94. *Parodia columnaris* Card.
95. *Blossfeldia atroviridis* Ritt.
96. *Sulcorebutia markousii* Rausch
97. *Neowerdermannia vorwerkii* Fric var. *gielsdorffiana* Backeb.
98. *Discocactus cipolandensis* Buin. & Brederoo
99. *Bergerocactus emoryi* (Engelm.) B. & R.
100. *Morangaya pensilis* (K. Brandeg.) Rowley
101. *Oehmea nelsonii* (B. & R.) F. Buxb.
102. *Cumarinia odorata* (Boed.) F. Buxb.
103. *Gymnocactus* (Escobaria?) *aguirreanus* Glass & Foster
104. *Rapicactus mandragora* (Fric) F. Buxb.
105. *Mammilloidya candida* (Scheidw.) F. Buxb.
106. *Turbincarpus klinkerianus* Backeb. & Jacobs.
107. *Obregonia denegrii* Fric.
108. *Ariocarpus fissuratus* (Engelm.) K. Sch. var. *lloydii* (Rose) Marshall
109. *Ariocarpus fissuratus* (Engelm.) K. Sch.
110. *Pelecypora aselliformis* Ehrenb.
111. *Epithelantha micromeris* (Engelm.) Web.
112. *Ferocactus hamatacanthus* (Muhlenpf.) B. & R.
113. *Echinofossulocactus kellerianus* Krainz
114. *Neobesseyia missouriensis* (Sweet) B. & R.
115. *Neobesseyia asperispina* (Boed.) Boed.
116. *Ortegocactus macdougallii* Alex.
117. *Pseudomammillaria decipiens* (Scheidw.) F. Buxb.
118. *Mammillaria pectinifera* Web.
119. *Lepidocoryphantha macromeris* (Engelm.) Backeb.

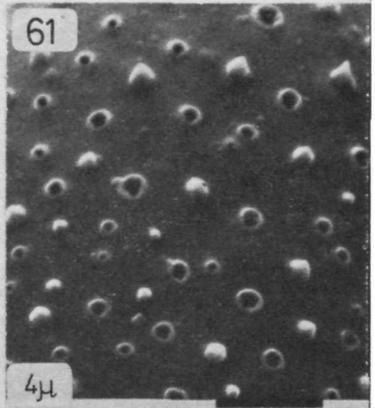
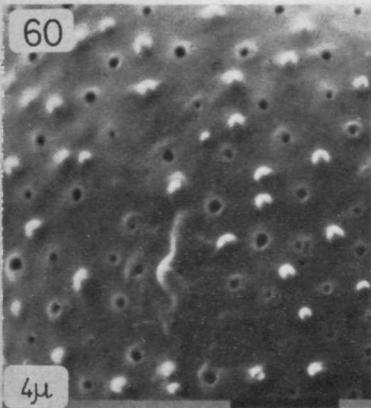
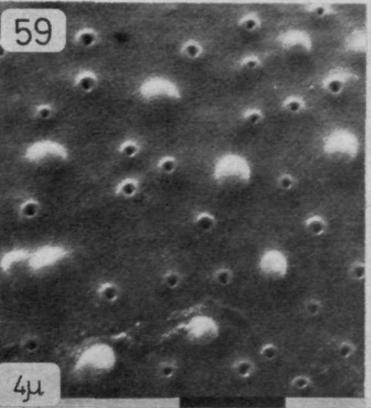
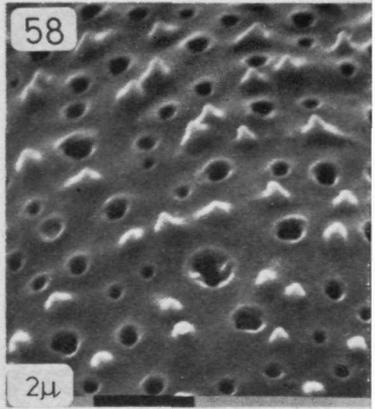
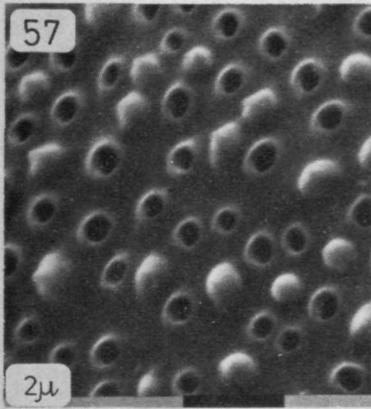
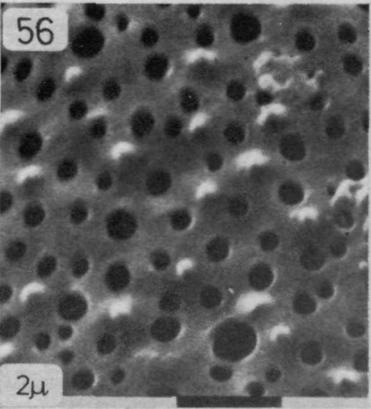
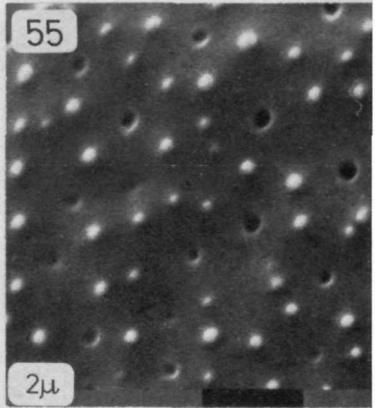
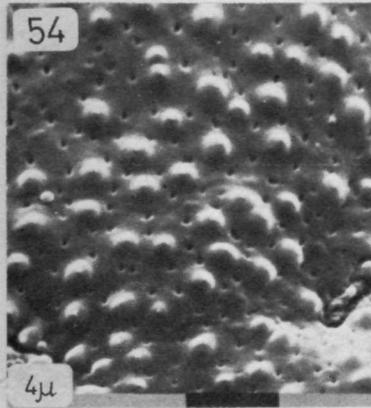
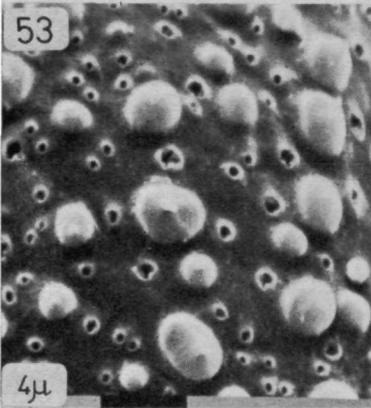
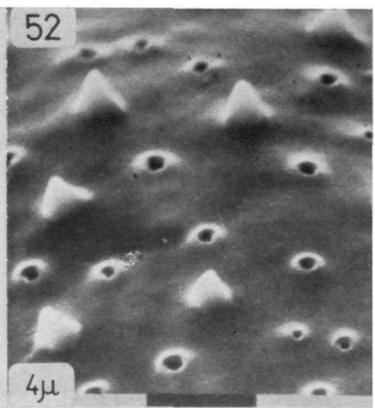
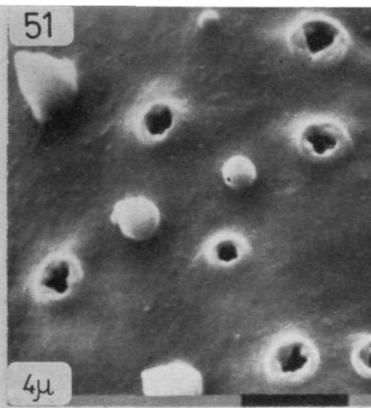
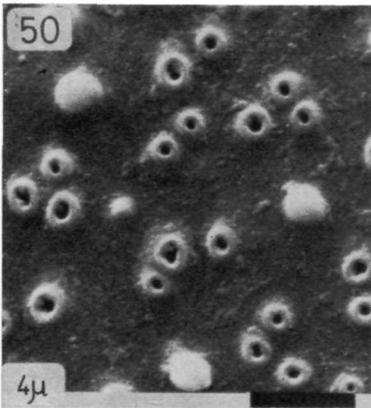


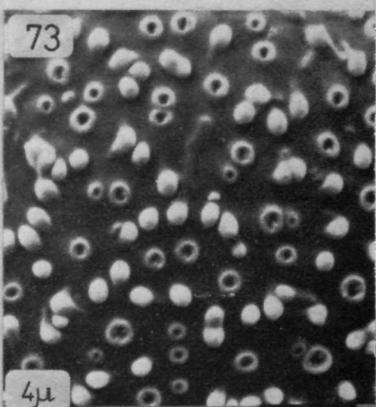
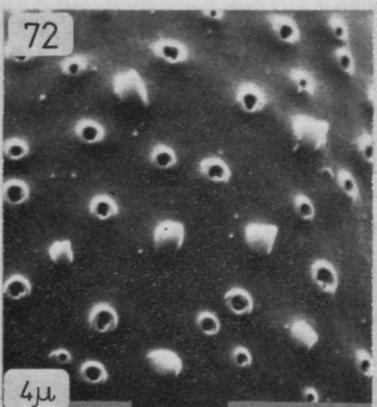
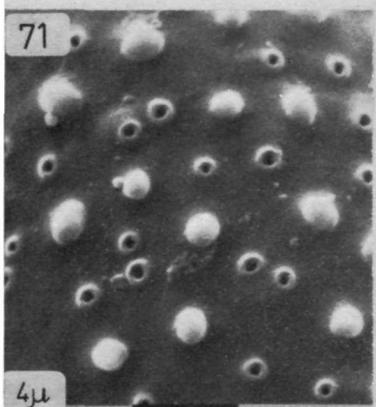
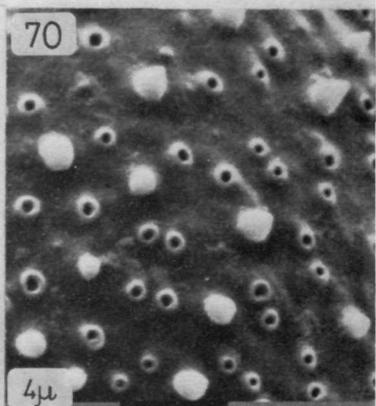
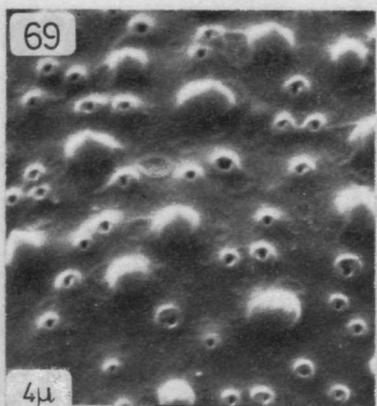
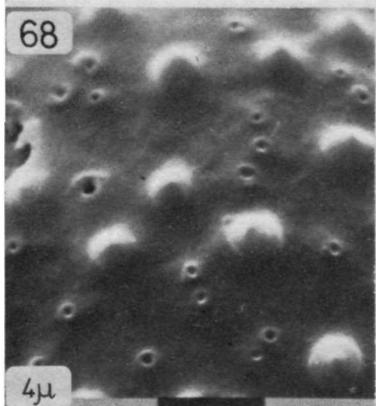
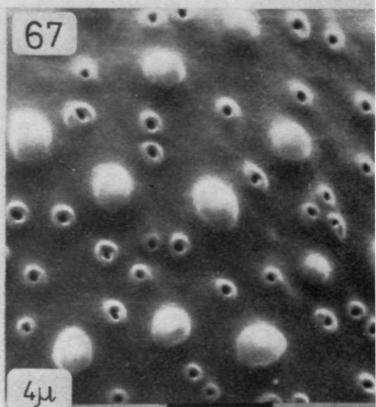
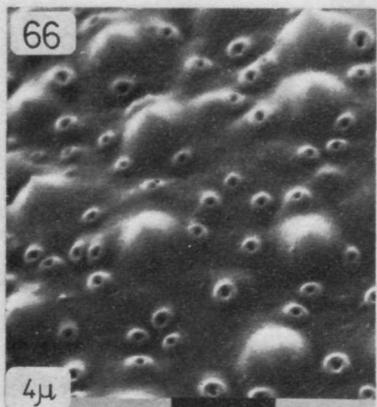
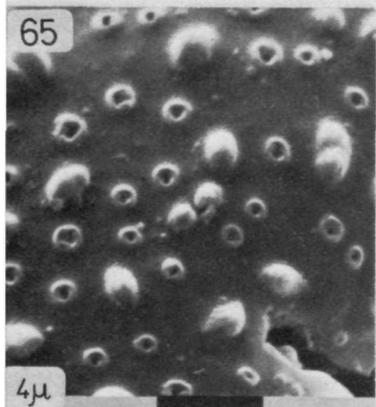
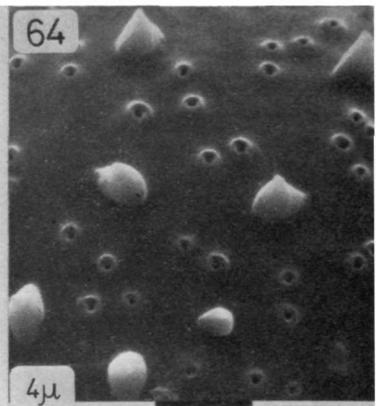
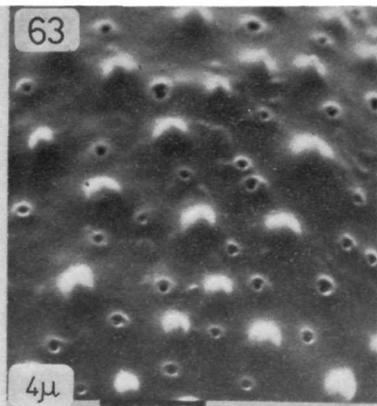
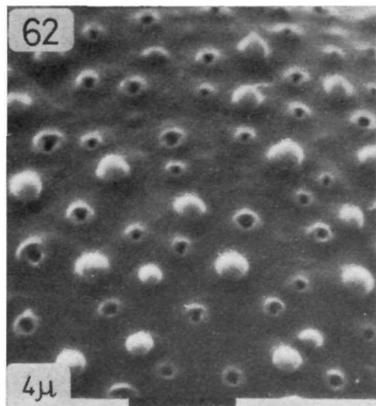


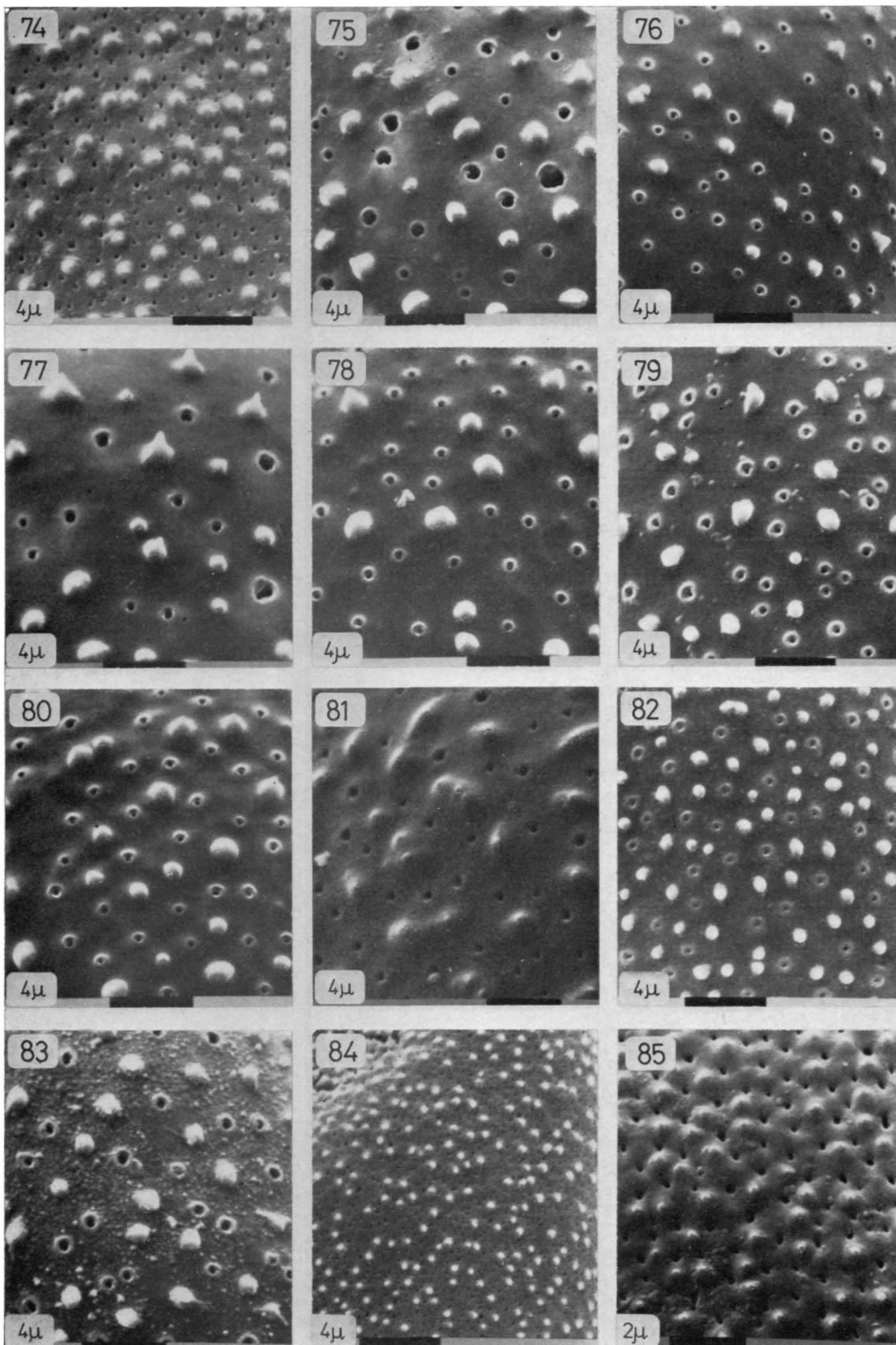


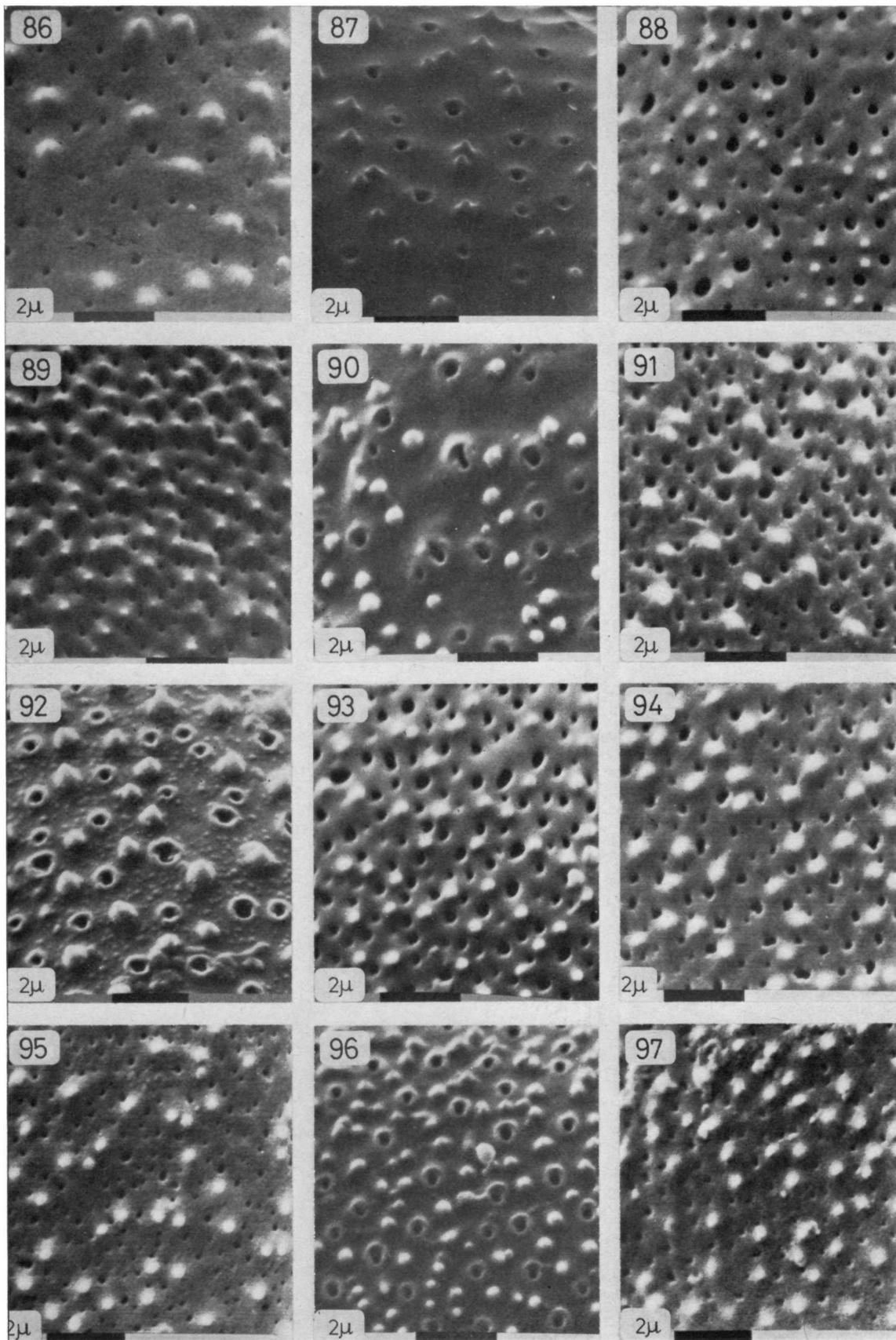


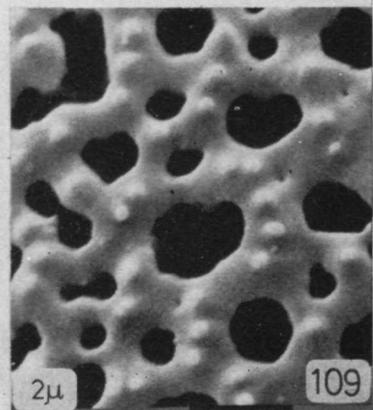
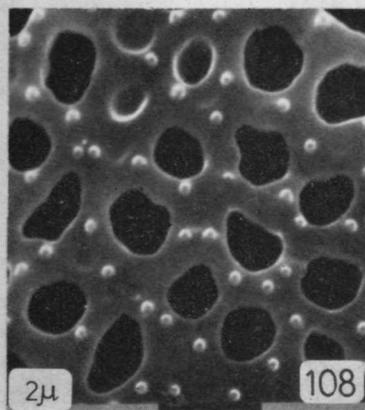
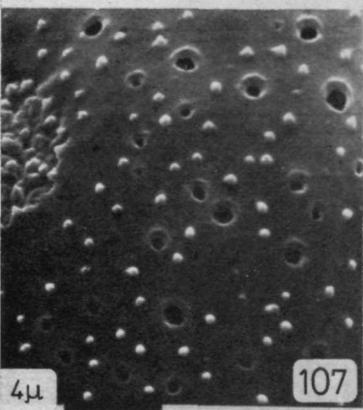
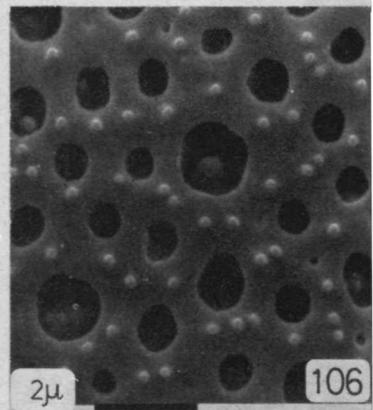
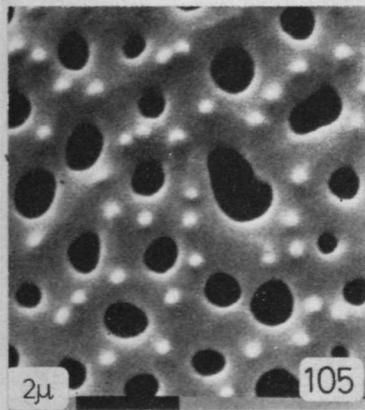
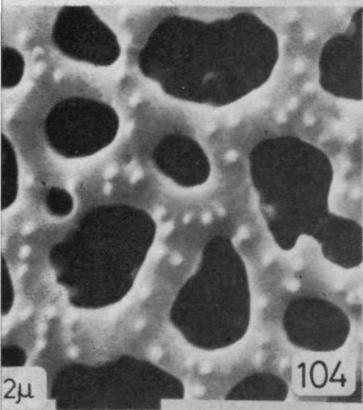
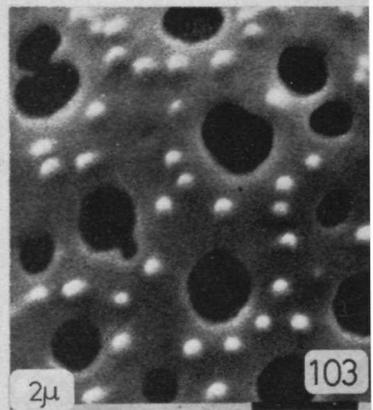
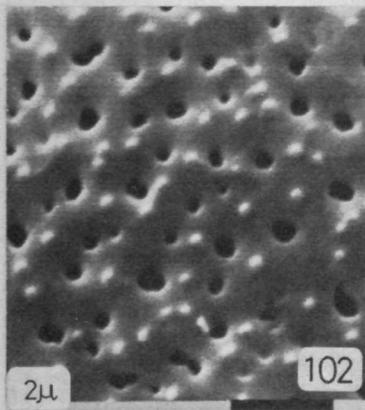
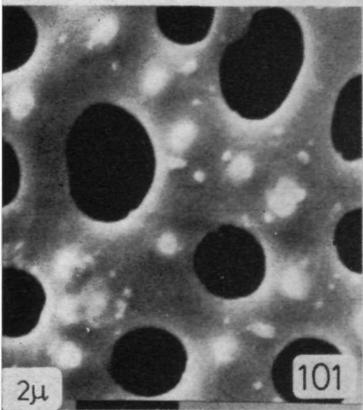
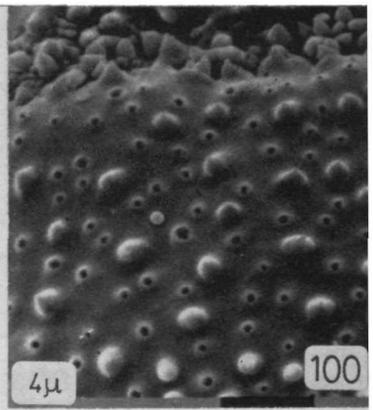
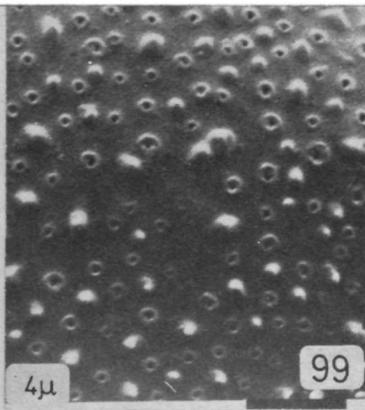
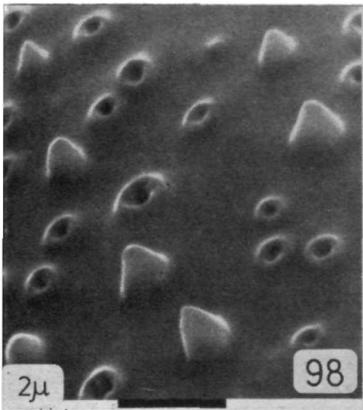


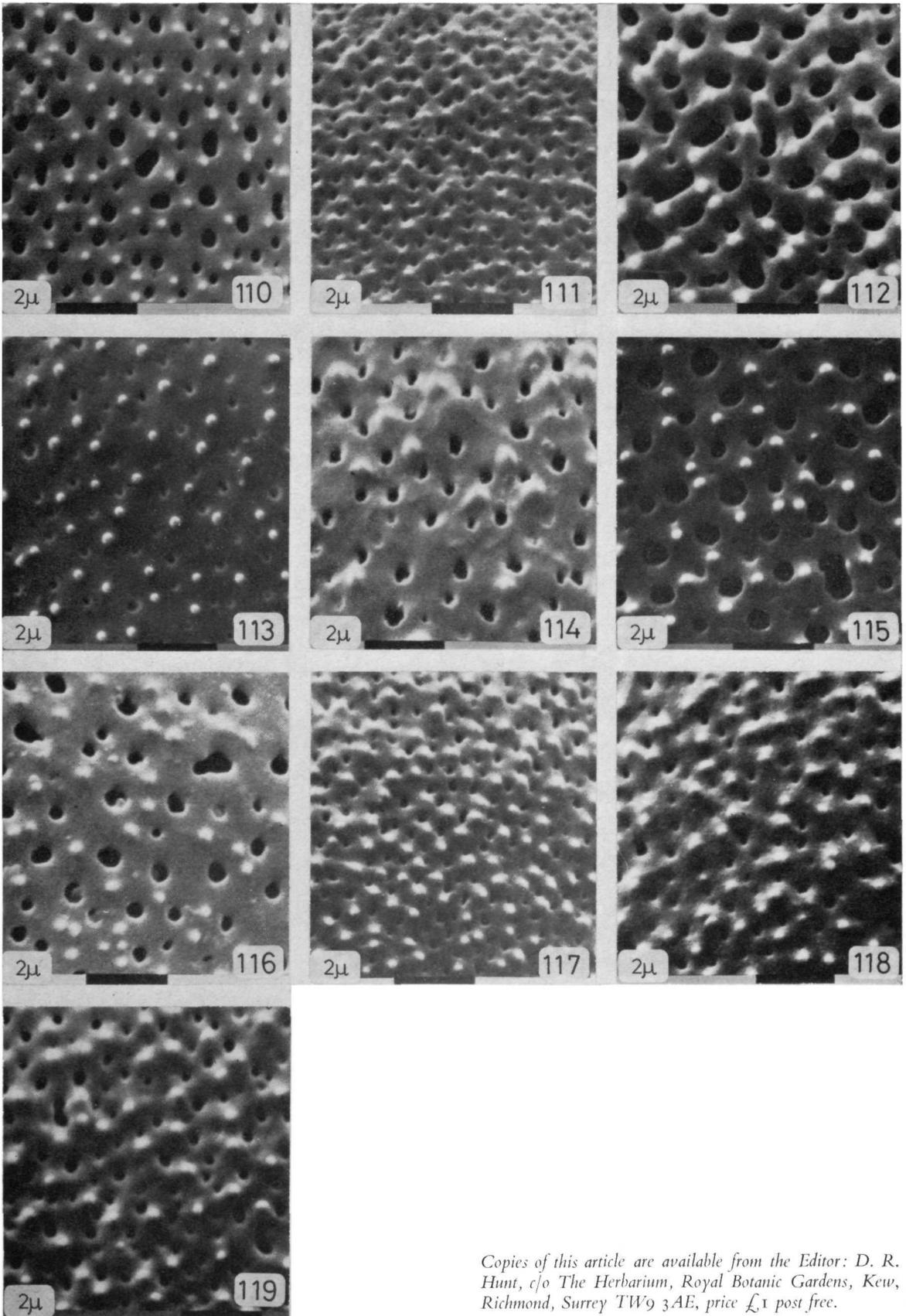












Copies of this article are available from the Editor: D. R. Hunt, c/o The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, price £1 post free.

Succulent Snippets

It was good to meet members from many parts of the country at Pimlico in June. The summer show is becoming as much an annual gathering for all of us as the Dinner. Next year (make a note of the date now—June 18th) I hope to meet still more of you and, of course, your prize plants as well!

We in most parts of England are still suffering from the water shortage, though the rain is beating down outside as I write. When the drought was at its worst the Editor returned from another of his jaunts to Mexico complaining that it had been cool and very wet there. Two years ago his friends loaded him up with bags of sugar to bring home (remember the sugar famine?); this time they were offering buckets of water!

Viva España!

There were about twenty of us from the U.K. at Barcelona for the IOS Congress—once we all got there. The strike of airport workers in Spain delayed many of us several hours and some poor folk for more than a day. What they said is *not* printable!

For me, there was *almost* too much to eat and drink, *almost* too many slides (but what a range, from close-ups of pollen grains to habitat shots in Peru, Mexico and South Africa) and *certainly* too little sleep, but



Professor Nodrog Yelwor, the well-known authority, glimpsed (a posteriori) at his devotions in Spain. Onlookers are former GB editor Len Newton and Betty Maddams (photo: W. F. Maddams)

never too many of those marvellous outdoor plantings of towering cacti and impressive other succulents.

Congress follies

—Señor Panella, one of our hosts and the programme organiser, blowing his whistle to try to assemble the enthusiastic masses and hustle them along—a difficult task when fifty or more ardent cactophiles are looking at wonderful plants!

—A well-known member of the British contingent (all in pastel blue) flitting round an illuminated cactus garden at night, just like the pollinating moths he was trying to spot!

—Our Chairman, Bill Maddams, strolling under a hose-spray in the palace gardens just for the excitement of enjoying a sprinkler in action again!

Buy-lines

Have you seen the Cacti and Succulents Wall Chart offered by one of our advertisers, L. Bell & Co. Ltd.? It really is very colourful. The illustrations are very good (some have been published before, I think, in Werner Rauh's book *Die grossartige Welt der Sukkulenten*), and reliably named so far as I can judge. It would make a nice Christmas present.

A pair of tongs for picking out tightly-packed pots is useful whenever you're in the greenhouse and especially during the winter clean-up or when repotting. Weldale Cacti and Succulents have designed their own and these are now being manufactured for sale. They are about 12 inches long and sturdily made of steel, with a return spring at the pivot. They'll save your plants—and you—from painful encounters, pricks and hook-ups, and should be very popular! Order from Weldale, at Ellingtons, Bromley Lane, Much Hadham, Herts SG10 6HU, price £1.65 per pair, plus 40p postage and packing.

Act now

Drop a line to the Secretary to reserve your place at the Annual Dinner on Saturday 27 November. I'm told there will be slides of Barcelona to round off the evening. I hope to see you there; if not, have a happy Christmas and a sch . . . sch . . . schlumbergerous New Year!

Sally Cornioides

Correspondence

Composts

Mr. Maddams's notes on composts in the May Journal prompt me to tell you of my experiences. I have a fairly large number of cacti and succulents, and my wife and I also grow a fairly large number of pot plants of other types. Generally speaking we find that the soilless composts are most suitable for plants such as tomatoes and chrysanthemums which will be subjected to a pro-

gramme of feeding no matter what type of compost they are grown in.

The nutrient content of soilless composts is very small and no matter what the plant is, feeding is necessary after 6 – 8 weeks. John Innes composts on the other hand, are capable of supporting plants for a great deal longer, and furthermore the loam in the compost provides a very effective 'buffer' when feeding is carried out, and it is also an excellent source of trace elements. I find that a good substitute for the loam specified is to use good garden soil that has been stacked for six months or so with either manure or garden compost. This gives a good crumb structure and being rich in humus, wets out easily. There is certainly no secret as to the formulation of soilless composts. The work done by the University of California was published in a paperback form in 1957 and a very good mix was published in the RHS Journal a year or two ago:

	<i>for potting</i>	<i>for seeds</i>
Sphagnum peat	75%	50%
Sand	25%	50%
Superphosphate	2 oz	1 oz
Potassium nitrate	1 oz	$\frac{1}{2}$ oz
Ground Chalk	3 oz	3 oz
Ammonium nitrate	$\frac{1}{2}$ oz	—
Dolomite Lime	3 oz	—
Trace element grit	$\frac{1}{2}$ oz	—

All quantities are per bushel (8 gals.) of the mixture of peat and sand. Sand should be sharp river sand. Some of the materials quoted may be difficult to obtain, but Chempak Ltd., Brewhouse Lane, Hertford, SG14 1JS, market small bags of the chemicals ready mixed.

Each bag contains sufficient for two bushels and costs around 40p. I have no interest financial or otherwise in Chempak and I can thoroughly recommend their mix. They also sell all the chemicals named separately.

Good as this compost is, however, I still prefer to grow my plants in John Innes No. 2 with extra grit!

I have also been looking into the feeding of cactus and succulent plants, and have been experimenting with a blend of mono-ammonium phosphate, sulphate of potash, and sulphate of magnesia which seems to be giving good results, but it is early days yet!

F. WAKEFIELD
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Reference

BAKER, K. F. (ed.). (1957). The U.C. System of producing healthy container-grown plants. Calif. Agric. Exp. Staff Extension Service Manual 23.

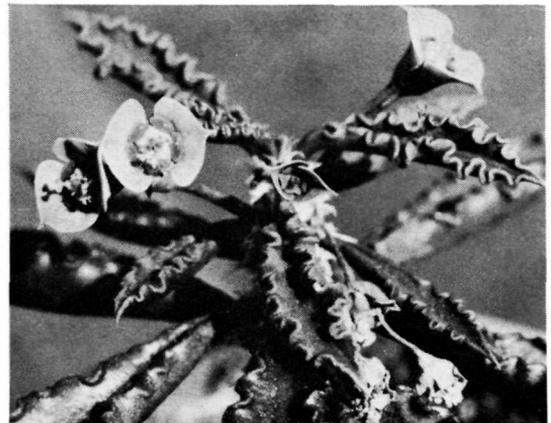
Connoisseur's Corner

Euphorbia decaryi

It was not long ago that the majority of Euphorbias grew to a fair size at maturity and small collections were somewhat limited to globular types such as *E. obesa* and *E. caput-medusae* as the more columnar types soon assumed fair proportions. However, explorations in south-east Madagascar have produced a selection of dwarf Euphorbias that have proved interesting and comparatively easy to grow under glasshouse conditions and probably *E. decaryi* is the most popular.

It produces tough succulent stems which are semi-prostrate; these are whitish and rough and branch out from the base like a fan. The leaves are wavy edged, dark green above and silver-green on the underside; they are stiff and long and thin, tending to redden towards the apex of the stems in a sunny position. The inflorescence is on a short stem; each consists of two greenish yellow red-edged bracts (cyathophylls) around the inner flower parts; they appear at intervals throughout the summer months and gradually dry off.

This species does not seem to present any difficulties in cultivation. It grows easily from seed and inflorescences can open in the second summer; early growth seems to be upright but as side branches grow the semi-prostrate effect begins. As a fairly mature plant will probably not outgrow a five-inch pot it is clear that younger plants in smaller containers will require plenty of water in the summer months to maintain the moisture in the stout stems above ground and the stolons below. Some moisture is also required in winter if they can be given the minimum temperature around 13°C (55°F) which they prefer. It is generally recommended that these plants like a slightly shady situation but, given sufficient water and air circulation, they can look most attractive when grown in full sunshine.



Euphorbia decaryi (photo: Betty Maddams).

Society Sales

Society Christmas Cards, with badge and greetings in red	5p each, incl. envelope; 10 for 45p (postage 10p)
Booklets	15p (postage 10p)
Badges	45p (postage 10p); 10 for £4.75 post free
Ties (navy blue)	£1.00 (postage 10p)
Car Stickers	17p (postage 8p); 10 for £1.65 post free
Ballpoint pens (blue or black)	5p each, 10 for 45p (postage 15p)
Key Fobs (various colours) ..	10p each, 10 for 95p (postage 10p)

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

Back numbers

Back numbers of the Journal are obtainable from Mr. A. W. Heathcote, Southwold, Station Road, Bishopstone, Seaford, Sussex, BN25 2RB. Each volume is made up of four numbers. The following are available:
Volumes 21-22 15p per number
Volumes 23-37 25p per number
Postage 10p per number, 20p per volume, extra overseas.

Note from the Publicity Officer

All members and branches holding the yellow membership forms, or booklets containing application forms, are asked to be sure that they amend the details of subscription rates before handing them out. Further supplies of forms are available on request—please assist by sending a stamped 8 in. × 5 in. envelope.

In our next issue

The February 1977 number will include 'Forum: *Ariocarpus*', compiled by Ray Pearce; John Donald on drawing the line between *Echinopsis* and *Lobivia*, and Brian Ivimey-Cook on 'What is a species?', plus notes on the Society Seed Distribution and articles by our regular contributors.

Cactaceas y Suculentas Mexicanas

The Journal of the Mexican Cactus Society. Published quarterly in Spanish with extensive English summaries. Well illustrated in black and white and with at least two colour illustrations. At least 24 pages in each issue, featuring scientific articles, reports of field trips and so on.

The annual subscription (including Society membership; Journal sent by surface mail) is \$5 U.S. currency, payable direct to Dudley D. Gold, Apdo. Postal 979, Cuernavaca, Morelos, Mexico. Alternatively, you can send £3.00 to David Hunt, who will make the necessary arrangements for prospective U.K. members.

Forthcoming Meetings

At Westminster

Wednesdays at 6 for 6.30 p.m. at the Royal Horticultural Society's New Hall, Greycoat Street, S.W.1.:

8 December	Slide Competition
5 January	Succulents of Tenerife (L. Hurley)
2 February	Travels in East Africa (Dr. P. Brandham)

Summer Show, 18 June 1977

Council have decided to continue holding the Summer Show at St. Saviour's Church Hall, St. George's Square, Pimlico, and the date next year will be Saturday 18 June. Please make a note of it now! Further details of the classes, draw and Junior poster competition will be in the February Journal.

Branch Meetings

Branch Secretaries are listed on the inside front cover.

Northern Counties. Social Service Centre, Park Road, Whitley Bay. 3rd Monday in month, 7.30 p.m.

Wirral. 'The Grange', Grove Road, Wallasey. 3rd Thursday in month, 8 p.m.

North Staffs. Contact Mr. J. Wilson, 5 Monkton Close, Dresden, Longton, Stoke-on-Trent, ST3 4BG.

Berks and Bucks. Allotment Holders New Hall, St. Leonards Road, Windsor, 2nd Tuesday in month, 7.30 p.m.

Herts. Friends Meeting House, Upper Latimore Road, St. Albans. Contact Branch Secretary.

Hatfield & District. Hatfield Congregational Church Hall, St. Albans Road East, Hatfield. 4th Monday in month, 7.30 p.m.

North London. Chapel Manor Primary School, Bulls-moor Lane, Enfield. 3rd Friday in month, 7.30 p.m.

Essex. Room A3 (film room), Little Ilford Comprehensive School, Church Road, Manor Park, E.12. 1st Saturday in month. 7.30 p.m.
The Annual Branch Dinner will be held on 4th December.

North Surrey. Adult School, Benhill Avenue, Sutton. 1st Tuesday in month. 7.45 p.m.
7 December Members' Slide Evening

East Surrey. Community Centre, High Street, Caterham. 3rd Tuesday in month, 7.45 p.m.

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Annual General Meeting

In accordance with Rule 6, I hereby give notice that an annual General Meeting of the Cactus and Succulent Society of Great Britain will be held on Wednesday, 30th March 1977, in the New Hall of the Royal Horticultural Society, Greycourt Street, London, S.W.1, commencing at 6.30 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 President and 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.

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 Tuesday, January 25th, 1977.

The following are due to retire and are eligible for re-nomination:—

Chairman	Mr. W. F. Maddams
Honorary Secretary	Mr. R. H. I. Read
Honorary Treasurer	Dr. R. Rolfe
Members of Council	Mrs. H. Hodgson, Mr. D. T. Best, Mr. R. Pearce

In the event of the number of nominations exceeding the number of vacancies, a ballot paper will be circulated to paid-up members not less than six weeks prior to the Annual General Meeting.

R. H. I. READ
Honorary Secretary.

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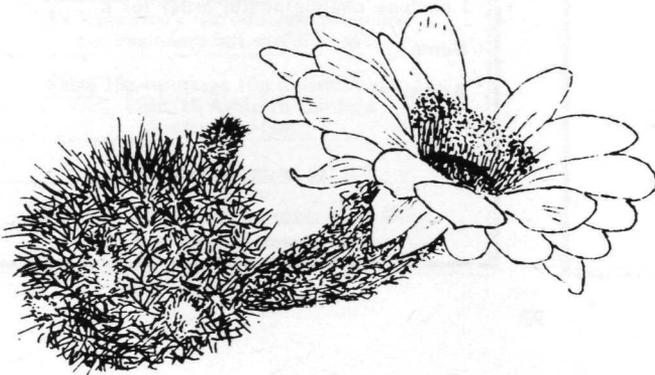
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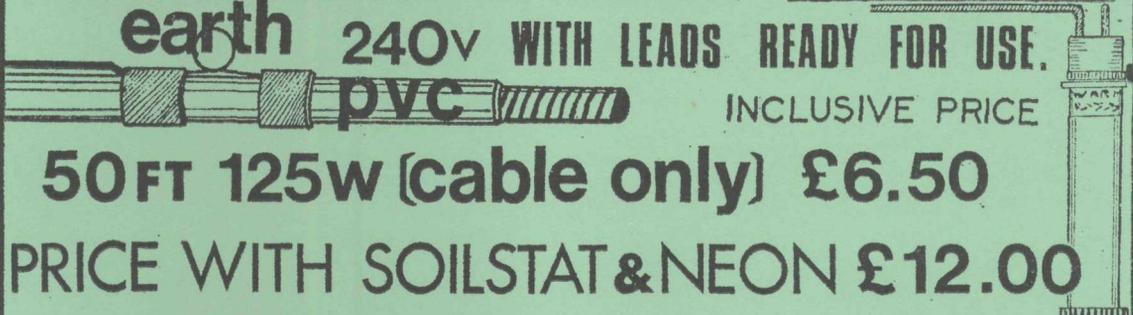
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