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Fig. 1. *Mammillarias* at the Exhibition.

[Photo by R. Malby & Co.]

The Cactus Show

ON July 2nd and 3rd, 1935, the third Cactus Exhibition was held at the Royal Horticultural Society's Old Hall, Westminster. The number of entries in the Competitive Classes was nearly twice as large as in previous years and professional growers were also well represented.

W. T. and H. E. Neale had an interesting and extensive exhibit along one side of the Hall; the Cacti were arranged in botanical sequence and some fine plants were included. There was a 3ft. high specimen of *Lophocereus Gatesii* bearing a number of flowers and a fine pan of *Echinocereus dubius* with six large magenta blossoms open; Echinocacti and Mammillarias were also well represented.

Amongst other succulent plants Mr. Neale was showing shrubby Mesembryanthemums in full flower, Euphorbias, Cotyledons and Bryophyllums which bear plantlets on their leaves, such as *B. tubiflorum* and *B. Daigraimontianum*. The London Garden Stores were showing a number of different Cacti and had some very fine cristates; amongst many other succulent plants they had some of the large Euphorbias, like *E. Ammak* and *E. abyssinica*. F. Denton of Dewsbury, exhibited a large number of seedlings of his own raising; these were beautiful little plants, especially *Leuchtenbergia principis*, *Echinocactus Leninghausii*, *Astrophytum ornatum*, *Pilocereus senilis* as well as Lithops,

Stapelias and Carallumas. The requirements of growers were catered for by Mrs. Helen Milford who showed her tufa pans and square pots, very suitable for Cacti, and by C. E. West who had a comprehensive range of gardening sundries.

The following are the prize winners in the Competitive Classes :—

- Class 1. Twelve Echinocacti. 1st, S. J. Pullen; 2nd, P. V. Collings; 3rd, Mrs. Vera Higgins; commended, C. Clarke.
Class 2. Twelve Mammillarias. 1st, P. V. Collings; 2nd, J. W. Joyce; 3rd, S. J. Pullen.

limited). 1st, D. de C. Smiley; 2nd, A. Harold; 3rd, A. E. Watts.

Class 10. One specimen Cactus. 1st, R. Reid; 2nd, A. E. Watts; 3rd, Mrs. A. Davey.

Class 11. One Cactus that has been ten years or more in the Exhibitor's possession. 1st, Dr. F. H. Rodier Heath; 2nd, R. Reid; 3rd, A. Harold; commended, A. Boarder.

Class 12. Seedlings raised from seed distributed by Mr. Boarder. 1st, Dr. H. T. Marrable; 2nd, Mrs. Vera Higgins; 3rd, Mrs. G. Birkett.



Fig. 2. Old Plants.

[Photo by R. Malby & Co.]

Class 3. Twelve Cerei. 1st, Dr. H. T. Marrable; 2nd, Mrs. Vera Higgins.

Class 4. Six Echinocacti. 1st, D. de C. Smiley; 2nd, Mrs. A. Davey; 3rd, J. Tyson.

Class 5. Six Mammillarias. 1st, A. E. Watts; 2nd, A. Emm; 3rd, D. de C. Smiley.

Class 6. Six Cerei. 1st, D. de C. Smiley; 2nd, S. J. Pullen.

Class 7. Twelve Cacti, any genera. 1st, Dr. H. T. Marrable; 2nd, Mrs. Vera Higgins; 3rd, S. J. Pullen; commended, C. Clarke.

Class 8. Six Cacti, any genera (size of pot limited). 1st, D. de C. Smiley; 2nd, Mrs. A. Davey; 3rd, G. E. J. Jeffery.

Class 9. Three Cacti, any genera (size of pot

Class 13. Cacti raised from seed by the Exhibitor. 1st, R. Reid; 2nd, A. Boarder; 3rd, C. Clarke.

Class 14. A Miniature Garden. 1st, B. Webb; 2nd, E. C. Edwards; 3rd, Mrs. A. Davey.

Class 15. Twelve Succulents. 1st, Mrs. Vera Higgins; 2nd, C. Clarke; 3rd, P. V. Collings.

Class 16. Six Succulents (size of pot limited). 1st, S. J. Pullen; 2nd, Mrs. A. Davey; 3rd, A. Harold.

Class 17. Twelve Euphorbias. 1st, Mrs. Vera Higgins; 2nd, Dr. H. T. Marrable.

Class 18. Six Euphorbias (size of pot limited). 1st, Miss H. Mackenzie; 2nd, Mrs. A. Davey; 3rd, S. J. Pullen.

Class 19. Twelve Mesembryanthemums.

1st, Mrs. Vera Higgins; 2nd, P. V. Collings.

Class 20. Six Mesembryanthemums. 1st, Dr. F. H. Rodier Heath; 2nd, Mrs. A. Davey.

Class 21. Twelve Aloes. 1st, Mrs. A. Davey; 2nd, Mrs. Vera Higgins.

Class 22. Six Haworthias. 1st, Mrs. A. Davey; 2nd, Mrs. Vera Higgins; 3rd, Miss H. Mackenzie.

Class 23. Twelve Sedums, etc. 1st, Mrs. Vera Higgins; 2nd, Mrs. V. G. Jeffery.

Class 24. Six Sedums, etc. (size of pot limited). 1st, S. J. Pullen; 2nd, A. Emm.

25 was awarded to Mrs. Vera Higgins, of Croydon.

The King Medal for success in Classes 4, 5, 6, 8, 9 and 16 went to Mr. D. de C. Smiley, of Virginia Water, and the King Medal for success in Classes 16, 18, 20 and 24 to Mr. S. J. Pullen, of Horley.

In the opinion of the judges the quality of the exhibits is steadily improving and there were some very well grown and unusual plants on show. It is perhaps invidious to pick out any special features but, for the benefit of those members who were unable to visit the exhibition, one or two points of interest might be noted. For instance, Mr.



Fig. 3. Seedlings.

[Photo by R. Malby & Co.]

Class 25. Twelve Stapelias, etc. 1st, Mrs. Vera Higgins.

Class 26. Six Succulents raised from seed. 1st, Mrs. Vera Higgins; 2nd, Dr. H. T. Marrable.

There were no entries in the classes for Non-Members.

The Cups and Medals were awarded this year on the number of points gained in certain classes, with the exception of the Miniature Garden Cup which goes to the best exhibit in Class 14, and on this occasion was won by Mr. B. Webb, of Southampton.

The Evelyn Theobald Cup for the greatest number of points in Classes 1, 2, 3, 7 and 10, was won by Dr. H. T. Marrable, of Croydon.

The Lawrence Cup for the greatest number of points in Classes 15, 17, 19, 21, 22, 23 and

A. E. Watts showed a number of beautiful Mammillarias, in which he specialises; the white haired varieties were particularly lovely; such cleanliness is hard to obtain near a large town and Londoners may well envy Mr. Watts the pure air in which his plants are grown, but the healthy condition is due to the skill of the grower rather than to the environment. In Fig. 1 Mr. Watts' plants are shown in the foreground and behind to the left are three more of his white Mammillarias.

The Class for Cacti which had been more than 10 years in their owner's possession is shown in Fig. 2; the prize-winning plant is the beautiful pan of Mammillaria plumosa shown by Dr. Heath. The Large Echinopsis on the right hand side has been 57 years in Mr. Harold's family, the seed having been

sown by an uncle ; it has been in the present owner's possession for 11 years and, as can be seen, is about to flower again.

Plants raised from seed attracted a number of entries, some of which are shown in Fig. 3. Those in the foreground were raised by Mr. R. Reid and cover a number of genera ; the *Leuchtenbergia principis* was a lovely little plant and some of the Cerei were especially well grown. Behind at the end of the table, can be seen Mr. Boarder's group of beautiful Mammillarias, most of them in flower or fruit, which he grows so well.

Sandersonii, shown by Mrs. Vera Higgins. The Euphorbia groups contained some rare plants, such as *E. obesa*, *passa*, *crassipes*, *horrida* and others, shown by Dr. H. T. Marrable, and *E. Suzanae*, *Pillansii*, *multiceps* and *Schonlandii* shown by Mrs. Higgins. Dr. Heath's Mesembryanthemums were remarkably fine ; he included *Pleiospilos simulans*, the white-flowered variety, *Fenestraria rhopalophylla*, *Gibbaeum perviride*, *Conophytum exsertum*, *C. Nevillei* and *C. tumidum*, the largest member of this genus.

There were several Non-Competitive



Fig. 4. Succulent Plants. [Photo by R. Malby & Co.]

The Miniature Garden shown by Mr. B. Webb was a great attraction to visitors, for it had a fountain which could be made to work ; from this steps lead up to a lawn surrounded by flower beds in which many small succulents had been cleverly planted. The bowl shown by Mr. E. C. Edwards had been planted with seedlings in 1932 and the condition of the plants after several years shows that this form of decorative arrangement can be kept in good condition with suitable care.

Fig. 4 shows some of the groups of succulent plants ; the plant in the centre with a swollen stem is *Ibervillea sonorae*, a member of the Cucurbitaceae and behind can be seen the curious parachute-like flowers of *Ceropegia*

Exhibits ; Mr. C. H. Lankester showed beautiful Melocacti (*Cactus communis*) with their "Turk's Caps" well developed, and also *Cephalocereus lanuginosus*, *Cereus albispinus* and an unnamed *Cereus*, all from Curaçao. Mr. W. Denton put up a most interesting exhibit of mimicry Mesembryanthemums ; each had its surrounding rock and pebbles so carefully chosen that the full effect of the strange colourings of the plants was apparent ; besides excellent Lithops, *Frithia pulchra* and *Argeta petrensis* there were several species of Titanopsis such as *Schwantesii*, *calcareae*, *Primrosii* and *setifera*. Mr. P. V. Collings showed seedling Cacti of his own raising, *Cephalocereus senilis* and the Astrophytums being particularly attractive.

Aloes and the Local Succulent Flora of Port Elizabeth

THE lantern lecture given by Mr. F. R. Long, A.H.R.H.S., Superintendent of the Parks of Port Elizabeth, was divided into two parts, the first consisting of monochromes of Aloes taken by Mr. van Balen of Pretoria, with Mr. Reynolds of Johannesburg, and the second part being a beautiful series of three-colour photographs of succulent plants taken within 80 miles of Port Elizabeth by Mr. Keith, of the South African Railways; the object of the lecture was to show the natural habitats in which a number of interesting succulents grow, which should be of assistance in suggesting the best methods of treating the plants in cultivation in this country.

A photograph of the Town Hall at Port Elizabeth showed the use made of Aloes, *Haworthias*, *Bergeranthus*, etc., planted in rock gardens for decorative effect; such plants require very little up-keep. *Aloe globuligemma* from Waterspoort, in the Zoutspanberg, is often found growing in squares or circles; the reason is that this Aloe is planted by the natives round their huts and the plants persist after the hut has disappeared.

Aloe polyphylla has a large, low rosette and grows just below the snow line; it is a very difficult species to keep in cultivation. A specimen of *Aloe Marlothii* twenty-five feet high had been damaged by frost; *Aloe Peglerae* is probably not a distinct species, but the Transvaal form of *A. pratensis*. *Aloe melanocantha* is variable and in Port Elizabeth is very different from the plant shown in the photograph. *Aloe nitens* was shown growing with *Euphorbia Dregii*; *Aloe Thraskii* grows on the sea coast, at Durban it is almost within reach of the waves; Mr. Long uses this species considerably in decorative plantings at the seaside. *Aloe dichotoma* occurs in very dry regions of Bushman's Land, but is difficult to grow near the coast. *Aloe pretoriensis* is very common round Pretoria and Witwatersrand, where it withstands bush fires in an extraordinary way; the flowering spike may be eight feet high. *Aloe Wallacei* is now known as *A. angelica*.

The type of country where *Aloe arborescens* occurs was shown; it grows on rugged cliffs exposed to the wind. *Aloe rubro-lutea* is remarkable in that it is found at Windhoek and also occurs on the other side of the Kalahari. *Aloe Pienari* is a stemless species,

of which there are several varieties which are still being worked out. *Aloe ferox* var. *xanthostachys* is a handsome plant found in the Transvaal; *Aloe Bainesii* reaches a height of 30-40 ft. and forms branches. *Aloe mutabilis* from Waterberg hangs down steep cliffs where the drainage is perfect. *Aloe Reynoldsii* was shown growing beside *Crassula falcata* in cracks between boulders; it is very like *Aloe striata* but the inflorescence differs; *Aloe Broomii* has a wide distribution in rather flatter, grass-covered country where there is rich soil. *Aloe Schlechteri* grows in circles and half-circles, because the centre or older part of the plants die off; it occurs in the Karroo as well as the Transvaal. *Aloe pluridens* is more in demand than any other Aloe, but is not common in the Transvaal as it needs more moisture. *Aloe castanea* makes fine plants and branches from the base. This concluded the series of slides of Aloes and the following plants were shown in colour.

Aloe ciliaris var. *Tidmarshii* is very beautiful and climbs 6, 8 or 10 feet. One species shown is near *Aloe Cooperi* and the same as one of Burchell's early collections; *Eulophia barbata* occurs with it; the ground is poor and stony and the site windy and exposed to full sun. The bush consist chiefly of *Portulacaria afra*; cattle feed on this and can maintain their plumpness even without water; the colour when the plants are in flower is a beautiful pink to mauve.

A group of Euphorbias which included *E. Ledenii*, *inconstantia* and *mauritanica* was shown and another of *E. inermis*, *Ledenii* and *mauritanica* in the Addo Bush. The soil is a very strong, rich loam, but very dry and may even be brackish.

Mr. Long's daughter was responsible for the rediscovery of *Haworthia sordida*; it has very thick roots and needs heavy loam. A fine specimen of *Euphorbia inermis* was shown; another species with pinkish flowers but otherwise very similar, needs investigating. *Euphorbia meloformis* is usually found on limestone formations in very exposed situations amongst grass, near the mouth of the Zwartkop River, which was visited by many famous collectors in the early days.

Euphorbia polygona, which also occurs in the Karroo and on the coast, is remarkable in that the parasitic Mistletoe, *Viscum minima*,

grows on it in the indentations ; it was shown growing with *Haworthia Herrei* which is green when growing in the shade but turns copper colour in full sun. *Haworthia viscosa* shows a similar colour change in different situations ; it occurs within seventy miles of Port Elizabeth but is not common. *Haworthia cymbiformis* var. *planifolia* always grows at an acute angle, often with the rosette almost perpendicular ; it usually grows in shade but reddens if in the sun.

Several Stapelias were shown, *S. glabricaulis*, *nobilis* and *Pillansii*, the latter being a specimen growing in the Park collection. *Huernia Thuretii* grows in fully exposed places. *Stapelia flavopurpurea* has a wonderful flower ; *Caralluma lutea* has a really terrible smell, whilst *Stapelia pulchella* is common near Port Elizabeth and several natural hybrids or crosses with *S. variegata* occur. *Apicra rubiflora* is the only species in this genus with red flowers ; it was shown as growing in Mr. Long's garden.

One of the commonest and at the same time the most beautiful of the Eastern Province plants is *Crassula falcata*, which grows in long grass in stony, well-drained country ; Mr. Long finds this a very useful plant for street planting. The colouring of *Crassula perforata* harmonises with the rock on which it grows ; it is quite a common plant in ledges, even growing in exposed places on the aerodrome and is very beautiful. *Bergeranthus multiceps* is common, but a lovely plant and useful on account of its very long flowering period.

A species of *Faucaria*, probably *F. lupina*, was shown ; this genus is used a great deal in the parks and streets. *Dinteranthus microspermus* flowering in the garden of the Ford Factory was shown ; the manager of this very large factory has formed a succulent garden and the collection is now a very fine one. From the same garden was shown a photograph of *Lithops Fulleri* which was the first *Lithops* Mr. Long ever found ; Mr. Fuller had himself told him where the plant grew, saying the plant was easier to recognise than the golf course ; however, Mr. Long, accompanied by his son and daughter, found the golf course, but for four mornings they traversed the ground before they actually discovered *Lithops Fulleri*—and then they found hundreds.

There are four species of the Cycad *Encephalartos* in this district ; *E. Lehmannii* occurs with *Euphorbia Ledienii* ; where this ends the range of *Euphorbia coerulescens* begins. *Encephalartos caffra* (the new name is *cycadi-*

folius) occurs within four or five miles of *E. Lehmannii* and the plants may be as much as five or six hundred years old. The plant of *Encephalartos latifrons* was growing in the Ford Factory garden, having been collected eighty miles to the east.

A view was shown of the country where *Euphorbia grandidens* grows to a height of sixteen or twenty feet, accompanied by *E. Ledienii*, *Aloe supralaevis* and on the rocky cliffs were Stapelias and Haworthias ; the new Rat's Tail Stapelia, very recently discovered, which has been called after Mr. Long, occurs here. There was a slide showing the beautiful *Plumbago capensis*—a greenhouse plant here in England—growing in masses, and the series concluded with the entrance to the Happy Valley, one of the beautiful parks under Mr. Long's care.

The above account is given so that members not able to be present at the lecture may have some idea of the plants dealt with, but it is not possible, unfortunately, to give any idea of the beauty of the slides on which the main interest depended.

Cultural Note

FOR the third year in succession the summer has been hot and dry and consequently Cacti have grown and flowered well and the plants have been well ripened. When the weather continues warm there is always a tendency to go on watering freely, but the best results are obtained if the amount given is reduced towards the end of August and during September. Growth for the year is practically complete by this time and the plants should not be made too soft. This does not apply to seedlings which, provided a little heat can be given during the winter months, should never be allowed to get quite dry at the roots or they will receive a check from which they will not recover for some time. Succulent plants other than Cacti, especially those in which the resting period is not so marked, may be watered with reasonable frequency while the warm weather lasts. But some succulent plants have very definite resting periods, during which they should be kept dry ; these may occur in summer or winter, depending on the country of origin ; water should be withheld whenever a plant appears to have finished growing.

Succulents

Other than Cactaceae and Mesembryanthemae

By R. S. Farden

(Continued from page 76, Vol. III.)

Section 6. ANTHACANTHA

E. mammillaris. Cape Province. According to N. E. Brown this is rare in cultivation. The plant is described in Berger's book *Sukkulente Euphorbien* as *E. erosa* Willd. Plant six-sided, ribbed, with numerous woody flower stalks; cylindrical, often thickening.

E. mammillaris spinosior.

E. aggregata, syn. *enneagona* Bgr. Cape Colony. Much branched shrub, up to 12 in. high; stem short, branches in whorls, 8-9 angled, $2\frac{1}{2}$ - $3\frac{1}{2}$ in. thick; angles separated by deep furrows, broader than high, almost straight, scarcely toothed; thorn-like inflorescences numerous, yellow brown, later black.

E. sub-mammillaris. Cape Colony. Stems irregularly branched from the base, about 2 in. thick, green, slightly grey, roundish, thicker above, 9-10 angled; branches somewhat thinner, erect, 5-8 angled; the angles $\frac{1}{4}$ in. high with distinct grooves between, divided by cross grooves into areas about $\frac{1}{3}$ in. across, dentate, with a small leaf scar; woody flower stalks numerous but may be lacking on many side shoots, slender, red at first, later brown.

E. heptagona. Cape Province. Shrub up to 6 ft. high, stem erect, 1-2 in. in diameter, branching irregularly or in whorls; branches erect, bright fresh green, later grey, 5-8 angled. Angles $\frac{1}{4}$ in. high, edges with teeth pointing downwards, or slightly notched; flower stalks strong, $\frac{3}{4}$ -1 in. long, yellowish, woody.

E. polygona. S. Africa. Stem 2 ft. high, usually less in cultivation; branches from the base, ribs 10-13, distinctly grooved; angles straight or spiralled, with few teeth at the edges; a few woody flower stalks.

E. cereiformis L. syn *erosa* Willd. Stem 3 ft. high, branching from the base, dark green; ribs 9-13 with deep furrows, prickles turned slightly upwards; flower stalks becoming thorny, 2-2 $\frac{1}{2}$ in. long.

E. Morinii. Cape Province. Like *cerei-formis*; 6-8 angled, smoother, less dentate, few thorns and shorter.

E. horrida. S. Africa. Stem very low, slightly branched at the base, 2-4 in. thick, with 12-14 or more narrow ribs, separated

by a deep furrow, the edges toothed, with $\frac{1}{2}$ -1 in. long flower stalks, which become thorny and usually occur three together.

E. stellaespina. S. Africa. Stem cylindrical, usually forming an inverted cone, branched from the base, 2-2 $\frac{1}{2}$ in. thick with 10-14 low ribs, the leaf bases hooked and turned downwards; leaves up to $\frac{1}{2}$ in. long, small, dropping off; woody flower stalks branched to form a star, grey.

Section 7. MELEUPHORBIA.

E. meloformis. Cape Colony. Plant body spherical, often 3-3 $\frac{1}{2}$ in. in diameter; usually broader than high, with a thick turnip-like root, ribs 8-12, vertical or slightly spiralled, more or less grooved, crown sunken; green or grey green, the sides of the angles with lighter or reddish cross-bands; the edge with rounded leaf-cushions. The woody flower stalks are repeatedly forked, erect or bent down, dropping later. Male and female flowers are on different plants.

E. valida. Like *meloformis*, round to cylindrical, flower stalks persisting many years.

E. falsa. Similar, but can be recognised by the offsets which are freely produced on the ribs.

E. obesa. Cape Province. Stem simple, spherical or somewhat higher than broad, 3-4 in. in diameter; ribs broad, about 8, vertical, with very small, blunt, brownish notches; distinct furrows, these and the crown hardly depressed; the plant body is pale greyish green marked with reddish brown in longitudinal and transverse stripes, which are especially apparent near the top. Male and female flowers on different plants.

Section 8. DACTYLANTHES.

E. globosa. Cape Province. Syn. *glomerata*. Low plant; branches with round joints, lower ones rather rounder, $\frac{1}{2}$ -1 in. long, the younger ones may be more egg-shaped up to 1 $\frac{1}{2}$ in. long, dark green, later greyer; leaf cushions rather prominent and spirally arranged; flower stalks from the young joints grow to 4 in. long, repeatedly forked, thin, woody, persisting for some time.

E. anacantha, syn. *tridentata*.

E. ornithopus. Cape Province. Similar to

E. globosa. Joints as long as a finger, more or less $\frac{3}{4}$ in. thick, green, leaf cushions running into a small conical tubercle. Flowers on elongated stalks.

Section 9. MEDUSAE.

- E. caput-medusae*. S. Africa. Stem short, thickened above, up to 8 in. in diameter; branches numerous, radiating, snake-like, 1-2 in. thick, up to 2 ft. long, greyish green; leaf cushions 4-5 angled with deep grooves between; leaves 1 in. long, oval, falling later. Flowers numerous at the tips of the young branches, flower stalks persisting.
- E. viperina*. S. Africa. Like *caput-medusae*; stem thick and short; branches very numerous, $\frac{3}{4}$ in. thick, up to 12 in. long, often wound round like snakes; leaf cushions arranged in 6-8 spiral series, 4 sided; leaves small, soon falling.
- E. parvimamma*.

Section 10. PSEUDOEUPHORBBIUM

- E. Marlothii*. S.W. Africa. Stem erect, simple or with 2-3 spreading branches, in age up to 3 ft. high, 2-3 in. thick, round; stem and branches covered with spirally arranged leaf cushions; at the tips there appear in summer a number of umbellate, leafy, herbaceous shoots which bear the flowers and drop off in autumn or, in part, dry up and persist.

Section 11. PSEUDOMEDUSAE

- E. procumbens*. Cape Province.

Section 12. TREISIA.

- E. bupleurifolia*. Cape Province. Stem simple, very thick, egg-shaped, 2-2 $\frac{1}{2}$ in. tall, 2 $\frac{1}{2}$ -3 in. thick; leaf cushions square, brown, scale-like, in a double spiral row; leaves at the top in summer, 2-3 in. or more long, oval, tapering, pale green; flowers with long stalks.
- E. clava*. Cape Colony. Stem up to 10 in. high, cylindrical, up to 1 $\frac{1}{2}$ in. in diameter, often thickened above, usually unbranched; leaf cushions low, several leaves at the top which are 2-2 $\frac{1}{2}$ in. long, $\frac{1}{2}$ in. wide, linear, pointed, grooved, pale green, falling off later; flower stalks shorter than the bases, woody, persisting.
- E. bubalina*. S. Africa. Stem erect, little branched, 12-15 in. high, $\frac{3}{4}$ in. in diameter below, thicker above, green, later greyer; leaf cushions long, flat rhomboidal; leaves at the top 2 $\frac{1}{2}$ -4 in. long, oval, blunt above, with short tip, soft, thin, pale green, falling in winter.
- E. stapelioides*. S. Africa. Stems little

branched, low, about 2 $\frac{1}{2}$ in. high, divided into solitary, lateral, somewhat flattened joints, green, somewhat reddish.

- E. hystrix*. Cape Province.
E. coronata. Cape Province.
E. oxystegia. Cape Province.
E. hamata. Cape Province.
E. cervicornis. Cape Province.
E. clandestina. Cape Province.

Other Euphorbias of whose position in the classification I am uncertain:—

- E. cyparissias*. Stem 1-2 ft. tall, leaves linear, quite entire, somewhat crowded; flowers yellow. Naturalised in Britain.
- E. gorgonis*. S. Africa. Stem spherical, circular, with sunken crown, with numerous, 4-6 sided, prominent leaf-cushions covered with white leaf scars. Branches short, sturdy, with spirally arranged leaf cushions.
- E. handiensis*. Canary Isles. Cactus-like plant, freely branching from the base, even when young. Stems and branches erect, 30-40 in. tall and about 2-3 in. in diameter; angles 8-12 or more, fresh green; small, white-haired, heart-shaped spine shields arranged close together along the ribs, with 2 spreading thorns 1-1 $\frac{1}{4}$ in. long; Flower stalks thorny when young, on the ends of the crowded shoots, red, later brownish and finally white.
- E. pseudoglobosa*. Cape Colony. Numerous oval shoots from a thick turnip-like root, about 1 in. long, almost smooth, divided into 5 at the top, the angles marked by a few round leaf-bases, brownish green.
- E. Suzannae*. Cape Province. Stem short, flattened, spherical, up to 2 $\frac{1}{2}$ in. across or egg-shaped with turnip-like root; ribs 16, vertical, rather prominent, separated by distinct grooves; leaf cushions prominent, $\frac{1}{2}$ in. long, bluntly hooked and curved downwards, usually with a dried-up tip; plant body grey to bluish green.

PEDILANTHUS

A genus of the family Euphorbiaceae containing some 15 greenhouse shrubs, often with fleshy branches. They are natives of tropical America, from Brazil to Mexico and the West Indies. The name is derived from *pedilon*—a shoe, and *anthos*—a flower, alluding to the shape of the flowers. They thrive in well drained sandy loam, with a little well-rotted cow manure. Propagation by cuttings thoroughly dried at the base and placed in sand which is moistened occasionally.

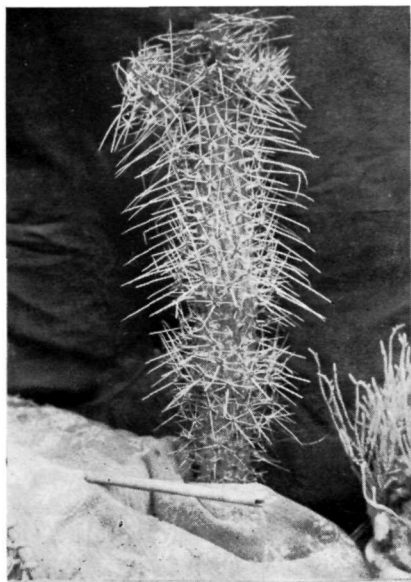
- P. tithymaloides*. West Indies. Flowers disposed in rather dense terminal cymes;

leaves 1-3 in. long, cuneate at the base, oblong, acute, often recurved at apex, margins slightly undulate. Plant grows 4-6 ft. high.

P. macrocarpus. Lower California. The plant has grey, almost leafless stems with milky sap; flowers much larger than any *Euphorbia* and somewhat like a bird's head.

DIDIEREA MIRABILIS

Mr. Thomas Sharp of Westbury has sent the accompanying photograph of a plant in his collection of the remarkable *Didierea mirabilis*; in habit it somewhat resembles a cactus-like *Euphorbia* and the spines are of a most unusual form, being stalked and stellate. The specimen illustrated is 23 inches high, measures 9 inches across the spines and has roots 30 inches long; the plant comes from Madagascar and is very rare in collections;



Didierea mirabilis.

examples were to be seen at Kew a year or so ago.

For some time the relationships of this plant were uncertain and it was thought to be nearest Sapindaceae; now it has been placed in a separate family Didiereaceae. In their native land the *Didiereas* are spiny trees of *Euphorbia*-like habit, with alternate, deciduous leaves; the flowers are dioecious, the sepals in each case being petaloid. An illustration showing the form of the mature tree and the structure of the flowers is given in "Families of Flowering Plants," by J. Hutchinson.

Editorial

WITH this issue the *Cactus Journal* begins its fourth volume and we hope that it is providing the sort of news and information that is required. Suggestions are always welcome and we hope that members and friends will continue to send items of interest as they come on them.

The question most often asked by beginners is:—"How can I name my plants?" It sounds as if it should be quite an easy thing to do and, in many cases, familiarity with the plants makes identification a fairly simple matter; no one who has ever seen the Bishop's Mitre, *Astrophytum myriostigma*, for instance, will have any difficulty in recognising it again nor can one go far wrong in identifying such a plant from an illustration. But some of the species are by no means so straightforward. And one of the troubles is that beginners are apt to acquire just those plants which do present difficulties. The *Opuntias*, for instance, are sold in large quantities as small cuttings and these very rarely produce flowers; also many of the species look rather alike and, moreover, are variable under different conditions of cultivation. Another group, the *Echinopses*, are often found in collections; these plants were amongst the earliest to be introduced and during the last century were extensively hybridised, but, until lately, they have not been re-imported from their native land to any large extent. Consequently, many of the plants in cultivation are hybrids of unknown origin and the beginner is apt to be disappointed when he submits his plant to an expert who cannot give him a definite answer. Another source of trouble which the beginner sometimes makes for himself is by raising plants from seed offered as "mixed Cacti"; the seedlings may come up well and, when their grower has become really interested in them, he wants to sort them out and get them named. Apart from the fact that small seedlings may differ considerably from the adult plant they will eventually become, these batches of "mixed cactus seed" may have been collected from plants growing in greenhouses where no attempt has been made to prevent cross-fertilisation, so that there is no guarantee that the plants are pure species at all; they may easily be unidentifiable hybrids. For those who merely wish to add to their collection, the mixed seed is very useful, but when the grower proposes to take further interest in his plants and likes to have them correctly named he will be well advised

to begin with reliable seed of a few known species; most dealers put up named seed in quite small quantities and this is much the best way for the beginner to start.

A word of warning with regard to naming plants from illustrations may not come amiss; even an excellent illustration may be quite misleading if the scale is not given; it is not wise to go by general appearance alone, the number of ribs, size and shape of tubercles, size, position and number of spines are all important. The beginner with only a few plants may easily feel so lost that he will be grateful for the assistance of someone more familiar with the subject and we feel sure that those of our members who have been growing cacti for some years will be willing to help novices in their neighbourhood. Half an hour amongst the plants themselves is often more valuable than any amount of written instructions.

Growers with larger collections may still find the naming of the less usual species difficult, but at least they will have had enough experience to know into which group they fall and so narrow the field considerably. When finding the correct name it is important to discover how closely the species in a group resemble each other; in the Mammillarias, for instance, many of the species bear a very strong resemblance to each other and it may be necessary to wait till the plant flowers before its name can be settled definitely.

Another point is that slight variations may occur between plants grown under different conditions, either in their native land or in cultivation; too much emphasis should not be laid on such differences; some species are notoriously variable in nature. The presence or absence of the central spine is apt to be given too much weight, yet some Cacti—*M. gracilis*, for instance—do not make a central spine till they have reached a certain stage of maturity, which is not necessarily measured by the age of the plant but depends on several factors. Again, the spines of offsets of *Echinopses* may vary very much from those on the adult plant from which they are taken, so that to identify a small *Echinopsis* without knowing the parent plant may lead to trouble. As a general rule, it is better to keep the name under which a plant is received until it is quite certain that it is wrong and not to substitute another until you are quite certain you have found the right one.

We hope we have not laid too much stress on this question of naming; the plants can be grown and enjoyed with no more dis-

tinguishing marks than a number or even a pet name. But comparison between plants by people whose collections are too far apart for the specimens to be compared is only possible if the two growers are using the same names, so that everyone would find it helpful to get the right names from the start whenever possible.

Catalogue

CURT BACKEBERG's new Catalogue will appear shortly; it is in the form of an index and gives a list of the majority of the rare and newly imported species in commerce to-day. The prices of the seeds and plants are also given. The Illustrated Catalogue which is produced as a separate publication is especially fine. The cover shows a great group of *Oreocereus Trollii* in their natural habitat; an old map of Peru is given and interesting pictures of the large permanent collection in Hamburg; a giant Cactus from Central Peru whose genus and species are a complete puzzle is illustrated, and there is besides a photograph of the "Cordillera Blanca," the Switzerland of Peru, with the great volcano Huascarán in the background, and a painting by a Chilean artist of a Chilean landscape. Many illustrations of new Cacti are included, as well as of succulents such as *Oxalis sepulosa*, and the very rare *Euphorbia Sipolsii* and *phosphorea*. There are over 60 photographs not included in the 1934 Catalogue. Index and Illustrated Catalogue can be bound together; the price is RM —.90 (post free), and it will be sent on receipt of a postal money order by:—

Herr Curt Backeberg,
Im Sorenfelde 15,
Volksdorf,
Bez. Hamburg, Germany.

WILHELM TRIEBNER, S.W.A. Succulent Nurseries, Windhoek, S.W. Africa, has issued a new Price List of Succulent Plants and Seeds. This list is a very full one, including all the chief genera of succulent plants and is especially rich in the South and South-West African species; thus there are 18 *Anacampseros* listed, 24 *Carallumas*, 72 *Crassulas*, 160 *Euphorbias*, 83 *Haworthias*, 62 *Stapelias*, etc. The *Mesembryanthemums* are dealt with separately and cover eleven pages.

Notes on New Coryphanthanae

By E. Shurly

SINCE the beginning of the year I have received a number of entirely new plants, many just discovered and never before in Europe. The following notes may, therefore, be of interest to the members of the Cactus Society.

From Mexico (Mr. Ferdinand Schmoll), I have received *M. auriareolis*, a plant $2\frac{3}{4}$ in. wide and $2\frac{1}{2}$ in. high. The stem is round, twin headed, tubercles short and round, naked in the axils. Radial spines are 40, thin, white. Central spines 5, white, with brown bulb bases and with brown tip. Central Spines on new growth are nearly all brown, so that the growing point of the plant gives a show of colour against the general white background of the plant.

I also received from him an unnamed plant $6\frac{1}{2}$ in. wide by $2\frac{1}{2}$ in. high consisting of four heads, each of which is a twin (eight in all). Each stem (twins) is round, flattened at top. Tubercles small. Axils are naked, but the tubercles are woolly at the top. Radials about 40, white. Central spines 4, white with brown tip. The plant is so densely covered with spines that the green tubercles only just show through. I think this plant as well as *auriareolis* are both allied to *elegans* or close species.

From California (Mr. Wright M. Pierce) I have received a very interesting plant which he has named *M. fortispina*. He cannot give me any information as to when or where this plant was named or where he picked up the name, but it is definitely closely allied to *M. polyedra* although the tubercles are round and not angled and the spines are much longer and more deeply coloured. That it is allied to *M. polyedra* is Mr. Pierce's statement, but there is a very strong likeness to *M. Hamilton Hoytae* as tubercles, length and colour of spines agree and only the radials differ slightly. Its stem is round, rather flattened at top, the tubercles are prominent, round, with just a suspicion of being angled. New axils are woolly, but the old lose most of this and become nearly naked. Radials are 9, white with brown tips. Central 1, same as the radials in colour but the brown goes further down the spine than in the radials. New spines are richly coloured, being a definite combination of red, brown and black. Centrals are nearly 1 in. long, radials $\frac{1}{2}$ in.

A further plant from Mr. Pierce is

M. Zeilmanniana of which we have heard, but never seen. It is a particularly pretty species especially when it is flowering, as it is now with me. My plant is small, $1\frac{1}{2}$ in. across, stem round. Tubercles small, round, axils naked. Radials 19, thin, white. Centrals 3, white, upper half brown, new spines only rise from white hair cushions. Bottom central spine is hooked, completely red brown. When received the plant had apparently finished flowering as the past dead blooms were still on it, but since it has developed a further 5 buds, of which three are now open. They are $\frac{3}{4}$ in. across when open. Petals pale cerise magenta (Mamillaria flower colours cerise, magenta, purple are a puzzle to a mere man). Stamens are the same colour. Anthers medium yellow. Stigma is 4 rayed pale yellow.

A further plant from Mr. Schmoll is *Escobaria Boregii* of which I have never heard before. My plant is quite small being only 1 in. across. It is slightly columnar and looks as if it will "grow up" to columnar status. Tubercles are small, round. Radials 23, centrals 4, all silky white, centrals with light brown bulbous bases. Tubercles are naked and spine cushions white, but not conspicuous.

Our good friend Howard E. Gates has been quite a godsend with his consignments and I have a number of extremely good plants from him, including a co-type of *M. pacifica* and a specially fine specimen of *M. Baxteriana*.

A small *M. saetigera* $\frac{7}{8}$ in. across proves to be round with a flattened top, tubercles short, angled, bright green with small white spots (natural). I mention these as they are quite distinct from the "pitting" sometimes seen on Mamillarias and are helpful in recognising the plant. Radial spines 25, white, centrals 2, white, with red brown tips. The radials are thin and the centrals stouter. Spine sets of radials and centrals are not $\frac{1}{4}$ in. across. Axils are naked.

The above and the plants following are all from Mr. Gates.

The next one is an extremely interesting plant, which Mr. Gates tells me was discovered in a granite outcrop on a limestone hill at an elevation of 3,000 ft. at Sonora, Mexico. It is only $\frac{5}{8}$ in. across, but is quite mature, as when I received it two flowers had opened and withered away. Mr. Gates tells me the flowers are straw coloured with a pink midrib.

The stem is round. Tubercles very small, round. Axils are naked. Spines about 50, no centrals, very thin, white, springing from a yellow brown cushion. It is so densely covered with the white spines that it is with difficulty seen whether it is alive, as the spines still look alive even on dead plants, but my specimen is fine and healthy. Put against some of my giants, such as an 11 in. Potosina, it does look a pigmy, but both are mature and this is such a gem that it proves that bigness is not everything in Cacti.

I have two plants of *C. Alversonii* which reveal little differences, which illustrate the difficulty of real study with cacti. The larger plant is 7 in. high, five headed, the main head breaking out into two heads, not cristate. Tubercles are large and rounded. Spines are in three series, first 26, thin, white, then 16 white with black brown tips and last 4, white with black tip. The last and middle series are the same size in length. Axils are naked. Spine cushions are white, definite and large. The smaller plant differs in the tubercles which are larger than the other plant and, therefore, more prominent. The spine cushions are slight in size, less white, and not so conspicuous. The three spine series are 16, 6, 1 respectively, but the last central one is much shorter than the other specimen plant and is the most distinctive difference. These plants are very handsome indeed and are in bloom at the present moment. The larger plant has had five flowers $1\frac{1}{2}$ in. across when open and is a striking sight, for the petals are rosy magenta with deep bright magenta midribs, with a still further inner midrib of brown. The inner petals, however, have no brown and are brighter than the outer ones. Stamens are rosy white, anthers middle yellow, stigma 6 rayed, bluey white. The smaller plant has flowers much smaller, being less than 1 in. when fully open, stamens are white with rosy tips, the other plant's stamens being practically rose.

Mr. Gates was good enough to send me two specimens, one small and one larger, of a new Escobaria which he thought might be *E. bella*, but as he had no material to work upon he sent to me for my opinion. Unfortunately, I have not a *bella* either, but by references to the literature I have I was able to satisfy him that it was not a *bella* and is without doubt an entirely new Escobaria. The two plants I have are identical, the larger $2\frac{1}{2}$ in. high and the smaller $1\frac{1}{8}$ in. high. Both are columnar. They were found in Texas, by a cactus hunter who sent it to Mr. Gates. The larger plant has offset 7 young plants since received by me,

the offsets appearing at the base. Tubercles are long, narrow, white woolly when new, graying with age. Radial spines 19, white, centrals 2 to 4, white, with very pale brown tips. Spine cushions white, but inconspicuous. The new growth bears bright red brown spines, making the top growth coloured. A delicate looking plant which is worthy of a place in any collection.

With the same shipment from Mr. Gates came an entirely new Cochemiea. It is extremely rare to get new additions to the small genus and this plant was particularly welcome. At first sight it looked like a hooked *C. Halei*, but *Halei* spines are much stouter, springing from grey tuft of wool, colour whitish grey, horny throughout, the new plant's spines spring from a white cushion, are finer and more truly grey than *Halei*, they have red brown bases and the new spines are bright red brown, colouring the top of the plant which *Halei* does not do. Spine cushions only with newest tubercles. Lower spine is hooked. It was found on the West Coast of Lower California at the 29th parallel and the discoverer proposes to name it *maritimus* after its habitat.

I think this is the place to compare three very interesting plants, *C. vivipara*, I have received, No. 1 from Mr. Pierce and Nos. 2 and 3 from Mr. Gates. No. 1 is round with a flat base, 2 in. across and has 4 offsets. Tubercles long, round. Radial spines 18, white, thin. Centrals 4, with light brown tips. Plant looks white. New spines spring from large, very prominent, very white cushions. No. 2 differs from No. 1 inasmuch as the radials are 16, thin white, centrals 6, red brown with white tips. New spines only spring from white cushions which are not so large, so white, or so prominent as No. 1. The plant appears to the eye quite variegated with a mixture of white and brown. No. 3 is like No. 2, but centrals are 4 and spine cushions are more white, but not so white as No. 1. The plant is whiter and not so variegated as No. 2, but is not so definitely white as No. 1 and has the colours of No. 2. These differences with this plant are not so surprising when it is remembered that it is found throughout U.S.A. and even as far north as Canada, where it is hardy, and being native over such a large area it can easily be understood that it must be found in widely differing habitats and as a consequence acquires widely different characteristics.

Only yesterday I received a further parcel from Mr. Gates, which included plants numbered by him 517, 518, 523 and 524.

These have been discovered by himself and the last two on his recent trip to Mexico.

No. 517 comes from a rocky granite hill near the west coast, north of the 28th parallel. It is exceedingly scarce. The old tubercles wither and become woody at the base. Growing tubercles are flattened (it must be remembered they might become flattened during transit through lack of water). Radial spines 12 to 14, thin white, almost hair like, central 1, brownish. Arrived with one flower matured and open. Petals long and narrow, outer ones bright silky pale yellow with narrow brown stripe. Inner ones bright silky pale yellow. Stamens white, anthers and stigma pale yellow, the latter six rayed. I have another of this type smaller, with the tubercles not flattened, but rounded. Radials same, but central is brighter, almost red, giving the impression of a darker coloured plant. One unopened flower when received, but it appears to have no brown stripe. Axils naked, spine cushion white, but not conspicuous. The plants were three weeks in transit so the colours of the flowers are not to be relied upon. I place this plant very near *M. Heyderi* and *M. hemisphaerica*.

No. 518 is a plant 2 in. high and the two plants I have are identical. It comes from the same habitat as 517 and has a pink flower like *M. Blossfeldiana*. When my plants were received there were two withered flowers on the stem. Stem is short, rounded. Tubercles small, densely covered with white horny spines, 16 radial, 3 and 4 central ones, white at base, upper half deep brown, lower central spine hooked. Axils are naked, spine cushions white, but not prominent. A very attractive plant indeed.

No. 523 was found by Mr. Gates on a small, very barren island in the gulf off Los Angeles at the 29th parallel; he also found it on another small island on a rocky ledge. They were growing on outcrops of mica schist. It is fleshy rooted and is multiple headed, all heads apparently springing from the fleshy root which is quite big, branching at top into the heads. Flower and fruit not observed. Mr. Gates proposes to call it *insularis*. Stem is round with flattened top. Tubercles oval. Radial spines 19, white, central 1, white, black upper half, hooked. Axils naked. Spine cushions white, fairly prominent, but naked with age. Stems are small, mature when $1\frac{1}{4}$ – $1\frac{1}{2}$ in. high and wide. A very striking plant indeed with the black tipped hooked centrals jutting out from the top and when it is established should be a very handsome plant indeed.

No. 524 was found at Angel de la Guarda Island. Mr. Gates stated that if it were not for the hooked spines he would take it for *M. albicans*, which he has not in his collection and so could not compare. I have this plant, *M. albicans*, and it is nothing like it. I place it very near *M. Swinglei* of which I have a specimen. The appearance of the plant is yellow, which is caused by the white, horny spines. Horny spines are from white to grey and when small and numerous take on a yellowish tint. *Swinglei* appears white. Both No. 524 and *Swinglei* have central hooked spines, *Swinglei* red brown, No. 524 black tipped with dark brown. *Swinglei* has 18 radials and No. 524 26 radials. *Swinglei* 3 centrals, lower one hooked (B & R says 4), No. 524 1 central hooked. No. 524's axils are naked, spine cushions grey-white, but not prominent. It is difficult to count exactly the radial spines on both *Swinglei* and No. 524 as they are so densely covered, but the counting of the centrals is correct and constant.

I think that the American collectors are to be congratulated, especially Mr. Gates, on the perseverance and enthusiasm they have shown. They have given us a large number of plants that are new since *Cactaceae* was published and the new discoveries are getting handsome and even more handsome. The several species with white covered stems and dark coloured spines, mostly hooked, are a delight to the eye. I also find that most of them have good coloured flowers and they should oust many of the old favourites with whom we have been satisfied for so long.

The following extracts from a letter received from Mr. Howard E. Gates, dated July 30th, will give further details:—

"As to No. 517, should have a yellow flower with the customary purplish markings outside. There is a lad here who made two collecting trips down the peninsula and really was the first to find this. I was talking to him recently and asked if he had done anything towards writing it up. He said he had not, as he thought it likely it would be too close to *Brangegeei*. However, I think it is different, but the most striking points of differentiation are much finer and longer spines together with a decided incurving characteristic. I have not gotten down to counting spines and diagramming tubercles yet. If I go ahead with the description of it I shall probably name it for the lad and call it *Dawsonii*. He graduated from High School this year, yet has such a fine collection and staged it so well he nearly won sweepstakes at our Cactus Show.

"In No. 518 there may be a mixture. No. 518 should have a flower I have tentatively described as follows: '2 by 2 cm. Outer perianth segments brownish purple, inner segments acuminate, margins entire, rosy carmine central stripe, white margins, widely opened, anthers numerous, orange, style pink, stigma lobes 8 yellow green. Fruit clavate 2 cm. by 6 mm. orange red. Seed less than 1 mm., pyriform, black, punctate.' Growing with this is a practically white flowered species with small flowers. The two when not in bloom are practically indistinguishable to the eye. I suspect the white flowered kind will grow considerably larger. If no one else has done you the honour I am inclined to name No. 518 for you when the description is ready to publish. I have not consulted my Latin friends, but I suppose the form would be something like 'Shurliana.'"

Curious Behaviour of a Conophytum

Mr. Hall, Curator of the Darrah Collection, Manchester, writes:—"Have you ever known roots to form on leaf tissue in the Mesembryanthemums? It sounds a vague question, but I will relate a curious phenomenon with *Conophytum Friedrichae*. One growth at least $1\frac{1}{2}$ in. long (they do elongate so here) suffered from soft rot at the base, about twelve months ago. The decay travelled at least half-way up the growth and then stopped. I severed it from the living (?) tissue and threw the tip on to a dry shelf where it lay for about twelve weeks, because I wanted to note how long it would be before complete dessication took place. Knowing the growing point of such a species to be right at the base it must have been included in the portion decayed and therefore I never thought to try and keep it alive. It dried and shrank until the fissure could be seen from the base, i.e. an aperture from top to bottom, therefore no growing point could be present. However, I inserted the half inch piece of withered tissue in dry sand for a month, without water, and it commenced to expand and I found vestiges of outgrowths at the base which after many

more weeks became obvious roots. I watered it throughout the winter very sparingly and the thing developed into almost a normal growth, but, to my great sorrow, I found it gone at the base, as before, last week. I have since regretted that I did not investigate the subsequent growth for traces of a new growing point (if any) when I saw the final attack which spread throughout the growth in two or three days."

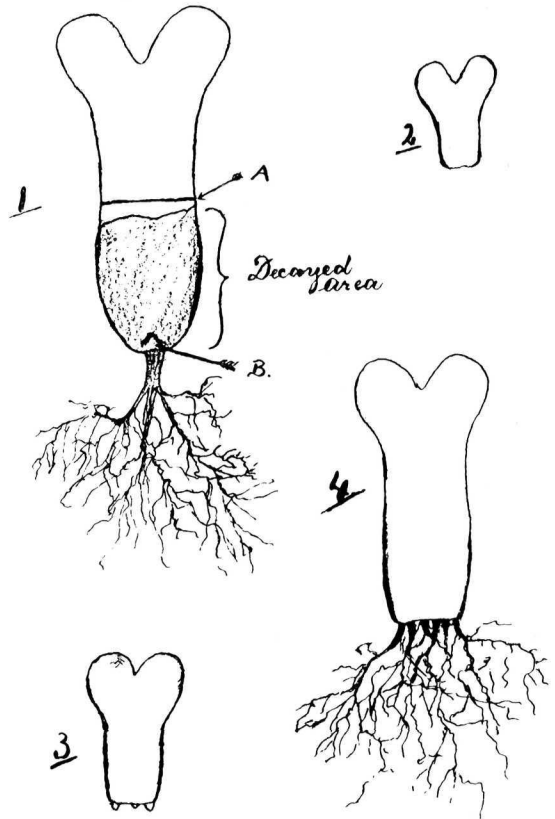


Diagram slightly reduced.

1. Original plant showing area of decay. A, where severed; B, growing point. May, 1934.
2. Actual size of cutting after desiccation for 3 months.
3. First appearance of adventitious roots 4 weeks after potting.
4. Cutting well rooted. April, 1935.

Mr. Hall kindly sent us the remains, from which it appeared that the roots had arisen from a ring, the centre being still hollow, so that it is doubtful if further growth would have been possible. Perhaps other members have had a similar experience.—Ed.

More About Seedlings

By A. Boarder

I FEEL that a little more about seedlings will be of interest to many readers, as so many more cactus enthusiasts are trying their hand at this intriguing pastime. The increased entries in the Class for seedlings at the recent Show indicate that the popularity of seed raising is growing.

It was rather disappointing to notice that only four people had entered for the class for seedlings raised from seed sent out by me. There were over two dozen applicants for seed and, from the letters I have received, it appears that many were dubious of showing as their plants were so small. Well, as those who attended the Show will have seen, none of them were very large and my own plants were no larger, although perhaps having better spines.

This year has been one of the worst I have experienced for seed raising. The spring was so fickle that results in the garden were, on the whole, bad and I have repeatedly noticed that one must have growing weather outside to get good conditions inside the greenhouse. One night, May 19th, the temperature in my house dropped to 32° F. and this with a lamp on. I have tried this spring to do without a lamp as much as possible, but I can see that the seedlings have not made the progress that they have done other years.

The Class for these seedlings should prove of greater interest in future years, as the plants will be larger and we shall no doubt see more difference in them with regard to the method of growing. I have been asked to give the name of the *Mammillaria* but I think it will be better to keep the name withheld so that there will be the added interest in trying to name it. This type of *Mammillaria* does not grow very quickly the first year, but makes up for it later and then makes fairly rapid growth.

Although it has been such a bad spring I have had a large number of flowers on the seedlings. In addition to those already mentioned in the *Cactus Journal*, I have had the following *Mammillarias* bloom:—*M. Painterii* (1933 seedling), *M. Bodekeriana* (1933), *M. Jaliscana* (1932), *M. pachythele* (1932), *Coryphantha radiosa* (1932), *Escobaria Chaffeyii* (1933). All those previously mentioned have again flowered.

I experimented with some *Echinocactus* seed last year, as so many people are of the opinion that this genus is harder to flower than the *Mammillarias*. I am pleased to say

that I have this year flowered *E. Ottonis* from last year's sowing. I must add that, so far, only one plant from a large batch has flowered, but several others have the appearance of flowering later. The *Astrophytum myriostigma* (1932 seed), which flowered last year has again had four or five flowers and *Astrophytum asterias* has had five or six, being the first time of flowering since sowing in 1932. I have several *Mammillarias* which I have raised from seed and have not yet flowered. It appears to me that a great deal must be due to the conditions that one grows them under, as one would need several divisions or special houses in which to give the different species the shade or sun they require.

I have noticed repeatedly that plants raised from seed in this country flower quicker and grow better than imported ones of the same species. I am gradually building up a collection of *Mammillarias* from seed and I take my own seed from an imported plant and find that in about three years I have a bigger plant than the parent. Some of my imported plants have made very little growth, while the seedlings raised from them make exceptional progress. I suppose a plant has such a great change in its conditions when it is imported and receives such a check that a home-grown seedling has every advantage over it and does not appear inferior in any way, either in colour or spine.

I hope that at a future Show it will be possible to increase the classes for seedlings, either by dividing the genera or by limiting the ages of the plants in certain classes.

Root Mealy Bug

One of the pests apt to attack plants in dry soil is the root mealy bug; this is by no means confined to Cacti and other succulent plants, though the dry conditions under which they are grown favours its increase. The insect itself is white and very tiny but its presence is readily recognised by white waxy deposits on the roots; in bad cases the wax may even be seen on the surface of the soil. The best treatment is to wash the roots thoroughly with a brush, but it is difficult to get the wax "wetted" so that this may be a tedious business. Crude naphthalene crystals appear to destroy the insect without damaging the roots of the plant and, if a few crystals are added to the crocks when repotting, the trouble will be checked.

The Huntington Botanical Garden

THE Huntington Botanical Garden, in conjunction with the Huntington Library and Art Gallery, is located in the City of San Marino, about ten miles east of the city of Los Angeles in Southern California. It was formerly the private estate of the late Henry E. Huntington who built his residence on the premises in 1910 and occupied same until his death in 1927.

In 1919 Mr. Huntington executed a deed of trust by which the Henry E. Huntington Library and Art Gallery, together with funds for maintenance, was transferred to a self-perpetuating board of trustees consisting of five members. The Art Gallery, formerly his residence, contains a collection of eighteenth-century English portraits, including masterpieces by Sir Joshua Reynolds, Sir Thomas Lawrence, Thomas Gainsborough, George Romney, John Hoppner and many others. Sir Joshua Reynolds' portrait of Mrs. Siddons as "The Tragic Muse" and Thomas Gainsborough's "The Blue Boy" have perhaps acquired the greatest notoriety.

Mr. Huntington's famous private library is housed in a separate building which was erected in 1921 for that purpose. The collections are confined to English and American history and literature and to early printed books (before 1501). Surrounding the buildings are 200 acres of ground which was formed into a Botanic Garden. During the years of Mr. Huntington's ownership of the San Marino Ranch (the official name for the estate) he not only had the grounds landscaped to suit his own pleasure but very early advanced the idea of collecting many domestic and exotic plants in order to demonstrate for scientific and educational purposes the cultural requirements necessary for the new introductions, and at the same time providing them as nearly as possible with their indigenous environment. San Marino being located twenty-five miles inland from the Pacific Ocean, has an ideal location for all types of plants indigenous to semi-arid and arid countries. Therefore it was suggested to Mr. Huntington to feature as much as possible the Xerophytic plants, since most of them can be grown very successfully in the open. Fifteen acres are devoted at this time to the Xerophytic collection, six acres of which is devoted to Cacti and the balance to Agaves, Fourcroyas, Yuccas, Dasylirions, Nolinias, Beaucarneas, Aloes, Haworthias, Apicras, Gasterias, Crassulas, Cotyledons, Kalanchoes, Aeoniums, Echeverias, Dudleyas,

Sedums, Euphorbias, Mesembryanthemums, Puyas, Pitcairneas, Dyckias and many other genera.

Adjoining this collection is the palm collection covering about two acres. About fifty acres is devoted to ornamental shrubs and trees, many of which are from Australia and South Africa. Nearly five acres is devoted to a Japanese garden, and adjoining this is a small rose and flower garden; ten acres to economic fruit trees and about 100 acres are reserved to future planting.

All plants under cultivation at this time are in the open; only one glass-house is maintained for propagating purposes. In other words, we are laying the foundations for a Botanic Garden of a semi-tropical nature.

The first scientific publication pertaining to the genus *Cereus* by Dr. Erich Werdermann should be at least partially in print by the time this notice appears.

We owe the above account of the Huntington Botanic Gardens to the kindness of Mr. William Hertrich, the Curator. Members who are familiar with the beautiful photographs in *Blühende Kakteen*, which are the work of Dr. Erich Werdermann, will remember that a number of these colour photographs were taken in the Huntington Gardens.

Anacampseros

The genus *Anacampseros* belonging to the family *Portulacaceae* contains a number of interesting succulent species; the plants are mostly small with fleshy leaves, either arranged in a rosette, as in *A. filamentosa* or closely overlapping each other up the slender stems, as in *A. ustulata* and *papyracea*. It is sometimes said that the flowers are cleistogamous, that is that they set seed without opening; and the fact that seed is freely produced though no flowers have been seen tends to confirm this idea. The period during which the flower remains actually open is, however, very short, sometimes not more than one hour, and as a rule they open in the late afternoon between 5 and 6 o'clock, so that it is quite easy to miss seeing the blossom. The seed capsules, which ripen very quickly, are worth examination; the sepals are raised like a cap and thrown off by explosive action of the valves of the ovary, leaving a basket-like arrangement of the dried ribs, within which the seeds can be seen, free from the walls and lying at the bottom.

Bradley's Succulent Plants

THE first book devoted entirely to succulent plants, written in English, was *The History of Succulent Plants*, by Richard Bradley, Fellow of the Royal Society, published in London, 1716. The sub-title says: "Containing The Aloes, Ficoid's (or Fig-Marygolds) Torch Thistles, Melon Thistles, and such others as are not capable of an Hortus-siccus, engraved from the Originals, on Copper-Plates, with their Descriptions and manner of Culture."

Though written in English the text is also given throughout in Latin, the pages being in double columns.

In the foreword Bradley says that the work was originally intended to contain fifty figures only, "but finding that the Spirit of Botany was not powerful enough to pay the expence of Engraving the Copper-Plates, I have for some time discontinued my Thoughts of Publishing it; till now, at the Desire of some Friends (who are unwilling the Design should be totally laid aside when many Tables are already finish'd) I have renew'd my former Resolution of Printing it; but in such a Manner as will be more easy to the Purchaser, and may tend to make the Design more Perfect than it could have been in the first proposed method. The Publishing of these Icons in Decades, will give me Liberty (if I meet with Encouragement) to continue the Designing and Engraving of every Succulent Plant which is or can be discovered either by my self or Correspondents; but as it will not be possible for me to Collect at once all of one Tribe, so I shall not be capable of observing any strict order in the Ranging and Classing of them."

Actually five Decades only were ever published; the number of copies was not large and a complete copy is not often obtainable now. The plants represented are various, and it is interesting to see the plants that were then known. The great upright Torch Thistle, the small Six-ribb'd Torch Thistle and the Three-ribb'd Torch Thistle are given; these are all columnar Cerei. A number of shrubby Mesembryanthemums are given, generally called Ficoid or Fig-Marygold. Aloes include plants which we should now put in other genera; for instance, the Common American Aloe is obviously *Agave americana*.

Several Stapelias are represented and called Cape Fritillary, and the Latin name given as *Asclepias*. Euphorbias are represented by the Long-single-Thorn'd Euphorbium, by *Tithymalus aizoides* which is *Euphorbia*

neriifolia and by the large White-flower'd African Spurge which might be *Euphorbia inermis*.

Altogether twenty-nine plates are devoted to Mesembryanthemums: these include *M. crystallinum* (the Diamond Fig-Marygold), a *Ruschia* called the larger perfoliated Fig-Marygold, one or two *Glottiphyllums* and one called the Dog's-Chaps or Tooth-leav'd Fig-Marygold is probably a *Faucaria*. The "Night-flowering Harts-horn Fig-Marygold" is *Hereroa dolabriforme*; of this Bradley says: "The Flowers appear in May on the top of the Plant, of a Limon Colour, with this Singularity, that they never open till the Sun is gone down. Every little Sprout of this Plant will take Root, being planted in a light Soil about June or July; it requires little water, and moderate warm air in the Winter; and we may lay it down as a Rule that the more Succulent is any Plant, so does it require less Water."

On the whole the engravings give a very fair idea of the plants intended and some are definitely good, but there are one or two curious errors. For instance, an undoubted *Mammillaria* is called the small African Melon-Thistle, and Bradley says: "This Melon-Thistle is brought to us from the Cape of Good-Hope"—an unusual place to find a Cactus growing wild! The Rose-mary-leav'd Fig-Marygold of which Bradley says: "this plant I suppose to be one of the Kali's of Parkinson, or that it is in other terms a Fig-Marygold of Naples, and not of Africa, as some take it to be," is obviously a *Kleinia*.

But it is hardly fair to be too critical, for little was known of these interesting plants at this early date, and sources of information must have been very limited and uncertain. Bradley's attempt to give his fellow countrymen some knowledge of the succulents in which he was interested are worthy of all praise and, if the resulting publication has no great value scientifically this quaint old volume is historically of considerable interest and a copy is well worth acquiring when opportunity offers.

Richard Bradley's chief claim to fame appears to be the publication of this work on Succulent Plants, though he also wrote a book on gardening, and he should be regarded rather as an authority on gardening than on botany in the strictly scientific sense. He was appointed the first Professor of Botany at Cambridge in 1724 but, though he retained the title till his death, from 1731 onwards the actual work was carried out by others.

Kirstenbosch

We have received from Mr. J. Read of Johannesburg, photographs which he took when visiting Kirstenbosch recently, where the National Botanic Garden is situated; the one which is here reproduced shows the comparatively new rock garden with tall Euphorbias in the background, the foreground being planted with Aloes, Mesembryanthemums, etc. Another photograph



Rock Garden, Kirstenbosch.

gives a good idea of the wonderful situation of this garden, which is quite close to Cape Town and occupies most of the eastern slope of Table Mountain. The rainfall at Kirstenbosch is fairly high so that many of the succulent plants from the Karroo have to be protected, hence the development of the Karroo Garden at Whitehill, described by Miss Karsten in a recent issue of the Journal (*Cact. Journ.*, Vol. 3., No. 2).

Bulletin of Cactus Research

It is possible that members who have joined the Society recently may not be aware of this most useful publication, which is being issued monthly by Herr Curt Backeberg. The Bulletin was begun in January 1934, and is the only publication of the kind available; botanical descriptions with excellent illustrations of the newest cacti and also of older but not well known species are given each month; most of this information is unobtainable so far from other sources, in fact

a number of the plants are here described for the first time. Descriptions of the areas where Cacti are found and cultural directions add to the value of the work; the text is in four languages, German, English, Dutch and French, so that it is universally useful.

The arrangement of the various species is carefully thought out and all are numbered, so that the folded sheets can be separated and arranged in their botanical sequence for future reference; the binding case issued at the end of the first year, which will hold the Bulletins issued over three years, makes it possible to "bind" the separate sheets in a convenient and usable form.

The value of this work to those interested in the correct naming of the newer Cacti can hardly be over-estimated and collectors are urged to become subscribers. The price by subscription is 6/- per annum; the complete issue for the first year can be obtained from Herr Curt Backeberg, Im Sorenfelde 15, Volksdorf, Bez. Hamburg, Germany, the price being RM 6.90 before the end of 1935; after that date the cost of the complete issue for the year will have to be raised to RM 12.00, but the subscription rate will remain the same. If preferred, the Bulletin can be obtained through Messrs. Neale, Meeching Rise Nurseries, Newhaven.

The Cactus Journal

Mr. Ludford writes:—

"I beg to advise you that, searching amongst my old papers I have been able to find some odd parts of Volume I. of the *Cactus Journal* 1898. Some of the Members of the Society might like to have these. The parts available are as follows:—

Part	1. February 1898	11 copies
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"	8. September	" 39 "
"	10. November	" 18 "

Any members can have these at 2/6 each.

I still have some copies left of Watson's Amateur Guide and Price List at 1/3 each, but *all* the bound Volumes of the *Cactus Journal* have now been sold."

Members wishing to take advantage of this offer should write to:—

Mr. W. C. G. Ludford,

Fern Lea,

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Book Reviews

"SUCCULENT PLANTS" by H. Jacobsen, translated by Vera Higgins, published by Williams and Norgate, 1935; price 25/-.

There have been singularly few books written on Succulents alone, certainly none in the English language in a comprehensive way, though various works on separate families have been published from time to time. Not until 1933 was it possible to find a reliable book of reference and to obtain satisfactory results—that year *Die Sukkulenten* by H. Jacobsen of Kiel was published. This book was a boon to cultivators, but to those unable to read German, it came only to tantalise.

Following many requests, *Die Sukkulenten* has been translated by Mrs. Vera Higgins, M.A., and lovers of Succulents will find complete satisfaction in its contents. The English edition is superior to the German edition in containing many more photographs and descriptions of more species both old and new. Furthermore, it is a larger and more attractive volume, having nearly one hundred more pages.

There is a chapter devoted to ecological notes on how the plants have become modified to conform to climatic conditions and the chief areas in which they occur, of value to students of botany and amateurs alike. Another section deals with their uses and cultivation in brief, more detailed notes being given with the genera and species as they occur throughout the book. The whole of the material is arranged alphabetically, for easy reference, but the new sub-genera of Mesembryanthemum are arranged under the heading Mesembrianthemum and receive special cultural notes owing to their wide and varied geographical distribution.

The additional material includes the genus *Cissus* L. (some works place several succulent species in *Vitis* L. also) the succulent Vines which are infrequently met with in cultivation though the most fascinating of strange plants.

Some might regret that *Stylrophyllum*, *Dudleya* and *Urbinia* are absorbed into *Echeveria* and *Cotyledon*, for the two are very confusing. Fortunately all the African species are distinct from those of the American deserts, whose plants are mostly rosetted types and either *Echeveria* or *Cotyledon*.

One is justified in wondering what *Cotyledon paraguayensis* N.E.Br. has done to deserve its frequent removal to and from so many genera, such as *Byrnesia*, *Graptopetalum*, *Echeveria* and *Sedum*. Jacobsen now classi-

fies it as *Sedum Weinbergii* Bgr., though most amateurs will hesitate before including it in the *Sedum* group! It is of interest to note the mention of *Lenophyllum pusillum* Rose, an uncommon Mexican plant. Anyone who has grown it and tried to keep its leaves on for a time will agree that it is not *Echeveria amoena* L. de Smet. as given in one reliable list of Dicotyledons. While *E. amoena* has a neat rosette and graceful inflorescence, *L. pusillum* can barely support its leaves; in fact, more leaves are found on the soil than on the plant after a few weeks, and its flowers are rather poor.

Under Mesembrianthemum many more sub-genera are described than in the German edition, eleven species being described in *Ophthalmophyllum* as against three in the earlier book. These "windowed" species are not specifically very different from *Conophytum* to which they were referred by the late Dr. N. E. Brown. Of particular importance is the note regarding the resting period of these sphaeroid types and the correct cultural requirements.

Very few errors occur and such can be easily identified. The author has not attempted to include all the succulents known, for several volumes could be filled; only the most attractive and best known are gathered together to fill a book worthy of inclusion in anyone's bookshelf.

H. HALL.

"CACTUS" by A. J. Van Laren, translated from the Dutch by E. J. Labarre, Amsterdam; arranged and edited by Scott E. Haselton; published by the Abbey San Encino Press, Los Angeles. 1935. Price 22/6.

This book is the companion volume to *Succulents other than Cacti*, of which an English translation was published last year. The Dutch version, written by A. J. Van Laren, Curator of the Botanical Gardens of the University of Amsterdam, has been available for some years for those who were in a position to collect the illustrations issued as coupons by the firm of Verkade, biscuit makers. The illustrations which this firm supplies as coupons with its goods are all of high standard and those used in *Cactus* are no exception; they are the work of the same artists—C. Rol, J. Voerman, jr., and H. Rol—who were responsible for the beautiful pictures of succulents in the other work. There are in all 114 small sized illustrations and 19 larger ones, all in colour, as well as black and white drawings as head

and tail pieces to each chapter. It is a pity that the original frontispiece, a beautiful picture of *Trichocereus candicans* was not available; instead, an illustration of *Carnegiea gigantea* on the Arizona desert from the Stendahl Art Galleries has been substituted; this gives an impression of the environment, but the colouring is not so happy as in the original illustrations. The attractive pictures on the cover of the Dutch edition also could not be used, but a pleasant linen cover has been provided and this, with the excellent type used throughout, well maintains the reputation of the Abbey San Encino Press for the issue of very fine productions.

The text is written by an expert, but in simple language for the benefit of non-botanists; the nomenclature used is that of Britton and Rose. The subject is treated in six chapters:—I. What are Cacti; How do they grow; Where do they come from? II. Structure; Habit; Adaptations; Means of Defence. III. Origin and Development of the Cactus Family. IV. Collecting Cacti as a Hobby. V. Monstrosities. VI. Propagation and Care of Cacti. In Chapter IV., the different genera are described and in the English edition the judicious use of headings has made this section rather clearer than it was originally.

Collectors of Cacti will be grateful that an English edition of this beautiful and useful book is now available; it does not pretend to be a complete treatise but makes an excellent introduction to the subject for beginners and the illustrations alone should appeal to everyone, whether interested seriously in Cacti or not.

Copies may be obtained from E. J. Labarre, Prins Hendrikkade 149, Amsterdam, Holland, price £1 2s. 6d., post free. If both books, *Cactus* and *Succulents other than Cacti* are ordered together, the price for the two volumes from Mr. Labarre is £2.

“BLUEHENDE KAKTEEN UND ANDERE SUKKULENTE PFLANZEN,” by Dr. Erich Werdermann, published by J. Neumann, Neudamm; 6 parts per annum. Price RM 22.80 per annum.

We have just received the twenty-fourth part of this excellent publication; a plant of *Melocactus Maxonii* Gürke in flower and fruit is shown, the illustration being of a plant imported in 1930 and growing at the time in the Botanic Garden at Dahlem which, unfortunately has since died; these plants are generally best imported young, before the

cephalium has developed. *Gymnocalycium Pflanzii* Vaupel is also illustrated; it much resembles *G. Saglione* in habit but is distinguished by the flowers; the plant was discovered near the Pilcomaya River, Bolivia, and was introduced about 1923; as far as is known, it has not been re-discovered. *Stenocactus* (*Echino-fossulocactus*) *arrigens* Link is a handsome species with mauve flowers, from Mexico; it was introduced many years ago and the exact locality at which it was found is now unknown. The fourth illustration shows *Euphorbia fruticosa* Forskal from Southern Arabia; it is a columnar type with 10–13 ribs bearing spines in pairs and the “flowers” are borne in threes closely packed along the ribs for several inches, from the top of the stem downwards. The plant is rare in cultivation and the specimen illustrated was collected by Herr Georg Schweinfurth for the Berlin Botanic Garden, where it grows well and flowers freely each year, being placed out of doors during the summer months. No other illustration of this plant is known and those interested in succulent plants will be grateful to Dr. Werdermann and his publishers for representing this plant amongst the very useful series of colour plates that they are issuing.

A CORRECTION

WE regret that in Dr. Tischer's article (Vol. III, No. 4, p. 63) our member, Mr. J. T. Bates, was incorrectly referred to as Mr. I. T. Bates.

ALL matters relating to the Journal, except advertising matter, should be addressed to the Editor:—

Mrs. Vera Higgins,
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Fig. 1. Succulents in New Zealand.

Cactus Growing in New Zealand

MR. H. C. EDWARDS, of Wanganui, is interested in growing cacti, and has sent photographs of his garden and notes of the conditions there. The climate of Wanganui is such that figs, grapes, persimmons and lemons grow and ripen out of doors; cacti and succulents also do well in the open, provided they are not allowed to get too wet in winter.

Mammillarias and species of Echinopsis do well planted in a border close up to the wall of the house, where they keep fairly dry all the year round, and *Opuntia robusta* (Fig. 2) lives up to its name and is a striking

object in this garden; the ripe fruits with which it is covered, about the size of medium-sized oranges, attract several species of birds, which are, however, rather a nuisance, as they stain the plants with the red juice of the fruit when pecking it. Hail in winter is inclined to mark the *Opuntia* joints.

The majority of the cacti have been grown from small plants and cuttings imported from Texas and Mexico. The *Cereus* in flower under the window (Fig. 1) is about six years from seed, about four feet high and the flowers are nine inches across. Mr. Edwards is very successful with cacti from seed

imported from Mexico and has many seed pans of thriving plants, under glass, ready to plant out next season.

Aloes also do very well and flower freely.



Fig. 2. *Opuntia robusta* and *Aloes*.

These flowers attract two of the most beautiful species of native birds, the Tui and the Bell Bird, and in spring, their lovely notes are an added charm to the garden. Aloe ferox flowers profusely in early spring and it is this Aloe that the Bell Bird visits so frequently. Agaves also do well, as can be seen in Fig. 3,



Fig. 3. *Agaves* and other *Succulents*.

and Euphorbias thrive in the rockery and increase rapidly. The rocks used are limestone, known locally as "shell rock," and the roots of the Succulents seem to enjoy growing under these rocks.

The Botanical Society of South Africa

ATTENTION is called to the Botanical Society of South Africa, which, founded in 1913, has for its object the development of the National Botanic Gardens at Kirstenbosch and the Karroo Garden at Whitehill, in order to further the interest in the South African flora and to assist in the carrying on of experimental botanical and horticultural work. The subscription rates are: £1 1s. od. for an Ordinary Member, £2 2s. od. for a Family Member, the subscriptions contributing largely to the up-keep of the gardens. In return, members receive literature, from time to time, and surplus seeds are distributed annually. The new Journal of South African Botany, which is being published by the Trustees of the National Botanic Gardens, is available to members at a reduced rate.

The flora of South Africa contains many plants of great interest to collectors of succulent plants and, as every collector knows, it is most desirable that these plants should be thoroughly investigated by competent botanists in order to clear up the confusion of nomenclature that exists, so that the objects of the Society should appeal to all lovers of these plants, and it is hoped that they will feel inclined to support the Society by becoming members. Communications should be addressed to the Hon. Secretary, P.O. Box 267, Cape Town, South Africa.

The *Journal of South African Botany*, under the editorship of R. H. Compton, M.A., Harold Pearson Professor in the University of Cape Town and Director of the National Botanic Gardens, is being published so as to make available to those interested the results of botanical research; it will provide a medium for the publication of work on the South African flora, whether systematic, ecological, morphological, etc., and whether carried out in South Africa or in other countries. The new periodical will be published in four parts annually, each complete volume to consist of about 200 pages of text, with photographs and drawings. The subscription is 20/- per vol., single parts 6/6, post free; application should be made to the Secretary, National Botanic Gardens, Kirstenbosch, Newlands, C.P., South Africa.

Californian Coryphanthas

By Howard E. Gates

AFTER reading several scattered notes in the *Cactus Journal* on the Californian Coryphanthas, I feel an urge to attempt to clarify the situation in non-technical language, but as a preliminary, it seems well to insert a few geographical notes.

The State of California occupies approximately the southern half of the western coast line of the United States, and has a width of approximately one hundred and fifty miles. In it, cacti are only found in the southern portion, which is usually, though not officially, known as Southern California. Lying from twenty to fifty miles inland and roughly paralleling the coast is a range of mountains whose peaks reach over ten thousand feet in height. To the west of these mountains is the thickly settled and highly developed section that is known around the world. In this section occur only a number of *Opuntias*, *Bergerocactus Emoryi*, *Mammillaria dioica* and *Ferocactus viridescens*. The larger and more sparsely settled desert portion lies to the east of the mountains. The desert is the home of most of the Californian cactus tribe.

Still another California is Lower California, a Mexican territory comprising an entire peninsula, whose length is about equal to that of the State of California and whose northern boundary is identical with the southern boundary of California. There are no Coryphanthas in Lower California, unless it is in the extreme north-eastern corner, where I have never been, and *Coryphantha Alversonii* may be found. Along the western shore of Lower California, some five or six hundred miles south of California, lie the islands of Santa Magdalena and Santa Margarita, which are the home of *Opuntia pycnantha*, *O. margaritana*, *Machaerocereus eruca*, *Echinocereus Barthelozanus*, *Cochemia Halei* and *Grusonia santa maria*.

In California, no Coryphanthas are found in or west of the mountains dividing the desert from the coastal section. All of them are most often found in heaps of rocky gravel thrown up by the streams as they leave the bare mountain ranges of the desert. They are not easy to grow and under cultivation appear to prefer a very coarse soil carrying considerable lime. They are true desert plants, accustomed to burning sun in summer and severe freezing in winter, with never an abundance of water and always excellent drainage.

The largest one is *Coryphantha Alversonii*, not recognised by Britton and Rose, but whose history has been studied and whose identity has been established by the exhaustive research of Mr. Edgar Baxter, President of the Cactus and Succulent Society of America. The heads of this species are always columnar with rounded tops, except in the very young stage, when they are nearly spherical. The spines are very numerous, stiff, quite porrect and vary in colour from white to brown and black, which colouring together with the shape of the heads gives the species the common name of "Fox Tail," though it is often erroneously called "deserti." The flowers are fairly large, rose pink, and placed at the top of the heads. The plants cluster freely, often being a foot high and a foot and a half in diameter. Individual heads are often three inches in diameter, and a foot long. This species is only found in the Colorado Desert, as the southern portion of the Californian desert is called.

Coryphantha deserti is found further to the north and east of *C. Alversonii*. It is a much smaller plant, having distinct juvenile and adult forms. The juvenile plants have a flattened spherical head covered with whitish radial spines that lie nearly flat. As the plant increases in age, the crown becomes slightly conical and long dark central spines with an inward and upward slant develop. The flowers are pink or rose and quite large for such a small plant. Clusters are not plentiful.

Coryphantha arizonica is not as abundant as either of the foregoing. It ranges through the same territory as *C. deserti* and considerably farther to the north and east, reaching even across Nevada into Utah. It is larger than *C. deserti*, but not so large as *C. Alversonii*. The nipples are larger, softer, and more widely spaced than on either of the others. The spines are large and heavy, but so few in number that they do not hide the plants, as is often the case with the other species. Often the top of the plant appears depressed because of the tardy development of the new spines, whereas, with the other species, the spine development appears heaviest at the top. The radial spines are whitish and the centrals brown. The pink flowers are the largest of the Californian group and are notable for ragged

or serrated margins. This species seldom clusters.

Mr. Baxter rejects the possibility of *Coryphantha chlorantha* being found in California. I have found it to be abundant on a range of mountains in Nevada, whose western slopes reach into California, so I believe it must be found in California, too. This species is the whitest of the group. The juvenile form is a depressed sphere, bearing only radial spines. As it develops the plant becomes columnar with rounded top, and stiff central spines appear, though without the robustness and length of the other species. Whereas the centrals of the others have a tendency to dark brown and black colourings, these are pink and light brown. The flowers are the smallest of the group. Officially they are described as yellow, but most of those I have observed were really a salmon pink. The fruit of all species is ovate, fleshy, green with occasional purple or black shadings. The seeds of all are reddish brown. These geographical and botanical notes are based on several years of collecting throughout the territory involved and the extensive exchange of observations with other collectors.

Book Reviews

LES CACTÉES & PLANTES GRASSES, by P. Fournier ; published by P. Lechevalier, Paris ; price 15/-.

This book is issued as the twenty-eighth volume of the series Encyclopédie Pratique du Naturaliste, and covers the field comprehensively ; it is divided into two parts, the first dealing with cacti, the second with succulent plants. It is fully illustrated with 64 coloured plates and 151 drawings and photographs ; a large number of maps showing geographical distribution are also included. A number of photographs of succulents are scattered through the pages devoted to cacti, but without reference to them in the text, either here or later ; the coloured plates and full-page photographs are reserved to the end, where each is accompanied by a full description of the plant depicted.

In the case of the cacti, the system of classification followed is that of Vaupel, with slight modifications. After general chapters on form and cultivation, each group is dealt with in detail ; a key is given for each genus, followed by a description of a number of species, presumably those most generally

cultivated. The succulent plants are condensed into 48 pages ; they are dealt with under families, but only a few species are mentioned in each case.

As a guide for amateurs this book will be very useful, though it is a pity that the numbering of the pages has been carried out in Roman figures, a cumbersome method.

KAKTUSBOKEN, by G. M. Eklund ; published by Nordisk Rotogravyr, Stockholm, 1935.

This handbook of some two hundred pages is the first book in Swedish to be devoted to cacti, and should be most useful to cactus growers familiar with that language. It contains a large number of excellent photographs of plants in their natural habitats and in cultivation, and the various cultural directions are fully illustrated, the photographs being supplemented by diagrams. A short history of cactus collecting is given, but the greater part of the book is concerned with methods of cultivation ; we gather that classification will be dealt with in a second part.

Dates of Meetings in 1936

January 14th.
February 11th.
March 10th.
April 7th.
June 9th.
June 23rd } EXHIBITION.
June 24th }
July 21st.
September 29th.
October 27th.
November 24th.

Das Kakteenbuch, by Dr. Walter Kupper, is a beautiful production by the publishing firm of Gartenschönheit ; it contains 250 excellent photographs and 20 colour plates of cacti, with descriptions and also chapters devoted to cultivation ; the text is in German. An opportunity occurs of obtaining copies in this country at the reduced price of 12/- post free, or 12/9 C.O.D. ; application should be made to : H. S. Robinson, F.R.H.S., 79, Buxton Crescent, North Cheam, Surrey.

All communications with regard to the Journal should be addressed to the Editor, Mrs. Vera Higgins, 28, Northampton Road, Croydon.

A Cactus Collecting Expedition in South America

Report on the First 5,000 km. in Argentina and S. Bolivia

By Harry Blossfield

THE beautiful flowers of the South American dwarf cacti, *Rebutia* and *Lobivia*, which during recent years have become familiar to an increasingly large circle, and of the large-flowered *Echinopsis*, which fascinated me during my gardening apprenticeship by the indescribable colouring of their large and numerous blossoms, offered inducement enough from the horticultural and scientific point of view for the undertaking of an exploratory and collecting

realisation of the scheme for such a journey was given by the well-known Argentinian Cactus collector, Herr Marsoner, who was the first to send many of the newly discovered species to Europe, and who himself volunteered to make the journey jointly with me. So I very willingly took leave of absence from botanical studies to prepare for and carry through this trip. From my horticultural experience I have gained a comprehensive idea of the most valuable cacti from the



Fig. 1. In the Sierra de San Luis.

trip to their native home. From the horticultural point of view it was important to search for and introduce rare or new species in order to stimulate the interest of cactus lovers. From the scientific point of view it seemed desirable to obtain greater certainty on the geographical distribution, the systematic delimitation of species, the occurrence of local variations and to collect data so as to verify the correctness of the classification of those species already described. The latter task is especially important, having regard to the chaotic condition of the nomenclature of the species discovered in recent years, where different opinions, with more or less scientific grounding, contend for recognition. The final incentive to the

gardening point of view and of their characteristics. From long study of the classification of cacti and their areas of distribution I have the means of bringing back home with me from this trip, scientific observations of value. For valuable additions to my list of localities, arranged geographically and systematically, I have to thank the friendly collaboration of almost all the botanists interested in botany, whilst from explorers who know the country I have received innumerable suggestions, directions, advice and introductions. Besides this, owing to the personal and business contacts of my father in South America, I have received counsel, support and help in many places.

The localities of various species were marked

on a large map of South America, the result being a route of about 20,000 km. as the crow flies, if the journey was to cover Argentina, Bolivia, Peru, Ecuador, Chile, Uruguay, Paraguay and Brazil. In view of the magnitude of this scheme I had to restrict the route to the chief areas of distribution. But even this plan had to be changed several times during the journey, when we came by chance on new localities which led us far from the pre-arranged route, if we were to explore them thoroughly. The easily accessible cactus regions along the main railway lines had already been "worked out" by other cactus collectors. So I proposed to make my journey with a small two-ton lorry, which certainly was very tiresome and time-wasting, but, in spite of this, promised better results, for only thus could we thoroughly investigate the remotest regions not yet explored, and there find valuable new plants and rarities. I therefore bought, after a thorough try out, a 4-cylinder Ford truck, with closed body, so as to be able to protect our plants and luggage from rain and dust (Fig. 1). A Ford was chosen because one can easily get spare parts for this type throughout South America, even in remote places, because this type of motor is known to meet the demands of bad roads and because the motor has a reserve of power by means of which we hope to be able to get over the Andes even. Before our departure the lorry was fitted with special contrivances for our convenience and also with thick balloon tyres which travel better on sandy, unmade roads, and do not sink in so deeply. Tools and a good supply of spare parts were procured, which would all prove useful, for our breakneck journeyings up hill and down dale would cause much damage. On every trip something was smashed, if it was only the mudguard, the running-board, the springs, reflectors or the driving screen.

Not having much money at our disposal we had to camp in the open, wherever night overtook us. This primitive method of travelling has the advantage that one can stop at the place where the species occur and be in position to begin work again in the cool morning hours of the following day. For the cacti mostly grow far from houses and settlements, on bare mountain tops, and so one can save much time by this form of travel. We pushed on eagerly all day. In spite of this one advances but slowly, by ways which defy description. We filled the water tank at streams and rivers, halted at likely-looking places—we gradually developed a fine instinct for cactus localities—unpacked machetes,

rucksacks, ice-axes, photographic apparatus and Brownings and then hunted over the ground on foot. The mountains are usually surrounded by a dense belt of thorny scrub, through which one has laboriously to work one's way. Here face and hands are badly treated, and the stoutest clothing, wind jackets, rucksacks and even my so-called "thorn-proof" shirts are torn to shreds. We soon learned to know from experience all the other pleasures, large and small, of cactus collecting. For instance, when there is a wasps' nest in a cactus which one has got to collect, or ants in the food stores; then again, enormous stones or trees have to be removed from the road, a broken bridge necessitates the fording of a river, where the lorry has almost learnt to swim, or a breakdown in a remote district. When collecting in the neighbourhood of Trancas, north of Tucuman, we were attacked by a microscopic kind of mite which lives in shrubs and undergrowth; this penetrated our skins and set up violent irritation. It could not be removed by any means, but appeared to die of cold in the icy mountain nights, high up in the north. Another time we found a snake which we wished to send to the Zoological Garden at Buenos Aires. We shut it in a box and when Herr Marsoner one morning wanted to see how it was getting on, it struck with its head and bit his inquisitive, outstretched nose so that the blood spurted! Luckily it was not poisonous! When we appeared unexpectedly in a large town in our well-torn travelling kit, with the lorry piled up with luggage, we were invited by a police sergeant in the most friendly way to go to the police station with our lorry. Our consciences were not entirely clear, for the hunting guns were in the wagon and we had no permit to hunt. On the driver's seat lay my large Browning, another hung in the haversack on the side. We went rather anxiously, with a policeman as guide on the running-board. The chauffeur trod on the gas, in the quiet hope that the policeman would lose his hold at a sharp turn in the road further on, which we took at 60 km. per hour. Unfortunately, however, we had underestimated his muscles and his persistence. We had to stop at the police station, our pockets were emptied, and, smiling, we showed our 1,001 permits. The chief station was telephoned to and we had to go up to this station. On the way there, the arms were so thoroughly hidden by the presence of mind of the chauffeur, that they were not discovered. Then renewed examination, renewed presentation of our permits. Then each of us was decorated with a large

number and we were, as was soon obvious, photographed for the criminals' register. They took three impressions of the ten fingers of each of us and immortalised them with the photographs in the criminals' gallery. After an unwilling halt of five hours we were released with a friendly laugh and even my pocket-knife was returned to me. In this friendly town another European cactus collector was similarly treated. The involuntary halt at the police station had upset our plans for the day so that we could not reach the next destination till darkness had fallen, and had to camp out in the bitterly cold night. We tried, however, to swear ourselves warm at least, which made it easier to sleep.

When at noon, we returned to the lorry, dead tired and sweating from our labours, the collected plants were packed up, the tent cover was spread over the cases and we journeyed on to any sheltered dry place, free from ants and snakes, where we could find a night's lodging. As soon as the sun sinks below the horizon it is night immediately, with no twilight. If we were late looking for a camping site, we had to hunt around with lanterns for firewood, if any was available. Then we made a fire, cooked macaroni or rice with tomatoes, meat paste, or with game we had caught, or there was only dry bread or ship's biscuit with Yerba. It is hard to get used to this tea, so much beloved in South America, which is prepared from the leaves of *Ilex paraguayensis*, and one first gets the real taste after one has drunk a couple of litres of this herb tea. It is very healthy and promotes long life. In this hope I drank it resignedly. After meals the crockery was washed, if there was enough water available, the chauffeur overhauled the motor, Herr Marsoner packed in the luggage, I wrote up my diary and saw to the most important correspondence and then we crept into our sleeping bags and under the covers, for the large tent cover, many times folded, served as mattress. With the top layer of the tent we kept ourselves dry; the Brownings lay ready to hand near us, close to the fire. In spite of this the great cold woke us as a rule before dawn. For in winter here towards morning the temperature on the lowlands falls below freezing point and everything is covered with frost. At greater heights the night temperature may be 15 deg. C. below zero. Then the fire is set going again, the inevitable Yerba mate brewed; with this we have dry bread, bread and honey or a sweet Marmalade Dulce. This is a horribly sweet marmalade made of all possible fruits, even *Opuntia*

fruits and potatoes can be recognised in it. Then we pack up with all speed, load up, fasten the cover firmly over the truck and set off to do as much as possible before the grilling heat of mid-day becomes too enervating. Washing is a luxury as it were, for it can only be managed when the camp is set near running water. Later in the Puña (as the high plateaux of the Cordilleras at 3,700-4,600 m. above sea level are called) shaving was discontinued, for in the rarified air of these notorious plateaux the skin becomes so dry that it cracks and bleeds. Here the well-known Puña disease, the Soroche, is prevalent. It is caused by the reduced atmospheric pressure and low oxygen content on the body and reacts especially on the brain, the circulation and the breathing. One gets giddy, with a feeling of muscular weakness and inability to carry out voluntary movement with precision; inability to see clearly, severe headache, breathlessness and bleeding from the mucous membrane of the lungs may occur. On such an expedition into the Puña my travelling companion had to turn back halfway because of hæmorrhage. Even eating was hard work for us. When standing one cannot swallow a mouthful, one must either sit or lie. We had to drag along several plants weighing about 15 kg., which seemed to us so terribly heavy, like a whole rocky pinnacle. Another time I wanted to search a certain district, whilst my companion went on with the car. This little digression was made on mules, and I hoped to get down again by evening, but was delayed, and had to spend an icy night in a bug-ridden native hut, covered only with old newspapers. Up above there our Polvorin, the native name of the skin mite, is killed by frost, and was almost forgotten when letters from home arrived with suggestions of remedies.

Now I will report on the most important of the areas traversed up to now and on the cacti collected or discovered and erect a small memorial to our brave Ford for the brilliant demonstration of its capacity for work. For high up in Jujuy, where the people have a better understanding of the difficulties of our trips than a European unfamiliar with the conditions in South America, our Ford as well as ourselves were regarded as wonders. Here no one would have believed a word of our tales had I not, as the surest and best proof that we really had been in all the districts that we described, been able to produce my photographs with the complete record in pictures of our journeying up to then. It appears that this photograph

album is the best letter of introduction, and one which opens for us all doors amongst the very hospitable Argentinians.

After we had struggled for weeks in exasperation over the release of my equipment by the customs and acquired an idea of the meaning of the phrase "mañana" (to-morrow), after we had finally even teased the customs officer on the unbelievable slowness of his mind, we went on to the Province of Cordoba. Here we found the beautiful *Lobivia violacea*, *Echinopsis aurea*, *Echinocactus lafaldensis*, *Kurtzianus* and *multiflorus*. Some of these plants I sent to my father at Potsdam, which he, as an experiment, sent on to Australia. News has come from the consignee that these plants, though they had made a double journey across the world, were received in Australia in perfect condition. We wanted from here to make a digression for a few days only towards the south, into the mountain chains of the Province of San Luis. But we struck such an incredibly bad road that we could only proceed very slowly. Once we stuck in the mud completely, and another time the rise was so steep that even our Ford jibbed and we had to unload, proceed empty and carry up the whole of the baggage, including several hundred kilo of cactus plants, and reload up above. From Cordoba we sent in advance to Jujuy all the plants so far collected, and all the luggage we could do without. We had not realised that it would take us three weeks to cover the awful road through San Luis. In spite of everything it was worth all the trouble. We found the white-haired *Lobivia* I had expected, to which I gave the number 19. It is probably new, but certainly the most beautiful of the *Lobivias*. We also found a dainty little dwarf *Opuntia* and the rare *Lobivia spiniflora*, whose petals terminate in fine spiny tips.

Along the only road leading westward, which was in an appalling condition, we then went into the Province of La Rioja. Taken all in all it is an unutterably barren and desolate region. Here we found a terrible landscape, completely dried up, with only a few ruined houses of long forgotten human settlements. Here also we were very short of water. On the plains the vegetation was miserable. Stretches were overgrown with *Opuntia diademata*, which is here almost spineless, and with *Opuntia strobiliformis*. On a small Sierra we found *Echinocactus Saglionis* and the peculiar *Echinopsis* No. 20. Our next aim was the 6,000 m. high mountain, Famatina, where we hoped to find the beautiful *Lobivia famatimensis*. But at Vichigasta, a

wretched village at the foot of this snow-covered mountain, our axle broke, and we had to make an unwilling stay of three weeks. Owing to the miserable road and the overloading of the lorry the differential drive was also damaged. We employed this delay to change the lorry, previously of the closed type, into an open one, by sawing off the upper part, which made possible a considerable increase in the effective load. We tied our large tent cover over the luggage space as closely as possible, but, in spite of this, everything packed underneath was covered thick with dust each evening. For our car, except when it was going straight over a stony slope, was always in a high cloud of dust, since the road usually consisted of foot-deep, fine dust. During the involuntary halt we sought for *Lobivia famatimensis*, but vainly, for we found only three specimens. But we did find a whole series of unknown cacti in the high mountain regions. When the repairs were finished we travelled in a great semicircle, first northwards, then eastwards, then southwards to Catamarca. There we found *Lobivia andalgalensis*, which we were the first to export; this is of slender, columnar habit with wonderful spines. We also found *Echinopsis aurea*, *Cereus Baumannii*, *coerulescens*, which has always been collected and exported previously in error as *azureus*, as well as *Cereus coryne*, and again *Echinocactus Saglionis*.

From Catamarca we went northwards into the tropical dampness of the Province of Tucuman, which is partly laid out as a single, large cane sugar plantation. In the southern part only we found two species of *Rhipsalis*. Though a storm raged behind us and rain in this region would make the road an impassable quagmire for weeks, yet we went on in spite of the bad road at an unjustifiably rapid rate, over the dreadful, loose streets and even made no halt in the town of Tucuman, on to Trancas, where it was still fairly dry. Rain in the tropics cannot be compared with the greatest European rainfall. Quite suddenly, as though the first thunder and lightning had burst open a door, the rain descends from heaven like a sea released. There is no room to breathe between the deluges of water. This sea, thundering down, appears to be in flames, its flashes roar like a wild animal, the earth trembles as if she would shake herself free from the terrible thunder. Quite suddenly the rush of water ceases and one stands often knee-deep in water. The storm quickly passes and one could almost believe that one had only dreamt this inconceivably

grand phenomenon. So it is understandable that we tried to get away as quickly as possible from the bad weather threatening. On this trip we broke nine of the ten springs of the front axle of our truck. Fortunately the last spring held out till we reached Trancas, and in this God-forsaken village we had to set up our tent and await repairs. Here we found giant specimens up to 10 m. high of *Cereus Terscheckii* (Fig. 2). On shining red sandstone hills we found a *Lobivia* which may be

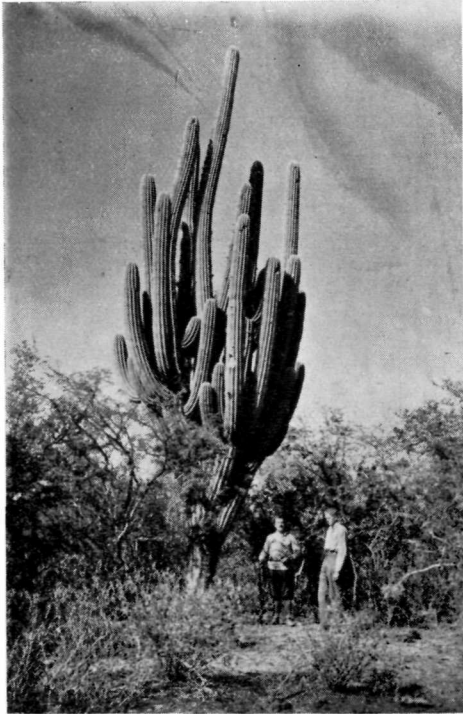


Fig. 2. *Cereus Terscheckii*, near Trancas in Tucuman.

identical with *Lobivia hyalacantha*. But, according to the not very reliable reports of the natives, it should have a dark violet flower. If this is so, it will be a new species. But there was nothing more here in the cactus line to collect. Also the road came to an end and so we could not penetrate the western hills, in which I still expected to find cacti. We had to turn and go to Salta. In this magnificent region we found the beautiful *Echinopsis* No. 37 and the extremely rare *Parodia aureispina*, related to *Echinocactus microspermus*. The true form of this lovely rarity with the golden spines only occurs in one single spot. It can be found in a few other places also, but the spines are only partly golden, in a degenerate or hybrid form. The

true and most beautiful form grows only on one almost vertical rock wall in the cracks of the slate. I had to climb up and let myself down from above between horribly prickly clumps of *Bromelia* and a sort of succulent stinging nettle, extremely painful to touch, to hack the little *Parodia aureispina* out of the rock walls. This was the most dangerous and difficult bit of collecting that we had had to undertake so far. Our task was to ascend the sun-drenched northern wall¹ which was covered with wasps' nests also, as already mentioned, with a terrible stinging nettle, and on the way up I disturbed a poisonous snake like a common viper, so that great caution was necessary. It is not easy to collect these small plants under such conditions. The collector who gathered them for the first time a few years ago and from whom the author received plants, returned home swollen like a barrel from wasp stings. I had to rope myself to a bottle tree, as one could not reach the plants otherwise, and so I hung defenceless on the rope, the victim of wasp attacks if I unintentionally disturbed a nest. It is understandable that I could only collect a few specimens of this beautiful species. The true, golden-spined *Parodia aureispina* will always remain a rarity.

As a result of heavy rain the previous year, many roads in the Province of Salta were wholly or partly washed away and destroyed. Hence travelling by motor was very difficult in places and many proposed expeditions could not be accomplished. On one trip through the Quebrado del Toro we and the wagon were stuck in the rushing water of the Rio Blanco. In the middle of the ford we got the front wheel into a deep hole which had been made earlier when a large lorry stuck in the bed of the river and had to be hauled out by oxen. The next day, then, we too fell into this hole. The water got into the motor so that we could not get out under our own power. The current was so strong that it took all our strength to stand erect in the water. And the water was so deep that it entered the lorry, so that we had to unload with all speed to keep our luggage dry. Two horses could not move the lorry one centimeter from its place. And besides it was night, so that we were freezing and, soaked to the skin, we had to make our camp on the stony shore. During the night I accidentally

¹ South of the Equator the northern walls are in sunshine whilst the southern walls are in shadow, since the seasons are the opposite of those in the northern hemisphere. In June, July and August it is winter here.

came on a thief, who would have stolen some of our tools. Unfortunately I had not brought my Browning on this little trip, otherwise I could have stopped the thief with a warning shot. Next morning we worked for four hours diverting the bed of the stream in which our car was stuck fast. Then we harnessed three horses, with the result that the driving rod of the lorry broke. Then it occurred to us to hitch the horses on behind and drag it out backwards. Whilst the horses pulled, we raised the front axle with a felled

so well organised a plant protection service; men afflicted with all manner of diseases can cross every frontier, but plants must be inspected by the plant protection office of the country of consignment and provided with a certificate of health. On arrival they are, as a rule, inspected once again, before they can be allowed to enter. All these provisions for plants have not, however, prevented the most dangerous pests from crossing the prescribed boundaries. Why the countries agreeing to the International Phylloxera Convention of

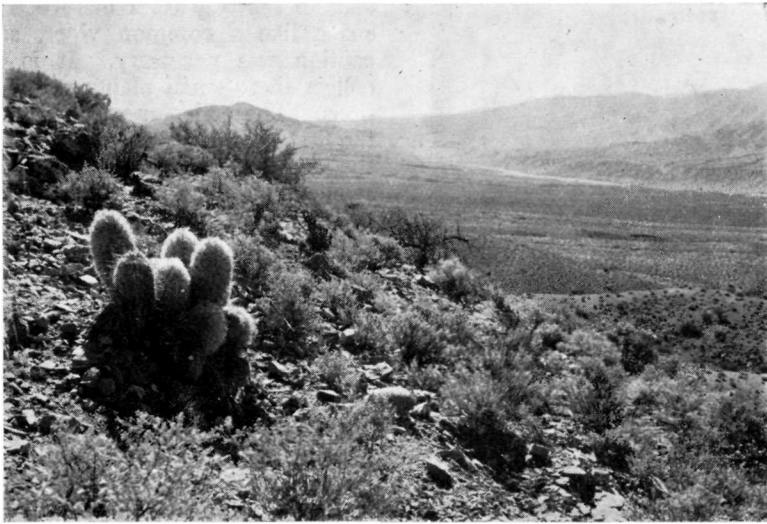


Fig. 3. *Pilocereus Trollii* above Humahuaca.

tree and slowly the lorry reached the shore. We spent the second half of the day drying our wet clothes in the sun. The next day we successfully crossed the river and the day following we found a beautiful yellow-flowered *Gymnocalycium* and *Lobivia* No. 38, which is firmly anchored deep in the loose stones by a very long tuberous root. This plant so strongly resembles, in colour and appearance, its stony environment, that one can hardly see it. A number of *Rebutias* also grow in this neighbourhood, but only on the almost inaccessible tops of the mountains.

We finally went on to Jujuy, where a whole shed full of cases, which we had sent on in advance, awaited our arrival to be despatched. This was a job which kept us busy for several weeks. Unfortunately, we had great difficulty, with the despatch of the plants, for the plant protection office could give no certificate of any use abroad, although we had received contrary information from the officials in Buenos Aires. It is remarkable that there is

November 3rd, 1881, still keep in force the whole law against Phylloxera, with its cumbersome apparatus, although after the discovery of the winged form of Phylloxera it was quite superfluous, is incomprehensible to me. Finally, after a series of telegrams and express letters, the plants could at last be sent off. In the meantime we took the ancient trade route northwards to Bolivia and found there a beautiful little *Rebutia*, *Echinocactus Chrysacanthion*, a golden-spined local form of *Cereus Straussii*, a tiny *Lobivia* with a worm-like root 20 cm. long, the lovely *Lobivia densispina*, the beautiful *Lobivia longispina*, which is probably identical with *Lobivia Ducis Pauli*, as well as the fine, rare *Lobivia Schuldtii*. Of the microspermus group we found *Echinocactus tilcarensis*, the peculiar *Echinocactus Maassii* and also *Lobivia* No. 37, though with quite different spines, then the very rare and beautiful *Lobivia famatimensis* with thick tuberous roots, which sometimes so closely resembles its surroundings that it is

very hard to find. We found here, too, enormous groups caused by the continual cropping of skunks and goats. Having hunted for several days, we all three saw one night before our eyes, overstrained with searching, the small greyish-red heads of *Lobivia famatimensis* between its native stones, similar in colouring and shape. With much regret we had to leave behind five magnificent cristates of *Echinocactus Saglionis*, weighing 20-40 kg. Then we found the lovely golden-flowered *Rebutia senilis*, which, according to

of localities and areas of distribution as many of the localities of new species given in the description by the discoverer.

At more than 3,000 m., where in June and July the temperature at night falls to 16 deg. below zero, where rivers and streams freeze at night right to the bottom, and where next day, under the bright sun, a temperature of 20-25 deg. exists in the morning, grows *Pilocereus Trollii* (Fig. 3) and the lovely *Pilocereus Poco*. The giant *Cereus pasacana* no longer occurs here. The last gigantic snow-white stems of

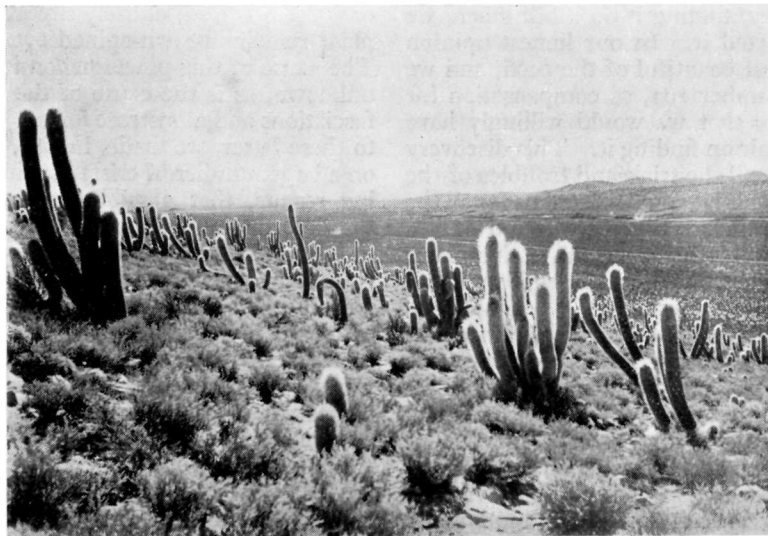


Fig. 4. *Pilocereus Celsianus* near the Bolivian boundary.

the original description, should occur about 200 km. further south, in Salta. Possibly the author has in error given the name of the town as locality, because he bought a few plants there. For if this species really occurs in Salta, too, it would be the first case of a *Rebutia* having so wide a distribution. In the genus *Lobivia*, such exceptions as *Lobivia famatimensis* are known, whose localities in Famatima and in Jujuy are 700 km. apart. Also *Lobivia* No. 37 was found at two places almost 200 km. apart. But here we saw from the marked difference in the spines that they represented the outer limits of the area of distribution. We found all the other *Lobivias* and *Rebutias* without exception in very restricted areas, often on one mountain top alone. It would be interesting to establish the distribution areas of these cactus genera which are apparently still evolving, by reliable comparisons of the true localities. In my experience, the vague statements of the Argentinian Indians are as reliable in respect

this species occur at 2,800 m. above sea level. Further north *Pilocereus Celsianus* is always found on the sunny side of a gently sloping hill, often as tremendous woods or as giant specimens. We found also for the first time a monstrose form of it, a colossus, growing like a *Cereus peruvianus*, known as the Rock Cactus. Here the tiny *Rebutia pygmaea* creeps along deep cracks in the rocks. Even with a crowbar we often could not splinter the massive rock into which these little plants are anchored by their long, slender, tuberous roots, seeking protection from attacks by the wild lamas and from icy storms which drift across the high plateaux at 3,000 m. from Bolivia. Up here occur the last *Pilocereus Celsianus*, bowed before the storm (Fig. 4).

On the high plateau of Bolivia is supposed to grow a beautiful, long-haired, giant columnar cactus, "pelo rojo," or red hair, so named by a native, which was the chief reason for this trip. So far we had found no trace of it. Systematically whole stretches were

hunted over, but unfortunately always without result. We spoke daily of turning back, for in this cold season it was more than disagreeable on the high plateau, often swept by icy storms; our food supplies had to be rationed, and water, too, was very scarce. But we found the beautiful *Pilocereus Hendrichsenianus*, which raised our spirits and our hopes, especially as we were able to increase our supplies by a chance meeting with a wild lama, although even when cooked in a special steamer, the flesh could not be softened. We firmly hunted on, and at last were lucky, finding it on a hill where we had not expected it. In our honest opinion this is the most beautiful of the cacti, and we gave it the number 101, as compensation for the 101 salvos that we would willingly have fired into the air on finding it. This discovery alone is worth all the trials and troubles of the whole journey and it compensated us for all the previous privations. Since we found only a few plants suitable for transport at this place, we had to hunt still further, to see if we could find yet other localities.

The road to a spot, where *Echinocactus Neumannii* should occur, which we afterwards found elsewhere, was so incredibly bad that we took $2\frac{1}{2}$ hours to do 10 km. with the lorry. Here we broke the front two springs, dented the exhaust pipe and broke all the lamp bulbs in the reflectors. Besides this, various screws were broken and the mudguards were put completely out of shape. We found instead of *Echinocactus Neumannii*, *Pilocereus Trollii*, *Echinocactus Maassii* and *Lobivia longispina*. In another place in the north of the province of Jujuy we found *Neowerdermannia Vorwerkii* Fric, whose locality is given in the literature as Bolivia. The body of this species, as with many others, dries up in winter so completely that one might believe that the plants retire into the earth in winter, where they are entirely buried by sand storms. We saw no trace of the plant till we accidentally discovered the fine spine tips, projecting slightly above the sand.

On our expeditions through the remote valleys in the extreme north of the Province of Jujuy and southern Bolivia we photographed several gigantic cristates of *Cereus pasacana* (Fig. 5), of which some weighed up to one ton. These monsters with snow-white hair stand on the slopes of the mountains like a hand with outspread fingers on a mighty arm. But despite so many hundred snow-white giant columns, we sought in vain for small plants, less than 2 m. high and yet with the typical white bristles. All the young plants

had close, long, brown spines. The reputed species *Cereus cephalopasacana* or *pasacana alba* owes its existence to the desire to add one more species to the catalogue. The seedlings of these two forms show no difference either in their native place or in cultivation in Europe, which would justify the setting up of a variety. In its native place one can be certain that in the high mountains and plateaux, *Cereus pasacana*, as soon as it has reached a given age, will form white bristles, instead of the long, stout, brown spines of the young form. At lower levels and on the plains the formation of white bristles is entirely suppressed and the plant remains brown-spined even in old age. The cause of this phenomenon is so far quite unknown, as is the cause of the formation of fasciations and monstrose forms. With regard to these latter, we made, in situ, observations on a large number of cristates with the following results, that possibly puts the cause of the deformation in another light. We found in all the cristates examined traces of damage by insects below the crest or in the crest itself. Usually there were tunnels as thick as a finger eaten out by insect larvae. The larvae themselves were often found in them. Often these were grey-green caterpillars, apparently of butterflies, or whitish yellow grubs of beetles, as thick as a finger. The walls of the holes were usually dry and covered with a reddish-brown cork-like layer. The passages were filled with the brown excrement of the larvae. Often, however, the passages were decaying, and we found, especially in some cristates of *Cereus pasacana*, a blackish brown slimy fluid outside on the crest, which ran from one of these nibbled passages or came from a large rotten spot. A broader, browner stripe in the once white hairs of the plant indicates that these decayed spots existed before the previous rainy period and that the fluid has been washed down by the rain, thereby colouring the white bristles brown. Often such cristates were split and long cracks ran across and across their crests. Then we made the important observation that, as a rule, a number of cristates of the same species occur near together. Often even several shoots of a branching plant are affected. This occurred in *Cereus pasacana*, *coryne*, *Baumannii*, *Pilocereus Celsianus*, *Echinocactus Saglionis*, *Schickendantzii* and *Opuntia ficus indica*. We only found solitary cristates of *Echinocactus chrysacanthion*, *Maassii*, several *Rebutias*, *Lobivias* and a few species of *Echinopsis*.

From these observations it appears to me as if the cause of the formation of many,

perhaps of all fasciations, can be traced back to the attacks of insects or other exterior damage. For only thus can one explain the considerable appearance of cristate forms in a small space and also on the limited power of flight of the insects. Apparently these insects use the same species of cactus on which to deposit their eggs, which thus serve them as hosts. If it can be established that the few cristates found amongst seedlings

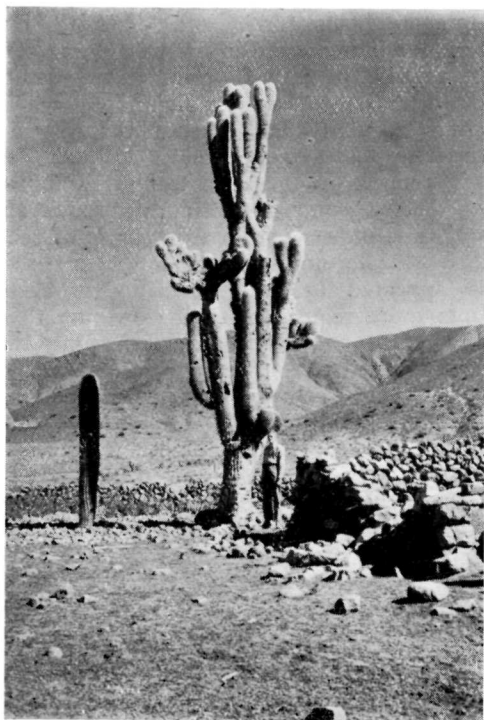


Fig. 5. The Author (5 ft. 9½ in. in height) beside a cristate *Cereus pasacana*.

owe their existence to accidental damage by tweezers, during transplanting, in the right spot, or other similar damage, perhaps eating by insects, then the formation of cristates would be finally explained.

The alkaloids recently discovered in cacti may be the reason why many species are not attacked by insects and, therefore, do not form cristates. Thus, for example, no cristate forms are found of *Pilocereus Trollii*, of many species of the *Echinocactus microspermus* group and of many *Echinopses*, *Lobivias* and *Rebutias*. Cristates, too, are very rare in spherical *Opuntias*. We only found two crested plants of *Opuntia diademata* in the Province of La Rioja, the two plants being 2 m. apart. If these observations only contribute to the better understanding of the

cause of the formation of cristates, yet the essential in the production of this deformation remains unexplained, namely, what happens to the growing point in the crown, which so acts that the cell division does not take place equally in three directions, but only in two? For even if we have correctly established that attack by insect larvae is the cause of cristate formation, the problem has only gone one step forward and the question remains, how the fasciation is formed when the insect has eaten its tunnel through a normal stem? I believe that science alone is interested in the answer to this question, for when it is finally decided and when one can produce cristates in any required quantity, no one would be interested any longer in these peculiar plants, which are collected only on account of their rarity.

After we have travelled more than 5,000 km. with the lorry in Argentina and southern Bolivia, hunting for cacti, after we have made countless expeditions on foot, without the car, through pathless country or on mules, it is perhaps a good thing to recapitulate the results of this part of the trip. We have found more than 100 valuable cactus species, without counting the numerous species that we found, but which, on account of their low commercial value, we did not collect. Of *Lobivia*, *Rebutia* and *Echinopsis* alone we collected over fifty different species. Probably there are a number of good new things amongst them. It seems desirable to leave the journey to Bolivia and Peru until next year and to penetrate with mules into the interior of the quite pathless country of north-western Argentina, which probably has not yet been traversed by a cactus collector, and here we hope to find new *Lobivias* and *Rebutias*. To have time for this task, we separated in July and Herr Marsoner carried out the trip to Paraguay planned for later on, and in a month of collecting obtained valuable material. Amongst them were cacti from the Chaco Boreal, earlier the scene of war, where collecting is no longer possible since the roads laid out for war purposes have quickly returned to their primeval condition and therefore penetration into this region is quite impossible. The transport of these plants was attended with so much difficulty that he has earned a special description, which I will keep till later. During this period I sorted the plant material in Jujuy and got everything ready for despatch and also found time to write this report and then to go on a collecting trip to the north of the Province of Jujuy and towards southern Bolivia. Through this

division of labour we have found time to go far enough into the unexplored cactus regions of northern Argentina, where we expect a specially valuable booty.

In the meantime, it is spring here in the southern hemisphere, and it looks as if we shall not be so terribly frozen during our nights in the open. It also looks as if we shall have, at the end of this trip, to replace completely our torn linen, clothes and boots. We will probably go on to Uruguay to collect there, and then the journey will be continued through Bolivia and Peru and at the end we reach Brazil. Since in the northern hemisphere winter is now setting in, all plants that we collect henceforth will be planted out at a suitable spot and carefully tended till the end of February or beginning of March, so that they can be sent off with the results of the collecting in Uruguay.

[Translated.]

Editorial

THE growing season for most cacti is over for the year and there is little work left for their owner to do amongst them, except keep a continual watch that all is well. The short days also mean that much less spare time can be spent in the greenhouse, even by those enthusiasts who have installed lighting or who go out with a candle. But since interest in one's hobby does not cease because the days are short, other ways of pursuing the interest must be found; records can be put in order, names checked up, labels re-written and, above all, there are books to be read—though there never seem to be enough for growers of succulents.

Beginners are apt to think that it is hardly worth while to make notes about their few plants and every one has a tendency to think they will remember interesting points, but only too soon one finds one really is not sure if such and such a plant flowered in April or June, and did this other really drop its leaves as early as September last year. With imported plants such notes are of additional value, for a plant may retain its original habits or may change to our seasons, if they vary from that of its native habitat, but the first year in this country they may compromise and a record which can be referred to when growth begins again, is very helpful. These records are especially useful when comparing notes with other growers; an account of a plant's habits will carry much

more weight if accompanied by a note written down at the time.

A number of members already keep such records of their collections and we would like to suggest that winter evenings could profitably be employed in looking through them and selecting items of interest for communication to other collectors, for which the Journal is an excellent medium. Most people like to know what is being done in the collecting grounds abroad, in herbariums where plants are being sorted and identified, but every one is interested in what other growers like themselves in this country are doing. For instance, we have an *Echinopsis* which flowers regularly on the last Saturday in June; if this is mentioned to visitors they often remark on the apparently well-known fact that a group of *Echinopsis* plants are likely to all flower within a day or so of each other, yet no note of this interesting fact has appeared in the Journal. Are these plants more regular in their flowering than other genera, or is it an illusion? Only the pooling of collective experience can show.

Then again, many new plants are coming over and their growing period is not well known; it is much more helpful if someone can say, "My specimens started into growth at the beginning of October and became dormant again in May," rather than a vague "I believe it grows in winter." We believe members could help each other a great deal by passing on items of information, and the Editor will always be glad to receive such notes.

The collection of cacti and succulents of the late Mr. A. Dale is for disposal, and Mrs. Dale is anxious to sell before the weather gets very cold. Any member interested is invited to write to or call at 9, Navarre Road, East Ham, E.6, where the plants can be inspected.

The Membership List will be reprinted early in the New Year; members are asked to send changes of address or other corrections or alterations to the Hon. Secretary, 28, Northampton Road, Croydon.

The Hon. Treasurer would be glad to receive, as early as possible in the New Year, those subscriptions which are due for renewal on January 1st.

Cacti from Seed

By A Boarder

THIS year has not been a very good one for raising cactus seed. The early part of the year was rather cold and dull, and the nights were especially cold. In addition, on May 19th there was a very severe frost which did not improve matters. The outside conditions have a determining effect on the inside of the greenhouse, too.

On looking over my seedlings of this year, I find that the size of most of them is rather less than that which I generally expect. The strength and general condition of the plants leave nothing to be desired. Several of last year's seedlings have flowered and I have *Mammillaria Scrippsiana*, 1932 seedling, at present in bud on October 20th. I am hoping that this plant will flower before the warmth goes from the sun, as I have not yet had any blooms on this plant. I have just had *M. hidalgensis* in flower from last year's seed, and I have been experimenting with this plant by keeping it in a box and not potting it up. I have expressed the opinion on more than one occasion that it is not necessary to have a plant pot-bound before it would bloom, and so I determined to put my belief into practice. I took some seed from one of my own plants in April last year and sowed them in a box. They were later replanted into another box, and there the plant has flowered. It is now a fine specimen as large as a hen's egg and has had about ten flowers so far. The box is about 14 in. by 8 in. In the box are a number of other seedlings. I think that this proves that a cactus plant does not have to be pot-bound, as is generally supposed, before it will bloom.

I have mentioned before about the *M. ocamponis* seeds that I tried last year. The percentage of germination was only about 2 per cent. and was very disappointing. I had been asked by more than one dealer if I would part with some seed, but I felt that it would be more fair if I tried some myself first. I only sowed a few at first and as these did not do too well I tried successive sowings until all were sown, with the result that I have about twenty plants from about 700 seeds. The first sowing was not made until January this year, and this summer I thought it would be a good plan to let the seeds ripen well on the plant before taking them. The

seeds of *M. ocamponis* are very difficult to collect as the tubercles of the plant are very long and the seed berries appear to be almost hidden between them, and one has to dig nearly into the plant to obtain the seeds. I was able to get a much smaller number of seeds this year, as I was afraid of damaging the plant. On September 22nd this year, I planted the seeds in a box in which I had already planted some of last year's seeds in a separate division. In ten days the seeds were germinating, and at the time of writing there are about 200 plants up, some of which are already showing their spines. This is very pleasing, as I had been so disappointed with last year's sowings.

Although these seeds have germinated well when planted soon after they have been collected, I have not always found that all kinds are best sown quickly, as I have had seeds come up after a year.

I was asked by a large grower recently what was my percentage of losses among my seedlings, and I gave it at about 10 per cent., but I now find it is much smaller, being no more than 5 per cent. The small rate of losses seemed to surprise the enquirer and, on thinking it over, I feel sure that one of the chief reasons for my small loss is that I do not transplant my seedlings as soon as some growers recommend, but wait until they have a good root, and the food bag has quite disappeared. It seems all wrong to me to shift these very small plants in, say, a month after germination, as I have often been advised, as the roots then are so tender that they are almost sure to be broken. Another tip of mine is to refrain from watering for at least a week after transplanting, as by this time the roots are beginning to form. I am sure that many plants are lost by watering them too soon after transplanting or re-potting; it is far better to wait until new roots are formed.

I have been testing the outside temperatures this week and the ground level readings were: Oct. 21st, 19° F.; Oct. 22nd, 26° F.; Oct. 23rd, 23° F.; Oct. 24th, 32° F.; Oct. 25th, 23° F.; Oct. 26th, 45° F.; Oct. 27th, 47° F.; On Oct. 21st. my inside temperature was 32° F., and on Oct. 25th it was 31° F.

“Viviparous” Succulents

By E. J. Labarre

AN attempt to analyse the attraction a thing has for various people is usually abortive, because if the object is the same, the individuals are so different. When I started to collect succulents many years ago, after having passed through the stages of Orchids, Phyllocacti, Cacti, and so forth, some friends said my taste changed with the fashion, while others said it had become a mania, whereas I was merely following what seemed to me the same line of development, attracted by what Sinclair Lewis has called “divine curiosity.”

All collectors probably possess a considerable amount of this curiosity, for they are always trying to ascertain in what way another variety of plant or animal, as the case may be, has solved the difficulties imposed upon it by climate and general conditions of life. I must confess that it must be some inquisitiveness of this nature which has maintained my interest in exotic plants for more than twenty years, and has led to the continual change in the contents of my greenhouse, which frequently puzzles non-collectors.

One of the most interesting phenomena in plants is the extraordinary variety of method they have adopted to assure the perpetuation of the species under the most unfavourable circumstances. We may assume that the alternation of the seasons, in practically all parts of the world, has from primeval times forced all vegetation to find a means of keeping its kind alive during the cold or dry season, which the plant itself could not survive. We all know that the ideal method devised for this purpose is that the plant produces seed; this is virtually a young plant reduced to a dry state and enclosed in an envelope sufficiently strong to protect the tender germ against great heat or cold. Some seeds have been known to survive for exceedingly long periods. Certain plants apparently found difficulty in producing such seeds, or possibly the seeds could not germinate successfully. Consequently they seem to have devoted their energy to producing long roots, from the ends of which they rose to the surface with new shoots, sometimes forming tubers, like a potato and several kinds of Helianthus, or like the house-leek, by runners which perish after producing a terminal leaf-rosette. Others, like some of our succulents and cacti, readily drop their joints (Opuntias, Stapelias, etc.), which then produce roots and

continue to live independently of the mother plant.

One of the most striking and effective methods of propagation, however, only came to my knowledge a few years ago and immediately set me searching for other varieties possessing the same power. It is what I would like to call the “viviparous” method, for the plant produces a young specimen, with two or more leaves, and a set of roots complete, before it is allowed to leave the parent plant.

This system is found in several of our succulents, three of them belonging to the species *Bryophyllum*, which produce perfect plants by budding at the edges of the leaves. The most typical is *B. crenatum* with a complete plant at each “crenation” or tooth of the full-grown leaves. This striking example of “complete service” on the part of the plant fascinated me so much that I kept a look-out for other species which had adopted the same method of reproduction, to the neglect of the normal flower-seed system.

I soon discovered several other *Bryophyllum*s, such as the well-known *B. tubiflorum*, which produces six or eight perfect young plants at the ends of its cylindrical leaves, and *B. proliferum*, though the latter forms the plant buds near the flowers, after these have died, and not along the margins of the leaves. A specimen of leaf-borne buds recently acquired is *Bryophyllum Diagremonianum*. Although this is still a small plant with only six leaves, it has already produced some twenty plantlets on each full grown leaf, so that after a few weeks only, I already possess a second generation!

Another plant which reached me from S. Africa about six years ago showed this “viviparous capacity” to an extraordinary degree. A single plant which grew to a height of about 50 cm. shed, after flowering, more than 500 young specimens with four or even more leaves, with roots complete, which in a few months covered an area of more than a third of a square metre! This plant proved to be *Crassula cordata* Thunb., which flowered without producing seed but made ample compensation in this manner. The young plants begin to appear at the terminal sections as soon as the flowers have faded. A similar plant is *Crassula quadrifolia*.

It would seem that this method of proliferation is not restricted to succulents, for

I find it in *Nymphaea Daubenyana*, a tropical water-lily which floats about and produces young plants from the centre of the leaves; the latter then rot away, leaving the young plant to carry on an independent existence. A similar method is seen in the well-known *Tolmiea Menziesii*, which many of us grow on the window sill.

It is the pursuit of such phenomena that arouses such a passionate interest in the collector, who is constantly on the qui-vive for a novel behaviour in the plants he acquires.

Euphorbias

By Capt. A. Dunston

THERE can be little doubt that the incorrect naming of this genus has done much in the past to detract from their popularity. The naming even in botanic gardens, all over Europe, is far from satisfactory.

I have for a long time been endeavouring to find out the origin of some of the fantastic names given to plants in this genus. *The Cactus and other Succulents, Amateurs' Guide and Price List*, by F. A. Walton, Handsworth, Birmingham, throws considerably light on some of the names under which Euphorbia plants may be found to-day.

In the following list there are 109 species offered for sale, of which five have now been removed from the genus and one has been entered twice; one also is a biennial and does not come under Berger's classification of Succulent Euphorbias. This leaves 102; no less than 55 names are not recognised to-day. The species *E. Waltonensis* should be a good name, for Mr. Walton spent much time and money on the collection of specimens, and anything named after him is likely to be distinct. The species *Kransei*, *Houlleti* and *Richardi* may well open up possibilities of finding articles on Euphorbiae by these gentlemen. I shall be pleased to hear from any member able to throw any light on these obscure names and of any other names which have fallen out of the books of to-day.

E. abyssinica.
E. antiquorum.
E. alcornis.
*E. articulata*¹.

¹ A plant of this exists at the Botanic Gardens, Glasnevin, under this name, and I possess an offspring; mine has not yet flowered.

E. atropurpurea.
E. anacantha.
E. aurelia.
E. balsamifera.
E. beaumierana.
*E. bupleurifolia*².
E. breonis.
E. breonis var. *splendens*.³
E. breonis var. *bojeri*.⁴
E. breonis var. *Jobinii*.
E. benpleurifolia.²
E. canariensis.
E. candelaber.⁵
E. caput-medusae.
E. caput-medusae var. *odorata*.
E. cereiformis.
E. coerulescens.
E. colletioides.
E. Commelini.
E. Cooperi.
E. cristata.
E. colubrina.
E. cassytha pendula.
E. De Smeti.
E. dendroides.
E. Echinus.
E. enneagona.
E. erosa.
E. erecta.
E. fimbriata.
E. funalis.⁶
E. Fournieri.
E. globosa.
E. glomerata.⁷
E. grandicornis.
E. grandidens.
E. gracilis.
E. Granti.⁸
E. gardeniaefolia.⁹
E. globosa major.
E. grandidens var. *cristata*.
E. habanensis.
E. habanensis var. *cristata*.
E. helicothele.

² These names are obviously attempts at bupleurifolia.

³ and ⁴ I treat for statistical purposes these two as good names, though *breonis* still requires explanation.

⁵ The figure of this plant in the *Cactus Journal*, Vol. I, 1898, dispels any idea of it being *E. candelabrum*.

⁶ Plants under this name are to be found at a number of places; they appear to be mauritanica, but none have yet been flowered to my knowledge.

⁷ This also is to be met with; Dr. Marrable gave me a plant under this name in 1933.

⁸ Not now included under the generic name Euphorbia.

⁹ Now only a variety of a species.

E. Hermantii.¹⁰
 E. Houletii.
 E. hystrix.
 E. hystrix var. viridis.
 E. heptagona.
 E. imbricata.¹¹
 E. Jacquiniiflora.⁸
 E. Kransei.
 E. lactea.
 E. laurifolia.
 E. laurifolia var. variegata.
 E. longifolia.
 E. lophogona.⁸
 E. Lemaireana.
 E. lathyris.¹²
 E. macroglypha.
 E. meloformis.
 E. mamillaris.
 E. mamillosa.
 E. mangador.¹³
 E. Morini.
 E. mexicana.
 E. monstrosa.
 E. natalensis.
 E. Neriifolia.
 E. Neriifolia var. cristata.
 E. officinalis.
 E. ornithopus.
 E. obtusa.
 E. pescatori.
 E. pirifolia.
 E. polygona.
 E. poincettia pulcherrima.⁸
 E. pyrifolia.
 E. pentagona.
 E. Pfeisdorffii.
 E. pulchra.
 E. Pulletiana.
 E. Pavoensis.
 E. Rebuti.¹⁴
 E. Regis-Jubae.
 E. resinifera.
 E. rhipsaloides.¹⁵
 E. Richardi.
 E. sahariensis.
 E. san salvador.
 E. serpentina.

E. sanguinea.
 E. scolopendroides.
 E. splendens.¹⁶
 E. tetragona.
 E. triangularis.
 E. trigona.
 E. tithymalioides.⁸
 E. stapeliaeformis.
 E. tirucalli.
 E. tuberculata.
 E. viperina.
 E. virosa.
 E. Waltonensis.
 E. xylophylloides.

¹⁶ This would appear to have been entered again as an abbreviation of breonis var splendens.

Conophytum

By Dr. A. Tischer

Conophytum teguliflorum Tisch. spec. nov.

(§ Biloba) Corpuscula 3-4 cm. alta, ad 2 cm. lata, cordiformia, lateraliter compressa, supra biloba, lobis ad 1 cm. longis, acutis, glabra, glauco-viridia, punctata; calyx tubo ad 1 cm. longo, lobis 5; petala 35-40, 3-5 seriata, ad 1.3 cm. longa, $\frac{1}{2}$ mm. lata, teguli-colorata; stamina exteriora exserta, interore in tubo inclusa, filamentis luteis, infra albis; stigmata 5, ad 4 mm. longa, lutea-brunnea, stylis 6 mm. longus.

Little Namaqualand (?).

Growths 3-4 cm. long, up to 2 cm. wide, cordate, laterally compressed, two-lobed above, lobes up to 1 cm. long, flat on inner side, keeled on reverse (Type S of Brown's Key), glaucous, smooth, sprinkled with fine, dark dots, darker green zone round fissure, margins of lobes towards tips and upper part of keel tinged dark carmine. Ovaries visible in the fissure; calyx tube pale green, about 1 cm. long, calyx lobes 5, about 5 mm. long, narrow, brownish red. Corolla tube rather longer than calyx tube, yellow, whitish outside; flower up to 2.5 cm. diameter; petals 35-40, in 3-5 series, up to 1.3 cm. long, $\frac{1}{2}$ mm. wide, of equal width throughout, blunt tipped, inner narrower and shorter, almost staminodal, bright terracotta to orange coloured, the tube yellowish; stamens numerous, outer slightly exserted, inner shorter, sometimes hidden in tube, anthers small,

¹⁰ Hermantii and Hermantiana both signify finds of Hermant and may well be the same.

¹¹ Plants thus named exist at Glasnevin. I have an offspring which has not yet flowered.

¹² A biennial found wild in Europe, including England.

¹³ Probably a misprint for mogador.

¹⁴ Plants under this name exist at Manchester (The Darrah Collection). I have an offspring which has not yet flowered.

¹⁵ Plants under this name exist at the Royal Botanic Gardens, Edinburgh. It appears the name has been changed to E. tirucalli var. rhipsaloides.

deep yellow, filaments yellow above to pale brown, style 6 mm. long, greenish yellow, almost white below. Flowers not scented, opening in the afternoon.

Occurrence: probably Little Namaqualand, discoverer unknown.

I saw this beautiful Biloba-form in flower in 1934 in September in the collection of A. Lösch, Kirchzarten, where it had been received in 1930 from De Laet, Contich, without particulars. It belongs to § *Biloba* Schwant. and is closely related to *Con. sororium* N.E.Br. It is distinguished from all other species of this Section by its terracotta flowers, whilst the other species all have golden flowers. *Con. frutescens* Schwant. also is of a deep golden colour. But this species is readily distinguished from our new one by the different form of the growths as well as by the shape and the measurement of the flower. The description of the flowers of *Con. frutescens* follows:—

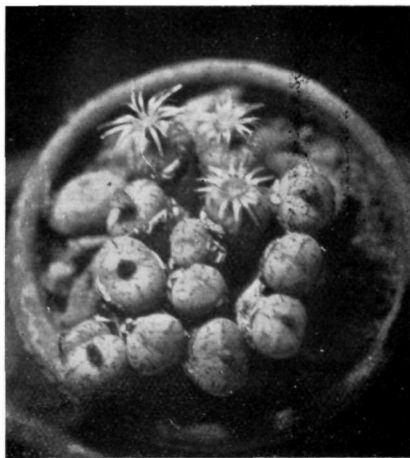
Conophytum frutescens Schwant.
(Description of Flower.)

Ovaries included. Calyx tube 5 mm. long, with 5 narrow, 5 mm. long, pale green, translucent lobes. Corolla tube 1.2–1.4 cm. long, up to 1.5 mm. wide, narrow lanceolate, tip slightly incurved, inner narrower and shorter, deep golden yellow, shining, almost orange inside. Stamens: outer slightly exerted, inner rather low in the tube, numerous anthers pale yellow, filaments orange above, paler yellow to white below. Stigmas 5, somewhat exerted, 6–7 mm. long, filamentous, yellow, on a 7–8 mm. long, yellowish white style. Ring weakly developed, capsule 5-celled.

Conophytum Luisae Schwant.
(Description of Flower.)

Ovaries included. Calyx tube 4–5 mm. long, 2.5 mm. wide, greenish white, with 4 lobes, 1 mm. long, green. Corolla tube 8–9 mm. long, white, yellowish above. Petals 50, in 3–5 series, up to 7 mm. long, and 1 mm. wide, tips blunt or somewhat incurved, outer and inner petals somewhat shorter than the middle ones, inner ones also slightly narrower and more acute, pale golden yellow. Outer stamens exerted 1.5 mm. beyond the corolla tube, inner shorter, sometimes more than half way up the tube, anthers pale

yellow, small, filaments pale yellow above, whiter below. Stigmas 4, about 3 mm. long, yellow, on a 7–8 mm. long style, becoming whiter below, sometimes attaining the height of the outer stamens. Ring dark green, very low and narrow. Ovary about $\frac{1}{4}$ mm. high, conical. Flowers opening in sunshine.



Conophytum vagum N.E.Br.

Conophytum vagum N.E.Br.

This beautiful species has been known for some time. The illustration shows a plant in flower. The flower opens at night. The plant is valuable since it came from the collection of the late N. E. Brown, investigator and author.

Pests

THE meeting on October 15th was devoted to a discussion on pests and methods of combating them. Mr. Collings opened the discussion by giving a short account of the way he dealt with the various pests which, from time to time, are found on cacti. He said that he had tried various insecticides, but his experience was that, if it was harmless to the plant, it was also harmless to the pest and vice versa; most insecticides contain oil or grease in some form, which was often said to improve the appearance of the plant, but he was afraid that it clogged the pores and would ultimately be harmful.

One of the commonest pests on cacti is the *mealy bug*; this insect is covered with a waxy deposit and oil or spirit is necessary to get through this covering; Mr. Collings uses a pointed stick dipped in Volck (a petroleum emulsion) and touches each insect with it; if the plant is badly infested he recommends Mr. Endean's method of dipping the plant into water to which a very little paraffin has been added; this does not kill the mealy bug, but disturbs them, and after the plant has been standing for half an hour or so in the shade, it will be found that many of them are at the ends of the spines and can be washed off by holding the plant, on its side, under running water.

Root bug, Mr. Collings considers to be worse than mealy bug, and more difficult to deal with; the insect is embedded in a waxy substance which cannot be wetted, and the plant should be turned out of its pot, the roots brushed with methylated spirit and then washed under a tap and dried. Root bug probably occurs chiefly in an overdry soil, and its attacks are not confined to succulent plants but, owing to the dry conditions under which they have to be grown, it is especially apt to make its appearance with this class of plant.

Red spider damages plants on which it occurs, owing to the small punctures which often turn brown, and a serious attack can be very disfiguring; it can be washed off with a strong jet of water, but the damage is often done before it is noticed.

One of the most difficult pests to deal with is *scale*; the insect has a hard shell which effectively resists ordinary insecticides. If there are only a few scale insects on a plant they can be crushed individually; but if there are many it is better to brush off with methylated spirit or Volck. If there are a large number on a close-spined plant, it is impossible to pick them off, and an insecticide must be used, but the results are not encouraging; syringing with Volck is probably best, but afterwards the plant should be syringed with water, otherwise the centre tends to rot.

Wood lice may cause damage by eating the plants; they frequent damp places, should be crushed whenever seen, and are most active at night when they may be trapped in potatoes cut in half and scooped out so as to make a hollow. *Ants* are sometimes a nuisance, especially if they get into the pots; the nests are often outside the greenhouse and, if the crack through which the insects enter can be found and stopped up, there will be no more trouble. *Slugs* and *snails* may cause damage

but, as they like wet places, they should not be found in a well kept succulent house. Mr. Collings recommended that all newly imported plants should be carefully examined before being put among the other plants.

In the discussion that followed it was obvious that there is no straightforward remedy that can be used with complete success in all cases. Mr. Theobald reported trouble with a clay-coloured *weevil* which eats into the stems of succulents, and for which he had found no remedy, whilst Mr. Davey said that the *Carpenter bee* sometimes causes trouble; this bee makes cigar-like cases from leaves (usually rose leaves) in which eggs are laid; the bee enters a pot either from below, through the drainage hole, if this is over the opening between two slats of the shelf, or by digging into the soil from above; as many as ten or more of these cases, each nearly one inch long, may be made in a single pot, and the grubs, when hatched, will destroy the roots of the plant. If a bee is found to be entering a pot, this should be turned out, the cases removed and the plant re-potted. Dr. Marrable suggested that pests were very selective; he has Euphorbias and cacti on opposite sides of a greenhouse and, whilst the cacti are sometimes attacked by mealy bug, these are never found on the Euphorbias; red spider, on the other hand, attacks the Euphorbias but not the cacti. He considered root bug to occur most frequently amongst mimicry plants; to prevent wood lice entering pots he used perforated zinc to cover the drainage hole.

Mr. Boarder is experimenting with mealy bug in an endeavour to find something that will actually kill the pest. Mammillarias are the most difficult to deal with if mealy bug gets in between the close tubercles. Paraffin, he finds, kills more plants than the mealy bug. Methylated spirit penetrates well but does not kill; Mr. Boarder tried a drop of methylated spirit on a mealy bug on a microscope slide; it appeared overcome, but shortly afterwards walked away apparently none the worse. He is therefore trying various substances dissolved in the methylated spirit and thinks that nicotine will probably be best, but is still working to find the smallest quantity that will be effective.

Naphthalene was suggested as a good remedy for root bug; in crystal form it may be sprinkled round the pot or mixed with the crocks when re-potting; it has apparently no effect on mealy bug. A liquid form of naphthalene also seems to be useful and has no ill effects on the plants.



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THE LATE KING

ON January 20th, 1936, King George V, the Well-Beloved, passed away amongst the lovely surroundings of his country home. Sometimes a great man dies without fully realising that his endeavours have been appreciated, but fortunately that was not so here; the joyful weeks of the Silver Jubilee celebrations made it very evident that throughout the Empire—one could almost say throughout the entire world—people of every walk in life had come to regard their Sovereign, not as a figurehead set above them, but as a father and friend, and it was their pleasure to show him in many ways, great and small, how much his thought for their well-being had been appreciated.

Those who moved amongst the Jubilee crowds, close packed at times but always good-tempered, probably thought that London, at least, had reached its highwater mark in the matter of crowds. But that very different crowd that gathered to mourn his passing was on a much vaster scale; many thousands can have seen little or nothing of the procession itself, but all felt that by being present they were uniting in a common sorrow so great that it must find some expression. If anything can bring comfort to Queen Mary in her grief and loneliness, surely the nation's spontaneous sympathy must go some way to help.

Throughout the world to-day, thrones are tumbling, gracefully pushed aside or ruthlessly overthrown; but here the Throne, under the wise guidance of our King, has

become, not an empty symbol of pomp and majesty, but a living power for good amongst the people. No one who ever saw or heard King George doubted his kingliness, yet all felt that he was not a person set apart but one of ourselves, a man like the rest of us, but wiser, kindlier, more sincere, pursuing steadfastly, through good years and bad, his single-hearted aim—the service of his people.

Such hours of leisure as the King allowed himself in an over-busy life he liked to spend amongst country surroundings, at Sandringham or at Windsor, where the beautiful gardens are world famous. Gardeners who know the rest and comfort that a garden may be, are glad to think that the King could also find pleasure and relaxation amongst growing things. One always felt that his annual visits to Chelsea Flower Show with the Queen were pleasant occasions for him.

There have been times when the loss of a good King has meant uncertainty and doubt for the future of his country; we are fortunate in welcoming to the Throne a Prince who has been much amongst us, has travelled widely through the Empire and in many ways has fitted himself earnestly for the great task that now falls to him. It has been said that the King is the only person in the country who can claim no annual holiday; let us hope that affairs of state will not be too ever-present but that His Majesty King Edward VIII will find time for leisure amongst his flowers—for he, too, is a gardener.

The Culture of Stemless Mesembryanthemums in London

By W. Denton

(Read at the Meeting held on November 26th, 1935.)

I EXPECT to be subjected to a certain amount of criticism to-night in my remarks, but this will possibly be all to the good, and we may learn a little more about our favourite plants. I consider that for London growers the stemless Mesembryanthemums are by far the most satisfactory plants to study; they grow better, flower freely and do not take up a lot of room; a very big collection can be grown in the ordinary sized greenhouse as they only require small pots or pans. I think most people will agree with me when I say that it is practically impossible to grow good roses in Bermondsey; this is because the stems become coated with dirt owing to the smoky atmosphere and are then unable to absorb the air and light so necessary to their well-being; after a year or two they dwindle and die. However, if we take a quicker growing subject in the same neighbourhood, we notice a great difference. The Dahlias in Bermondsey churchyard are generally a wonderful sight and compare favourably with those grown in the suburbs. This is because the leaves are fresh and green, grow very quickly and are easily cleaned by the rains.

My collection of Cacti and Succulents are grown in the average small garden of a London house. The Cacti are a big disappointment to me, they do not grow freely, flowers are scarce and some of my plants have not shown signs of growth for three or four years. You can guess how I felt when one of our members told me this summer that his plant of *Echinocactus horizonthalonius* had doubled its size in three years and flowered each year as well. My own plant has made about three new sets of spines in six years—what a difference! I put down my reasons for failure in these plants to the same as the roses in Bermondsey, the growth is so slow that after a number of years the pores of the plant are stopped up and they cease to grow. However, when we turn to the Stemless Mesembryanthemums we have a much more pleasing picture. Take a plant of *Conophytum*; here nature does not expect the same

stem to be subject to the atmosphere the whole of the plant's life; after one year new green growth pushes through the old stem, fresh and new, having been protected by the old stem in the form of a skin. In a large number of cases it is two new growths you get instead of the original one, so they increase in size year after year till you have large clumps that are a treat for the eye to rest on. Changing the outer skin yearly as nearly all species do, is, to my mind, one of the reasons they should be studied by London growers, as flowers can be produced that are equal in every way to plants grown in the heart of the country and even larger than in their own native habitat.

The best plants to my way of thinking are those raised from seed; my own method is to just sprinkle the very fine seeds on the top of shallow pans; for soil I have never found them very particular; I use a mixture of sand, loam and leaf mould with a good sprinkling of old mortar and charcoal. Beware of old mortar from ceilings, however, as the hair used in the mortar and the size in the old whitewash is not suitable for our plants. When you see a builder pulling down an old wall, beg a little mortar that falls out from between the bricks; this is ideal stuff for your purpose. I generally start about the middle of January and plunge the seed pans in sand or fibre in the propagator; this is kept close and a temperature of 70 to 80 degrees maintained. The seed generally germinates in about a fortnight; this, of course, depends entirely on the freshness of the seed. I am afraid people are often disappointed when seed does not come up and are rather inclined to think they are at fault when possibly it is the seed entirely. In February, 1934, I sowed three pans of *Titanopsis Astridea* obtained from the Botanical Society of South Africa, and at the same time I started two other varieties from a different source. In three weeks I had 200 *Astridea* seedlings, but of the others three only came up in twelve weeks, so that you can quite see you must not be in a hurry.

After the seedlings are well up I gradually

introduce a little air so as to keep them dwarf and make them hardy. There is only one thing that is very important here, you *must* shade the seedlings if the sun is anyway strong; a bit of fine muslin on top of the glass will do quite well and is easily removed in the evenings. If you do not shade, the seedlings will turn red or brown; this is what our American friends call "bronzing of the seedlings"; they then become stuck and no further growth will be made. Another important point is that they should never be allowed to become dry; stand the pans in an inch of water every three days or so and allow the water to penetrate through the drainage hole till the surface of the soil shows signs of moisture. If the young plants turn out to be fairly evenly spaced I do not hurry to prick them out; *Conophytums* and *Lithops* could stay in the seed pan for twelve months without harm. I generally prick out, however, in about six months, using a thin, pointed, bone crochet hook, $\frac{3}{4}$ to 1 in. apart should be ample; varieties like *Pleiospilos*, and *Titanopsis*, however, are much faster growers and should be shifted twice during the summer, taking great care not to break any of the fine roots. Special care should be taken with *Lithops* as, when the plant bodies are only as big as green peas, you will find the roots in the drainage and very liable to break. I find that the difficult part with seedlings is to bring them through the first winter; in nature they have to stand the same period of drought as the full-grown plants; on the authority of Mrs. Bolus in South Africa I understand that hundreds die in a particularly dry season. Again nature steps in and provides seed pods with a system of valves that only open in wet weather and release a few seeds at a time; a period of several years sometimes elapses before the last seeds are dispersed. Thus nature makes sure that at least a few seedlings will reach maturity. This state of affairs will not suit us, however, and we must strike the happy medium, that is to slightly rest the young plants without allowing them to entirely dry up, just a little dampness in the soil occasionally will prevent them from entirely withering away. After a number of years' study I have come to the conclusion that the whole of the stemless *Mesembryanthemums* grow better in frames than in an ordinary greenhouse. My house is a lean-to affair, 16 ft. by 9 ft.; in front of this, up close to the brickwork, I have three frames running the whole length; these are substantial and on brickwork to within a foot from the actual glass lights. There is

one brick knocked out at the back of each into the greenhouse proper and I get a certain amount of warmth here from the 4 in. pipes inside the house. To supplement this I have a 1 in. flow and return pipe in the frames; this warms the three frames and also supplies six more on the side of the garden. You will understand that I do not have very much heat. Winter and summer I always have a little ventilation on *except* in frosty, and particularly so in foggy, weather. The glass is cleaned every fortnight, if I can find time; it is very essential that the plants receive all the sun and light possible in the dull days of winter.

The next important point is when to water and when to withhold it. To successfully flower these plants this is the real thing that matters. I will now give you what I think is the whole secret of success. The pots should be plunged in earth, sand or shingle, as this allows you to leave the waterpot alone during the winter. My own plants in my principal frame are plunged to the rim of the pots in fine sand; as there is the natural earth immediately below this it will be clearly seen that there will always be a certain amount of water available to the plants through the porosity of the pots without any actually coming in contact with the plants. You can water the sand without fear and this should be done if, as we sometimes do, we get a fine spell of good weather in winter. Another important thing is that you prevent scorching of the root tips in summer; it is surprising how hot flower pots become after a day's sunshine in a greenhouse. This will apply particularly to the *Lithops* family, as their tiny thread-like roots can easily be damaged by burning of pots. At this point I should like to say that on no account should any water be allowed to remain on the stem of these plants in summer; they rot off with the greatest ease in twenty-four hours, and water in the top of a *Lithops* plant will help it on its road. Keep a small flat camel hair brush handy and if you accidentally spill a little water on them, soak it up. Dealing particularly with the culture of *Conophytums* you will notice that the majority of the species from about the middle of March, according to the increase of the power of the sun, through to the end of April start to change colour; this is considered to be that the resting season is approaching. Again this is not strictly true, the new growths are on the way and being nourished by the sap in the old stem. No water at all should be given now; allow them to remain dry the whole summer,

they will shrink down and look dead ; I very often think some of mine will never survive. Towards the end of the summer and early autumn you will find that one after the other the skins will split and the new fresh green growths appear ; now is the time to start watering a little, say once a week ; experience only can tell you when exactly to do it, there is no rule of thumb way to success. Watch the weather and the soil in the pots. The plant body increases in size till at last it is as big as last season's original plant, the only difference being, you may have two growths instead of one. Well grown specimens divide nearly every year. The flower then pushes its way through the top of the stem and you feel satisfied you have done well.

One other thing I do that I know a lot of experienced growers condemn. If you purchase an imported plant from South Africa you can generally form a fair estimate of its age by the old layers of skin persisting at the base. A few years ago I imported a plant of *Lithops mickenbergensis* that distinctly had eight layers of old skin present, telling me that this plant has passed through eight resting periods. It is considered that this old skin forms a certain amount of protection for the plant in the hot sun rays of its native habitat. As I am certain we are never likely to experience anything like South African temperatures over here I carefully remove the old skins after making sure that they are completely withered and are actually only a dried skin. This is done with a pair of blunt tweezers and you then have a nicer looking plant besides cutting out the risk of any surplus water lying at the base of the plant where the skin joins it. *Lithops* are a little more difficult to manage, the growing season seems to vary with different varieties, but you will notice, generally between March and April, new growth starting to push its way through the old stem, this is the time you have to be careful ; as soon as you notice that the old stem begins to wither you can give them a little water and continue through the summer. The plant bodies become larger and larger until at last you notice that, like *Conophytums*, the old stem persists only as a dried skin. The flowers then appear, in some varieties about the end of July, in others in August, September and October ; after flowering these plants should be allowed to rest for the whole of our winter. A very interesting way to grow a collection of *Lithops* is to take a large pan—square or oblong looks better than round—and plant this with a dozen

or so varieties of seedlings or, if you like, mature plants. I think they grow better this way than in pots ; they certainly like the company of their own kind. A few nice stones introduced between them and they look well and will reward you for the trouble you take. I recommend a little more loam to the soil for growing this way, they seem to like a stiffer mixture, but on no account neglect the drainage ; use West's pot crocks, and about 1½ in. of fine burnt clay and charcoal in the bottom. The watering of a pan like this becomes a little more difficult owing to the plants starting to grow at different times ; to get over this I make a series of holes fairly close to the plants with a pencil or piece of wood right down to the drainage. I fill these holes with fine burnt clay and you can then give the particular one you want to a little extra drink. Use an ordinary bottle for watering, with two ¼-in. brass pipes in the cork, one for the air to enter and the other for the water ; you can control the amount given much better this way than with a watering can. A pan I have at home contains the following varieties that all seem happy together :—*Lithops opalina*, *bella*, *Meyeri*, *vallis mariae*, *Ruschiorum*, *Comptonii* and *Peersi*. Before leaving the subject of culture, I should once again like to stress the point. Grow the plants hard, with all the sun and air possible and little water. Remarks of two gentlemen looking at my plants at the first Cactus Show :—1st gentleman : “ Those *Lithops* of Mr. Denton's are very small, don't you think ? ” 2nd gentleman : “ They are, but still they are a beautiful colour.” This, to my mind, is as it should be ; I have seen plants here large and green that I know would not pass through one of our severe wet winters. I have always had a great respect for that veteran grower, Mr. Taylor, of Southborough, a gentleman who knew his subject thoroughly and a deal of correspondence passed between us. In the June of 1928, in answer to a request to explain some losses of mine, he remarked at the end of his letter :—“ You know, Mr. Denton, these plants are very much like us humans, the heavy eaters and drinkers easily drop off when a bad times comes their way, while the spare can pull through and make old bones.” This I believe to be very true.

I should now like to explain my method of rooting imported plants ; this will apply equally well to all succulents and cacti. I plant these in a very sandy mixture in small 60 pots with the soil slightly damp ; these are then buried to their rims in 32 size pots

and the large pots filled with sand and pressed down hard. Place them in slight shade and water the sand every day but do not allow any water in the pot with the plant in it ; just sufficient will penetrate the inner pot to encourage root action. I rooted successfully this year two treasures from South Africa, though I know when Mr. Haddon brought them over to me he thought they were dead, they looked like pieces of dead wood ; they were *Trichocaulon pictum* and *officinale*. However, they are fine plants now. Any member who has tried to establish imported plants of *Trichocaulon* well knows they are not easy subjects. However, I must not talk about these plants this evening, as I may never stop, for I plead guilty for a fondness for this species.

All the *Conophytums* and *Lithops* can be grown quite easily from cuttings ; make sure you take the cuttings clean from the bottom intact ; if you break it off showing a fleshy end it will not grow. The operation is best undertaken in spring, although it can be managed at any time of the year. I personally think our plants should not be disturbed in winter. Treat the cuttings as an ordinary plant, use more sand in the soil, and, if it is plump as it should be in early spring, insert for about $\frac{1}{4}$ in. and leave to rest with the other *Conophytums* ; this will burst its skin at the same time as the others and often divide into two growths and sometimes produce a flower.

The worst pest we have to deal with in the culture of *Mesembryanthemums* is no doubt root bug ; all my plants unfortunately get this little or much and to cure this there is only one way, repot. I generally take the plant clean out, shake all the soil from the roots, then steep the roots completely for a few moments in methylated spirit, after this rinse in soapy water and leave to dry. If I want to repot at once, I shake dry sand among the roots till the fine fibres become separated, then proceed. Needless to say the repotted plants should be kept dry for a few weeks and afforded some slight shade. A few of the varieties are subject to scale ; this is the worst pest of all and the only cure is to consign the plants straight to the dustbin. I consider that a study of the treatment of scale should be seriously undertaken by our Society, as I am afraid that as years go on people will give up growing and lose all interest entirely owing to this. Overcrowding is no doubt one of the principal reasons for the spread of the pest through a collection ; you have so many plants that those at the back are a little

neglected and before you know where you are you discover three or four plants infected, then your troubles commence. I suppose we all more or less possess the collector's instinct and keep adding plants to our collection till they get out-of-hand. Take my own case ; my father built me a very small greenhouse when I was a mere lad and I obtained a few cacti that were a great pleasure to me ; any out-of-the-way spot that appeared on any of them was promptly removed and I was tempted to add to their number as my financial position allowed. When I removed to my present address, I selected the house because the early morning sun was on the end of the garden and I was thinking of my cactus house. I built first an 8 ft. by 6 ft. lean-to ; after the second year I erected another 8 ft. by 8 ft. in front of it ; these both became full and I decided to pull them both down and build one 16 ft by 9 ft. in place of them. On second thoughts I decided it would be a pity to destroy both small houses and I erected one as a cold house at the other end of the garden, to come in useful for Mrs. Denton to grow a few bulbs, etc. I am afraid she never got a look in, as it soon became full in spite of the shady spot. At this time I was taking more interest in the *Mesembryanthemums* and I concluded that they did not look nice among my *Euphorbias* and general cacti, so I constructed three frames with brick bottoms, glazed with vitreous glass along the whole length of the greenhouse and laid a circuit of 1 in. pipes through them for slight warmth. These were a great success and I raised many hundreds of seedlings that have all done well. I then turned the corner and built three more frames. After this I thought it was a pity to leave a small gap in the border and so I constructed three more and laid my pipes through the whole lot and into the small cold house at the top of the garden. Can you wonder that I should get scale ? Beware of the overcrowding disease. I wonder how many of us here are possessed of, what I call, the collector's instinct. You will find as you get more and more interested in these particular plants that the German nurserymen know it quite well and it will be easy for you to purchase duplicate plants with various names that all look alike. As an example, I have had for a number of years a nice clump of that free-flowering gem that used to be called *Mesembryanthemum erminum* ; this is now separated to a new genus called *Stomatium*. I thought it would be nice to acquire some new species, so purchased *mustellinum* and *Jamesii* ; I found out that

they all looked exactly alike. This summer I received a German list offering other varieties, so I thought I would buy *difforme* and *Geoffreyi*; all I have done, I believe, is to add two more *erminums* to my collection. I am not suggesting for one moment that they are not different species, but what I do say is that there is not enough difference in them to make it worth while. After all, there is very little in it if you have to obtain a magnifying glass to notice a slight difference in the structure of the flowers.

Distinctive colouring is the thing that matters to me. If I can proceed for a few moments longer without wearying you, I should like briefly to describe a few varieties that are distinctive and free-flowering with me. Among the Lithops, of which there are only two colours, yellow and white, that one with the horrible name *pseudotruncatella*, is one that will never fail you; one of the first to flower, it opens when the sun is still strong enough to expand the blooms full open. Strange to say the variety of it, *Mundtii*, is not nearly so free-flowering. The commonest variety, *Lesliei*, is, I know, easy with most people, but not so with me. *Mickenbergensis*, *bella*, *Karasmontana*, *terricolor*, *olivacea* are all good. That very pretty species, *umdauensis*, and *alpina*, *optica* and *Comptonii* are not by any means free-flowering. Passing to the Conophytums we have one outstanding variety, unfortunately not easy to obtain, but very easy to grow and it increases fairly fast, *C. elegans*, pure white with a rugged top that makes it very interesting; the growths of this are very small. Incidentally this is the only variety that I have been successful in obtaining seeds from. *Elishae* is a common sort but always studded with deep yellow flowers regularly every year. One you must have is *Wettsteinii*, a magenta flower and a very easy doer which increases rapidly. *Minutum*, *pallidum*, *odoratum*, *Pearsonii* and *velutinum* are all good. That lovely round globe of pale green, *calculus*, is not free, however. *Argeta petrensis* is a variety I am very fond of, but unfortunately it has never flowered with me. *Frithia pulchra*, however, should be in every collection, it will never let you down. *Bijlia cana* is a fine sort and very free. Those two *Pleiospilos* varieties, *Bolusii* and *magnipunctata*, are both particularly good; I find *Bolusii* a little difficult to reach the flowering stage from seed; it shrinks down so that I feel tempted to give a little more water than I should and it persists with four leaves if you are not careful and will never flower under these conditions.

This variety should be kept dry and directly the new leaves begin to appear the old should commence to die away and no water be given at all for the rest of the summer. As a mature plant it is very easy to grow and with the exception of the tongue-leaves or Glottiphyllums one of the largest flowers. I am not attracted by the genus Glottiphyllum, it is so easily the most free-flowering, but the leaves are rather straggly and the plants are rather too large for me. If you have room to bed out a few for the summer you will have a fine show of flowers. I suppose one could talk for an hour about their individual favourites in this immense family, so I shall say nothing about the Gibbaeum species and Cheiridopsis and hope someone will come along and give me a little advice, as I well need it. I have left for the last species to describe my own particular favourites. It is not for their flowering qualities that I have studied these, but for the lovely colourings and peculiar markings of the leaves. The Titanopsis species are to me gems of the first water. My collection contains *calcareae*, *Schwantesii*, *Primosii*, *setifera*, *Fulleri*, *Astridea* and, I hope, *Luckhoffii*. It is generally considered that these are summer growers with us and should be rested in winter; as I believe there are half a dozen people here to-night who have been unlucky with these plants I should like to explain a little more fully my treatment, as I feel convinced they are easy doers and will stand lower temperatures than most varieties. Also they are plants that will grow on you and when you see them in flower they will soon become special favourites. For soil, rather more sand than for most species and a little more lime rubble. This is most important, for the lime will give *calcareae* the violet tint to the leaves that makes it so attractive. I was told in this room that when *calcareae* assumes this colour it is about to depart this life; as my plant is eight years old and has always been this colour, I am not worrying much. *Setifera* turns blue in the stem and is very attractive; *Astridea* turns red and is equally nice. Although I have shown plants here in pans possibly for appearance only, I consider that they do best with plenty of room, in rather deep pots; it is surprising what a large rooting system they have. With me I always slightly rest the plants in early summer as this colours the stems nicely. Through the winter I do not allow them to dry out completely, but always give a little water and they all certainly look well. *Primosii* is the only one that has not flowered with me this year.

In conclusion Mr. Denton said that he used suitably coloured stones among some of his plants, not only because they added to the appearance of a pan but also because they tended to conserve moisture and the plants appeared to like this form of top-dressing. Plants of *Titanopsis Astridea* grown in different soils were shown by Mr. Denton; the specimens in the mixture he recommends were healthy and well coloured; one in pure burnt clay was somewhat smaller and one that has been potted in crushed tufa had made practically no progress at all.

During the discussion that followed, Dr. Rodier Heath said that he had been growing Mesembryanthemums for forty years and he certainly agreed that the best plants were those grown in frames; at Weymouth there is no fog and a good deal of sun and during the winter only a little heat was given; the frames being covered with mats on frosty nights. At one time pests had been a nuisance, but he now has no trouble since adopting the method of spraying with water at 180° F.; this sounds rather an alarming treatment and the plants may go grey for a time, but they are not seriously damaged and the scale disappears entirely; to cure root bug the pots are dipped in water at 180° F. till it has penetrated the soil; the root tips may be killed, the pest certainly is and the plant's condition improved as a result of the treatment. Dr. Heath has had considerable experience with seed raising and recommends keeping pots for a considerable time, even if the seed appears not to be germinating; it may lie dormant till its natural growing period (often about September, the South African spring).

Mr. Stuart Griffin said he thought that the plants were more likely to flourish if grown hard; his best plants were also frame grown, the only protection given in cold weather being an oil lamp and sacks. He had not much time to fuss over individuals and thought that was probably to the advantage of the plants. Dr. Heath in answering a question with regard to the flowering of *Rimaria Heathii* (which was named after him by Dr. N. E. Brown) said he agreed that there was a good deal to be said for treating the plants roughly but it must also be remembered that some people have the green hand.

Euphorbias

The following letter has been received from Capt. Ambrose Dunston:—

"I have read with interest, but with

disappointment, Vol. iii, pp. 73-76, and Vol. vi, pp. 7-9 of the *Cactus Journal*. Mr. Farden has apparently begun the Euphorbias with the intention of following Mr. Berger's idea of some twenty-eight years ago in differentiating between succulent and non-succulent Euphorbias. Yet how *Euphorbia cyparissias* can merit a position, even in unclassified sections any more than *E. peplus*, *E. peplis* or *E. Lathyris* beats my comprehension, all of which are found wild in parts of England.

"I have recently been giving time and attention to the Euphorbias of Madagascar, of which there are 76 species at least, which eventually I hope to possess during the coming year.

"If reference is made to the Journal of the Linnean Society of Paris, 1887, p. 517, I think it will be seen that *Euphorbia alaicornis* Baker is more rightly placed in the Tirucalli group than in the Diacanthium section, as suggested by Mr. Farden, and I should much like to know Mr. Farden's authority in saying that *E. xylophyloides* comes from S. Africa as this is hardly borne out in Brogn. ex Lemaire, *Illustr. Hort.*, 1857, p. 72; Boiss, *Prodr.* 1862, p. 176; Berger, *Sukk. Euphorbien*, 1907, p. 24; or Denis, *Rev. Gen. Bot.* xxxiv (1922), p. 226, but I am open to correction.

"I see, too, that Mr. Farden has ignored the section Goniostema in which Berger incorrectly placed *E. lophogona* Lamk. I think this may be justified, but as *E. lophogoma* Lamk. should be in the Diacanthium section (Lamk. *Dict. Enc.* 11, 1786, p. 417, Boiss, *Prodr.*, p. 78; Denis, *Rev. Gen. Bot.*, xxxiv (1922), p. 118 = *E. Fournieri* Rebut, Lyon, *Horticole Rev. Bot.*, 1893, 1896 = *E. madagascariensis* Comm.), it should, in my opinion, be included (as it is in fact in all representative collections) just as much as *E. Bojeri* or *E. splendens*."

In reply to Capt. Dunston's letter, Mr. Farden informs us that he used Berger's classification of the Euphorbias as a basis for his notes, as this is the last revision of the succulent species of any note; it is incomplete in that a large number of new species have been discovered since that time.

Euphorbia cyparissias perhaps hardly merits inclusion as a succulent Euphorbia but as it is often grown in gardens (see Nicholson's *Dictionary of Gardening*) the name seemed worthy of mention. The country of origin of *Euphorbia xylophyloides* was taken from Jacobsen's *Die Sukkulanten*, where unfortunately it was given erroneously as South Africa; it should, of course, be Madagascar.

Some Plants in My Collection

By Thomas Sharp, Westbury

HERE are notes of some of my plants collected for their conspicuous adaptations, yet admissible, I think, under the heading "succulents" (a gardening word of kindly latitude).

My greenhouses are four in number ; two

lean-tos. The plants occupying the 6 ft. by 6 ft. house remain in it the year round.

General Management, Conditions

To me, light, air and judicious control of water are the most important environmental factors. Light in my houses is always

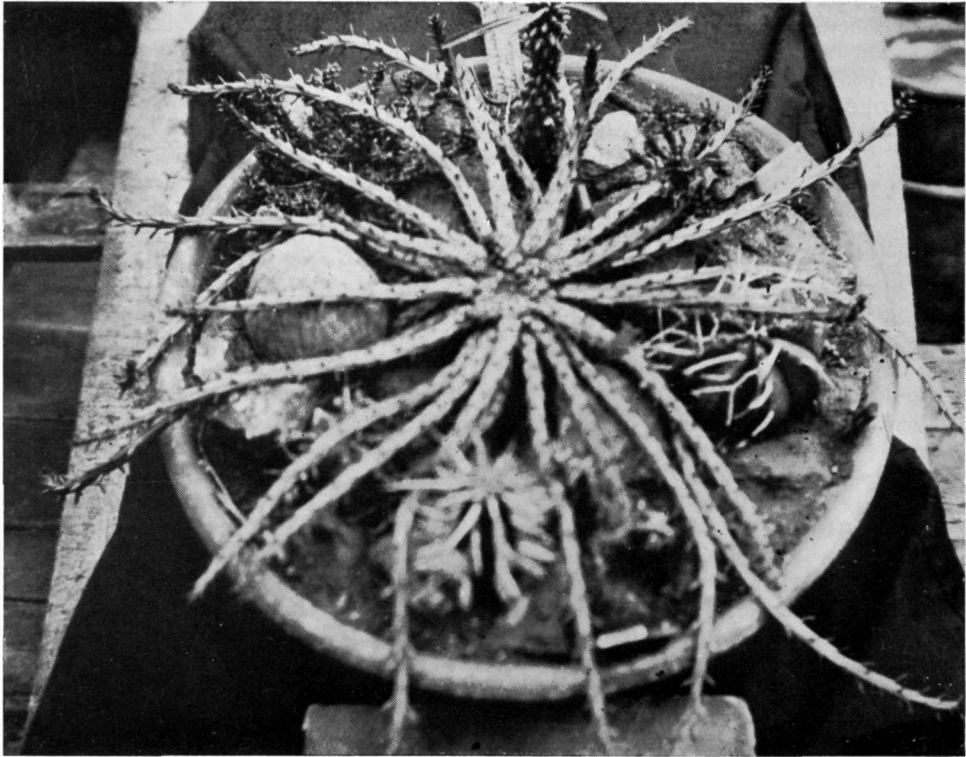


Fig. 1. *Euphorbia Woodii*.

30 ft. by 9 ft., heated lean-to facing south-west, receiving no direct sunlight for five and a half months, and in summer the sun does not reach them till 11 a.m. One 30 ft. by 12 ft. with span roof running north-west to south-east ; the eastern end is shaded by a Cypress ; this house is not heated and receives direct sunlight by about 11 a.m. in summer. The fourth is a 6 ft. by 6 ft. lean-to, heated ; it faces south and is the only really light house. From the end of April to the end of October by far the greater number of the plants occupy all the space available ; from the end of October to the end of April they are packed in one of the heated 30 ft.

deficient excepting in the height of the summer. Air is easily controlled and only in severe weather are ventilators entirely closed.

Water, by reason of light insufficiency, is a continuous problem ; with a few exceptions, water is withheld from early October to May, being reduced in early September and gradually increased in May, governed by the activity of the plants. My methods of applying water are as follows :—all imported and non-established plants are plunged to one-third in very fine sand in pots larger than the one they are in and water is poured between the two pots. In many cases this method is

employed year after year—death-dealing dullness necessitates it. In very favourable winter weather, the plants are sprayed with rain water early in the day.

Soil

Some quite desirable species will thrive in quite ordinary compost, say, as for Geraniums; more and more the following compost is finding favour with me:—one-third coarse sand, one-third common (not orchid) peat, and one-third rich, oolitic, calcareous loam from the underlying Oxford clay. These are mixed and passed over a three-sixteenth inch mesh sieve and always used dry.

Potting

New plants may come in at any season and are, of course, potted at once; stock

stout and sharp. *Euphorbia seclusa* (Eritrea) has an extremely pale green stem; *Euphorbia nigens* (Transvaal) has a dark green and somewhat marbled stem; my specimen is over 3 ft. high but it is said to grow to 40 ft.

Didierea mirabilis (Madagascar). My search for this plant was rewarded after nine years; it reached me on June 8th, 1935. The roots were 30 in. long when received and it required a special pot; one was constructed by cementing a 6-inch pipe with a 7-inch pot; 8 inches of the roots were cut off. The three roots are remarkable, close together, straight, rigid, woody, clothed in scaly bark. Potting:—one crock was placed over the hole in the pot, the roots inserted to the bottom, $\frac{1}{2}$ in. crocks poured in to a depth of 3 in.; the compost as described was filled in and rammed with a potting stick, in about 3 in. layers until

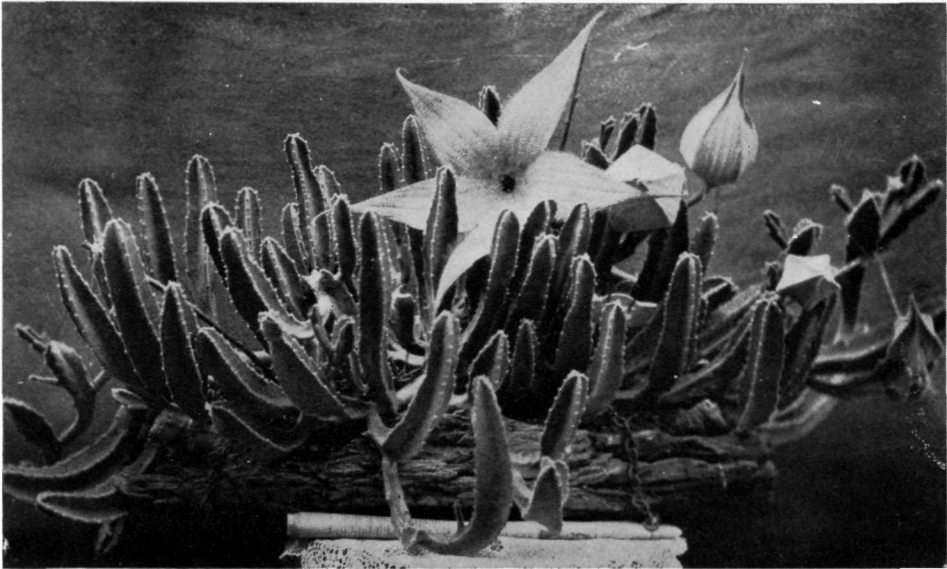


Fig. 2. *Stapelia gigantea*.

plants, when requiring it, are potted any time from March to May. Water is never given after potting until evidence of activity in the plants is seen. Experience is showing me that most plants requiring pots from two to four inches in diameter, thrive best planted in pans nine to fifteen inches in diameter, the plants being arranged at suitable distances apart, governed by the likely growth of the plants used. (See Fig. 1.)

The following notes of some of my plants may be of interest to members:—

Euphorbia erythraea (Eritrea) is 3 ft. 7 in. high; the twisted stem is an intense dark green; the stipular spines zig-zag and are

completed. This elongated pot was semi-plunged as described above, the trough was filled with water to "close" the sand. A rubber cap was fitted and sealed round the base of the plant to exclude water from the soil and also from the trough. The plant was placed in the span-roof house under a suspended bellglass; the glass was shaded on all sunny days and the plant sprayed three or four times daily for three months, when it commenced to break into leaf; it received no water at the roots throughout its rest. At the appearance of leaves it was moved into the warmest house and placed under a contrived "heat trap." The temperatures ranged

from 60° to 70° F. and on a few bright days 80° F. Were it in Madagascar it would revel in 80° to 120° F. Once a month water is poured between the two pots but no water has yet been given to the plant other than by absorption through the 7-inch pot. It has made good leafage. (For illustration, see *Cact. Journ.*, vol. 4, No. 1, p. 9.)

Euphorbia Woodii (Fig. 1). My plant is growing surrounded by *obesa*, *melioformis*, *ferox*, an unidentified species from Tanganyika, *melioformis*, an unknown species, *clandestina* and *gorgonis*. *E. Woodii* appears to be exceedingly rare in this country; I know of but two specimens; mine has twenty-nine

the—at this stage—developed spines. Spines do not form with the secondary leaves. This plant is growing in ordinary greenhouse plant compost. It rests at irregular intervals, the leaves growing, maturing and falling in about three months. From the little information I have the Kew and Westbury plants were imported by the late Mr. Justus Corderoy, fifty or more years ago. (For illustration of this plant, see *Cact. Journ.*, Vol. ii, No. 1, p. 20.)

Stapelia gigantea (Zululand). My plant is some eight years old and 30 in. long, growing in a boat-shaped piece of elm bark; the compost was a mixture of oddments, rubble,



Fig. 3. *Opuntia Tirpintii*, *Cephalocereus Palmeri*.

branches, most of them 7 to 10½ in. long. The species from Tanganyika has double stipular spines, the inner pair about one-third the length of the outer.

Fouquieria columnaris. Until quite recently there were but few in the British Isles; I knew but four, viz. at Glasnevin, Kew, Westbury and Manchester, that at the last place being by far the largest. There are now to my knowledge several fine plants of it in this country. The origin of the spines is remarkable; they appear at first to be the under part of the primary leaf stalks, but the leaves with their stalks at maturity split from

loam, leaf mould and anthracite grit. It flowered in October and then was killed in the following January by snow-water trickling down the greenhouse wall from the faulty gutter of an adjacent shed. At that period I was for a run of years from home every winter for five or six days each week; my plants were sorely tried. Prior to seven years ago *Stapelias* grew wildly with me, then quite suddenly, affliction came to them—not discernible disease but weakness, reminding me of strawberry sickness of the garden and clover sickness in the field. There came last year just slight improvement and from

recently effected changes in conditions and position I am not discouraged though it is still winter. The five flowers on this specimen did not all open at the same time so two photographs were taken, one of which is shown here (Fig. 2); the diameters of the flowers was $14\frac{1}{8}$, $14\frac{1}{2}$ and $11\frac{1}{4}$ in.; the largest flower of *Stapelia gigantea* I ever had measured $14\frac{1}{2}$ inches on a two-year-old plant.

Cissus Juttae (Hereroland) is a relative of the grape vine; it thrives in ordinary greenhouse compost. It rests for seven or eight months with the other succulents but is put into the warmest house very close to the glass for its growing period. The growths are short, the first leaf large, the second half the size, the third smaller and then the grape-vine-like flowers. The leaves are soft and fleshy and, when bruised, have the odour of ivy. One side of my plant has a deep hole, no doubt scooped out by some animal many years ago. Ten years ago it produced three grape-like berries; two ripened in early October and their two seeds were given to a botanic garden, where they germinated in a month; the third fruit was not ripe and was wrapped in tissue paper, placed in my waistcoat pocket for a month, then sown, but it did not germinate until fifteen months had passed; that seedling is now, at its greatest diameter, hardly half an inch.

Opuntia Tirpinii (W. Argentina, Chile, Brazil) (Fig. 3). The longest of the parchment-like spines on the plants shown in the illustration are four inches in length and are markedly hygroscopic. My thought is that spines, hairs, wool, etc., are viaducts of water to their plants; they lose their heat rapidly, vapour condenses upon them, the water is conducted to the plant (by capillary attraction?) and passes into the plant, how? (osmotically?) I—and doubtless others—would welcome a scientist's pronouncement upon this rationale.

Cephalocereus Palmeri (E. Mexico) (Fig. 3). A, to me, remarkable form; the wool is unusually long and completely hides the plants. Note, the two *Opuntias* are plunged as described above, the *Cephalocerei* were taken out for the photographing and will be replaced by summer. All four plants are in the compost given earlier in these notes.

Maximowiczia sonorae (Mexico) is a relative of the cucumber; it sends out vine-like shoots from an enormously swollen stem; it usually rests for eight months but last year it rested nearly ten.

Pedilanthus macrocarpus (Lower California)

is a relative of the *Euphorbias* with long, thin leafless stems; it has given but one flower, probably due to insufficient light.

Hoya Kerrii was discovered by Dr. A. F. G. Kerr, after whom it is named, near Chiangmai, N. Siam; my plant came from its habitat and was nine weeks in transit. On arrival it was fastened to a small dead palm and placed near a wall to which it might attach itself; it did, by a net-work of roots, some ramifying into the joints of the wall. It has given cuttings to botanic gardens and private



Fig. 4. *Hoya Kerrii*.

growers—three went to Australia and a flowering piece was sent to the late Dr. Stapf for figuring in a recent *Bot. Mag.* The picture herewith (Fig. 4) is a photograph of that *Bot. Mag.* plate. The scapes are persistent, like those of *H. carnosa*; the attractiveness of the flowers is much enhanced by the large globules of nectar which depend from them.

Pachypodium giganteum (S.W. Africa) is a relative of the periwinkle; the tapering stem bears stout spines irregularly; my specimen is 3 ft. high and 12 in. in girth at the base; it is grown semi-plunged in another pot.

Nolina recurvata (S.W. North America) is remarkable for its highly developed base (storage organ); its leaves are markedly xerophytic; it is related to the lilies.

Cotyledon fascicularis and *Wallichii* (S. Africa) (Fig. 5). *Cotyledon Wallichii* sheds its leaves but not their stalks which become

hard stubs; unfortunately the camera cut off the base stubs which were formed in the Cape Botanic Gardens; they are broader at their bases, more pointed, but about the same length as those grown here. Although these two plants have been here for years, they retain

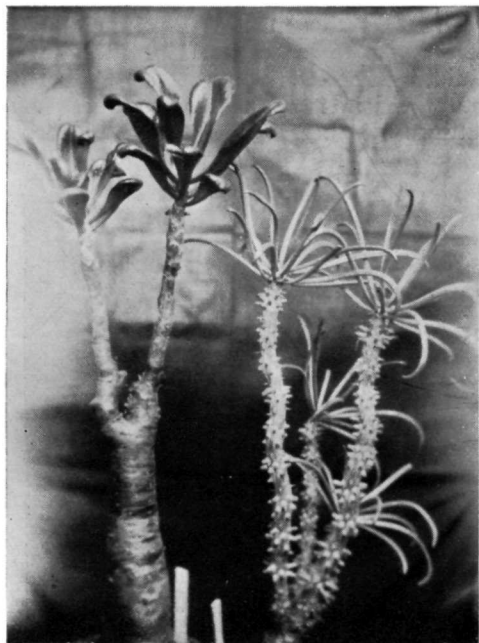


Fig. 5. *Cotyledon fascicularis* and *Wallichii*.

their habit of growing in our autumn, which is the S. African spring. They shed their leaves at the end of spring and are kept waterless until growth has actually started; they start although the soil is absolutely dry. They certainly support Romanes, "habitual actions become automatic."

(To be continued.)

Winter Problems with South African Succulents

By H. Hall

(Curator of the Darrah Collection,
Manchester)

THE seasons of growth and rest in almost every class of plant are well known to most people, both varying considerably, according to climatic conditions and the plant's own peculiarities. Of course, there are plants under real tropical conditions, with abundance and regularity of rain and warmth which exhibit no real pause in growth at any time, whereas the reverse is seen in the high

alps where the growing period of plants is limited to the short summer between the snows.

It is generally understood that most South African succulents have their growing period during the cooler months of the year, going dormant and in many cases flowering in the hot and dry summer months. From this and the assumption that rainfall is required for growth, it is to be expected that most, if not all, falls during the winter. Owing to its wide and varied geographical range there are many exceptions, some areas of low annual rainfall receiving 90 per cent. of it in summer. Are we to assume that plants in these areas do their growing at this time? Undoubtedly they must, which accounts for the remarkably short season of growth as seen in *Frithia* and *Mitrophylum*. Therefore, it is not wise to treat all plants from S. Africa alike.

In this country, on the other hand, our native plants grow in the warmer months for obvious reasons and most of our garden plants do likewise. They are not controlled so rigidly by rainfall, as our soil never gets dry in the technical sense.

It is often stated that these S. African succulents can be induced to grow during our summer, which corresponds to the drier months in their native home, and perhaps this is true of many districts more favoured than industrial cities. In Manchester, at any rate, there are certain kinds which exhibit no tendency to start until autumn, when the best conditions are nearly over. *Haworthias*, *Gasterias*, deciduous *Cotyledons*, some *Kleinias* and the Canary Island *Aeoniums* are typical examples. The first two flower during the summer here, though others state that they do so in winter. During this time their roots shrivel and die back, indicative, surely, of resting conditions. As autumn approaches the new, white and fleshy roots of some species appear and the plants assume their normal turgidity.

Sunlight is vitally important to all green-leaved plants as it supplies them with the energy for food building. The so-called desert plants have become modified to excessive sunlight, though scores of examples amongst them are to be seen which prove that they can have too much of a good thing; many are found in shade, others have stems and leaves (when present) protected by thick cuticles, wool, hairs and spines, all of which decrease its power. Others, like the "windowed" plants, e.g. *Fenestraria*, some *Conophyta* and a few *Haworthias*, have transparent tips which are the only parts showing

above the drifting sand, the "window" allowing the sun's rays to penetrate to the green part below. They are regarded as having a more delicate constitution, have sought the protection of the sand and the "window" weakens the power of the light rays.

The disadvantages of our autumn and winter are too obvious to describe here. In smoky cities it is far worse. In the first place there is the glass of the house which stops certain beneficial rays and shelters them from the winds which in nature keep them hard and sturdy. Secondly, the artificial heat we are forced to use at times, which warms the pots and roots unnaturally, causing them to dry out often, whereas in nature they are all well down in the cool earth. Thirdly, the soot-laden air which considerably decreases the intensity of the sun. Fourthly, the prevalence of cloudy days and lastly the deadly fogs which are worse than all the others combined.

Difficulties seem to begin with the commencement of the artificial heat; growth quickens, no matter how one ventilates to keep the temperature down; there is unnatural lengthening of the internodes, especially in shrubby Mesembryanthemums, which seem the most difficult of all to keep during this time; normally fat leaves get thinner, white-stemmed sorts go green, green ones become yellow and shrivelling of the tips is common, even though water is withheld to a point bordering on wilting. After a dose of fog these weakened leaves drop off, growing points wither away and the result is a leafless, leggy nightmare. Manchester had six consecutive days of thick fog in December last year, there was no daylight to balance the unnatural warmth which does seem to minimise the effects of it. Of the plants affected, the following suffered the worst:—

<i>Cotyledon orbiculata</i>	became completely leafless.
„ <i>coruscans</i> ..	became completely leafless.
„ <i>teretifolia</i> ..	young leaves and growing points killed.
„ <i>decussata</i> ..	young leaves and growing points killed.
„ <i>reticulata</i> ..	became leafless in a few days.
<i>Bryophyllum crenatum</i>	many leaves dropped and flowers atrophied.

Bryophyllum tubiflorum many leaves dropped and flowers atrophied.

Kalanchoe laxiflora .. killed outright for the past 3 years.

„ *Fedtschenkoii* became nearly leafless.

Kleinia radicans appeared to be unaffected while *K. gonocladus* (a synonym of *radicans* according to the *Bot. Mag.*, but whose leaves are longer) lost every leaf. An unusual state of affairs was noted with *Euphorbia Nivulia*, a leafy Indian species. Every leaf turned yellow and later shrivelled to dryness. Their removal caused the bleeding noted when a young leaf is pulled off, proving the condition to be abnormal. As a rule this plant carries its leaves till late spring. Three species of *Drosanthemum*, plants with beautiful, dewy leaves, were killed outright. They were in pots. This point is given because some specimens were planted out in beds, much further from the glass and are still quite happy. This supports the suggestion that pots in winter are not ideal.

Some five miles from the city is a small collection of similar plants and the difference in health and vigour is remarkable. Many mature and flower well which fail to do so in the town. The house is a low span roof and all the plants get plenty of light.

There is one more difficulty. It is unavoidable in a large mixed collection, not to have Cacti in the same house, these, as a rule, requiring a higher winter temperature than other succulents. The Cacti are quite happy in that they are in a dormant state.

After the worst of the weather is over, most of the plants mentioned recover in the spring and then cease growing, but definitely feel the effects of their trying time, and this probably accounts for the unbalanced state of affairs which others in better localities do not seem to get. Perhaps these Manchester winters have so affected them that they have not the necessary vigour to start into growth until late in the season again.

To summarise, it seems obvious that these plants require all possible light to balance growth, so that a low span house is ideal; a position to catch the most sun, perfect ventilation to keep down the temperature in mild weather and means whereby the pots can be kept cooler than on a stage immediately over the pipes. Experiment might help in proving the kind of soil, watering, feeding and atmospheric humidity best suited to obtain the natural beauty and charm which nature has bestowed so generously upon these popular forms of plant life.

Variation in Haworthias

By C. D. O'Donoghue

DESPITE the severely scientific appearance of this title, the following remarks are designed to assist the ordinary, and often much bewildered, cultivator rather than to make a contribution to scientific data. The owner of a few Haworthias is often puzzled by the fact that a friend has the same plant under an entirely different name and recourse to a botanic garden for assistance has, until quite recently, resulted in the discovery of the same plant parading there under yet a different name and at times under as many as three different names and possibly all three incorrect.

For some years the writer has been endeavouring by means of official descriptions and of trustworthy illustrations, such as the remarkably beautiful series of Salm Dyck in the R.H.S. Library, to identify correctly his own plants but has been frustrated over and over again. It would seem that his plants are entirely different from any that have previously existed. In truth this is so, and, further, they are different this year from what they were last. Their rigid, fixed, stolid appearance is entirely deceptive. Changes in their growth, markings and decorations are slow but continuous and most unsuspected. How they are produced is a matter for enquiry and the forthcoming season will afford opportunities for using note books and carefully noting variations and trying to trace the probable causes. A delightful evening's agenda in the fall of the year would be provided if a dozen members would come along with their note books to discuss Variation, not of Haworthias alone but of Cacti and other succulents and the bearing of sun and shade, watering, soil and ripening periods on these variations.

The chief and apparently the most fixed characteristic of Haworthias is the shape and the direction of growth of their leaves. They appear to be unalterable, but here is a striking example to the contrary. Amongst a collection of really beautiful Haworthias received from Mr. J. R. Brown, of Pasadena, was a magnificent specimen labelled *H. sub-attenuata*, Bkr. Leaves about 6 in. long, all upstanding, beautifully marked with tubercles on the back—a really splendid plant but different from anything we had previously seen. Enthusiastic colleagues who had known and grown *H. sub-attenuata* for years would have none of it. "The leaves are too long.

They don't spread enough. The tubercles are too small and too many, etc." The sequel is that, after rather more than one year's cultivation, a vigorous offset has now become acclimatised and the present verdict is, "It looks as if the name was correct after all. The new growths are all shorter and thicker, the leaves are more widespread and the pearls are larger and fewer." The parent plant is adding tubercles to the face of many of its leaves, both of the younger ones and of the oldest ones, whilst the offsets at its base are showing their disregard of family traditions by having many of their leaves heavily besprinkled with pearls on both sides instead of on the back only.

Amongst the limpid type of Haworthias there is one that very frequently assumes a double appearance. In the semi-dormant stage it has leaves with parallel sides which stand upright and well apart and its apex is slightly retused. In this stage it is frequently illustrated with the name *H. cymbaeformis* (boat-shaped!) attached to it. When in active growth and grown in slight shade the leaves swell and lie flat, the apex swells and becomes partly pellucid, the whole plant forming a dense rosette. In this stage it is of striking beauty. What its proper name should be then is open to question. *H. cymbaeformis* would seem to be ridiculous, but *H. cuspidata* would not be inappropriate. It is not beyond the bounds of possibility that these two names have been applied to a single species. Their appearance is distinct enough to give grounds for the suspicion.

Reference has already been made to the changes in the tubercles on *H. sub-attenuata*. Discussions on the identity of a plant are frequently confined to the number and order of the tubercles as if this were the sole specific determinant instead of being only one characteristic in more than a dozen. Different species have their more or less distinct type and arrangement of tubercles, but the only safe way to read the official description is to insert the word "generally" before reading about their size, number and order. The official description of *H. fasciata* says:—"No tubercles on the face," yet it would be rash to reject a plant solely because it produced a bold line of tubercles down the face. At times a specimen of *H. fasciata* may be found with some leaves quite clear and some strongly spotted. These spots

may be permanent or they may disappear, it all depends on something, but what that is would be hazardous to guess. Two plants acquired at different times, each in full possession of "seven rows of immersed, whitish tubercles," are now entirely destitute of any sign of tubercles; and not one person in a hundred would accept them as specimens of *H. Greenii*, as they veritably are. Another plant, after being cultivated for over a dozen years without showing a single tubercle on its back, in accordance with the illustrations and its official description, *H. mirabilis*, has at last, for no ascertainable reason, condescended to appear decorated with tubercles and show itself true to type.

The white-horny margin of *H. albicans* would seem to be so ivory-like and solid as to be quite a permanent part of the plant, yet most beautifully marked specimens from the Cape have only to be in our greenhouses for about twelve months when the leaves become wholly and entirely green, without a vestige of the hard and ivory-white margin remaining. Time alone will show whether it will ever recover its lost distinction. On the other hand, a really fine and luxuriantly grown plant purchased as *H. rugosa*—an obviously incorrect name—has now presented us with a "thin, continuous white-horny line" on the margin and thus confirms the correctness of our suspicions that it is an example of *H. glabrata*, typica. Berger, in his description of this species, uses the word "often" before "thin horny line," which is very reassuring, as the illustration in Salm Dyck shows a magnificent plant, each leaf richly bedecked with white margins and the uninitiated is very apt to imagine that, without that conspicuous line, it cannot possibly be correct. An arresting fact about this *H. glabrata*, late *H. rugosa*, is that it was nearly lost through root rot and though now re-rooted, its present station is a greenhouse which is barely frostproof. Obviously, the newly forming white-horny margin cannot be the result of a great heat or sub-tropical sunshine. Cultivators of *H. glabrata var concolor* need not be perturbed if the dark concolorous tubercles become a shining white. They often do, but resume their concolorous character later. Mention should be made of *H. Chalwinii*, not as a variation, but as a plant which exhibits two entirely distinct types of growth and so is apt to become a great puzzle to the uninformed. In its mature state the plant is remarkably similar to *H. Reinwardti*. The leaves all ascend, are at least twice as long as wide, and are inclined to be thin. In the

juvenile state the leaves are very short and wide as long, whilst they are so thick they are compelled to lie horizontally and so only a few of the tubercles at the leaf tip are visible. When first received and whilst awaiting identification, it was dubbed *H. "bulldog,"* and it readily responded to its name. Naturally it agreed with no official description, as it does not begin to put on its grown-up dress until it is 3 to 4 in. high and even then it was not until a specimen was received which had the mature growth and the juvenile growth both on one root that the sceptics were convinced.

Another descriptive item which is necessary to be read with "generally" prefixed is Teeth. Baker, in *Flora Capensis*, evidently regarded these as fixed and invariable, and uses the presence or absence of teeth as a basis of classification. Berger, whilst of course describing teeth where necessary, does not use them as a basis of his classification. The late Dr. N. E. Brown would appear to be the first to call attention to this variability when he wrote that "*H. polyphylla* is a synonym of *H. altilinea*, scarcely differing except by its more distinctly ciliated margins." As an example of what can happen to some cultivators, a specimen of *H. denticulata*—an offset from a plant which came from Mr. Cooper's greenhouse—may be instanced. The plant when received was in perfect condition with its leaf-margins nicely fringed with small cilia. After two years the plant is still in a very lovely condition but there is not the vestige of a tooth to be seen. "No, distinctly not." Bad conditions cannot be the cause when on the same shelf, not far away, is a species which normally has a single row of teeth on the keel and on its margins, but which now has most, not all, of its leaves adorned with a double row of teeth on their keels and, stranger still, a double row on their leaf margins. This latter arrangement does not seem to be mentioned in the official description of any species. Further along on the same shelf is *H. variegata*, many of whose leaves have their marginal teeth entirely lacking on one side only. It may be trying to emulate an unidentified neighbour which is quite content to have a single large tooth sticking out on one side only, on an occasional leaf. Truly a careful "dental inspection" of this section reveals remarkably unsuspected variations from the normal.

Naturally it is to be expected that growth in the sun or in the shade will make a difference in a plant's appearance, as will good growth compared with a plant which has gone

rotten at the roots, yet it was a surprise to hear one who is really an expert claim that two such plants as the latter were two distinct species when in reality both were offsets from the same parent plant.

To sum up. In order to establish the identity of a plant a careful consideration must be made of over a dozen distinct characteristics and the relative importance of each duly weighed. Then the probable or possible amount of variation must be carefully estimated and allowed for, after which the plant may be given a name, but a ? should be put on the label as the first shot will, in all likelihood, be WRONG !

Natural variation of species is beyond the scope of these remarks, yet it is well to be alert to the fact that plants in their natural surroundings do vary ; and further, as they grow in more or less isolated stations, these variations tend to become fixed, so that a specimen of *H. attenuata* from one district may present marked differences from a plant found a hundred miles away. There are several quite distinct varieties of the single species *H. attenuata* in our greenhouses and the species *H. fasciata* seems to be coming well forward as a possible rival. It is futile seeking refuge in "That's a hybrid," which is a common resort of both the botanist and the amateur. Before such an assertion is made, some evidence should be adduced in substantiation thereof. It would be a great thing if all collectors and all dealers in South Africa sent out the place of origin of all specimens sent over. Such information is usually inserted in all Von Poellnitz's descriptions and is of real importance. Berger gave a few stations and Baker none, and we, mere dabblers, are left talking about hybrids when we ought to be saying, "The Oudtshorn type," or "The Grahamstown type," which would be good sense and good science.

Report of the Council for 1935

THE Council are able to report that interest in the Society is well maintained, although the number of members shows little increase over the figures for last year. During the year two members have died, twenty-one have resigned and the names of fifteen members have been removed for non-payment of subscription ; forty new members have joined, and the total now stands at 354 Full Members and 15 Associates, 369 members in all. It may be noted that

the number of Associates has dropped from 22 to 15. Notices of the Society are inserted in the gardening papers from time to time, but it is hoped that all the members will do what they can to enlist others and to make the activities of the Society known.

The *Cactus Journal* continues to appear quarterly and, besides its distribution amongst the Full Members, goes regularly to a number of Libraries and Botanical Institutions in all parts of the world.

The Monthly Meetings in London have been continued, and the Council would like to thank all those who have assisted. The following are the subjects dealt with during the year :—

January ..	Mr. R. S. Farden, on "Some Plants I have Grown."
March ..	Mr. W. T. Neale, on his Trip to the Canary Islands.
April ..	Mr. T. M. Endean, on "Mesembryanthemums."
June ..	Mr. F. R. Long, A.H.R.H.S., on "Local Succulent Plants of Port Elizabeth."
September	Discussion on the Naming of Plants.
October ..	Mr. P. V. Collins, on "Pests."
November	Mr. W. Denton, on "The Culture of Stemless Mesembryanthemums in London."

In July, the third Cactus Exhibition was held ; for the first time the show was open for two days and the arrangement seemed sufficiently satisfactory to be repeated in 1936. The number of entries was encouraging, being considerably larger than on the previous occasions and, in the opinion of the judges, the standard of the exhibits was definitely higher.

The Library has received several useful additions, besides the Journals of kindred Societies which are regularly received. The books are in considerable demand and members are asked not to keep anything they may borrow longer than necessary, as other members may be waiting. No new developments have been attempted this year but, judging by the attendance at meetings and by correspondence received, interest is as keen as ever.

The Council would like to take this opportunity of thanking the authorities of the Royal Horticultural Society for the assistance they have given so willingly and also to the Press for their kindness in publishing notices of the Society's Meetings and other matters of interest to Cactus enthusiasts.

Grafting Cacti

By Harry Blossfeld

SINCE men have grown plants for their fruits and for ornamental purposes, grafting has been practised and, together with hybridising, it is perhaps the most interesting and successful method of cultivation. Apart from its ornamental possibilities, grafting is practised as a profitable means of propagation.

Slow growing and very delicate varieties of Cacti, which cannot be grown under the same conditions as they have in their native habitat, are grafted on a robust-growing stock. *Astrophytum asterias*, *Obregonia Denegrii*, *Ariocarpus*, *Leuchtenbergia principis*, etc., become really beautiful and quick growing plants when grafted. New introductions and valuable rarities are also grafted for safety.

Often a plant which is decaying at the base can be preserved by cutting away all the diseased portions and then grafting the crown. If also the growing tip is damaged, at least some new shoots may be obtained from sound areoles for propagation. Of course, it is nonsense to graft a plant which grows soundly and well on its own roots. Nothing but a swollen distortion of the scion would be the result, and the plant which receives much more food from the stock than it can assimilate may at last burst.

Freshly imported plants which are shipped in from the field are generally shrivelled more or less and must be re-established before they can be grafted. Roots which are dead or broken must be cut away in order to avoid infection with rot and the wounds allowed to dry and heal for a time. Then they are planted out in a hotbed and must gradually be accustomed to warmth, light and moisture. When they have started to grow again, they may be grafted if this is desirable. Plants which arrive late in August should be potted up at once and the pots placed in the hotbed; then one need not disturb the plants when bringing them into the greenhouse in October. Grafting is not advisable in late autumn and winter. If importations arrive so late that they cannot be established before winter, they are best planted in sand and kept rather cool and dry in a light place until February or March, when they will start to grow and may be planted in the hotbed. They will stand a long resting period better than too much moisture during the cold, dark season.

If some plants have made a light green or white growth in the box, they must be well

shaded at first. This occurs sometimes with plants which are very soft in tissue, such as Rebutias, some Lobivias, Mamillarias and Cerei. If such a shoot should have grown too long so that it deforms the plant, it may be cut off and grafted, when the growth is rich in sap and has turned green after some time under cultivation in the hotbed. The mother plant may remain on its own roots or may be grafted, too. In any case, it will make many side-shoots which may be detached and either grafted or rooted in sand.

The most surprising and pleasing success of grafting is obtained with some of the fine flowering species such as Rebutias, Lobivias, Epiphyllums, *Echinocereus Knippelianus*, *Notocactus Haselbergii*, several *Gymnocalyciums*, etc. I saw one Rebutia of hen-egg size, grafted on *Harrisia Jusbertii*, which was almost covered with about 250 buds and flowers. Grafted plants of Rebutia may even flower twice a year. There exists also a South American species of *Opuntia* which, if used as stock for grafting *Epiphyllum* (*Zygocactus*), induces the scion to an almost unbelievable floriferousness. Real show specimens are obtained on this stock within a short period.

Cristates are generally grafted, as this is the quickest method of propagation and very often the only way to keep them alive. Such crested heads can be cut into many small pieces which are all on a good stock where they develop very quickly.

Young seedlings of slow growing varieties are grafted by amateurs in order to avoid losses during the cold season and on a large scale by commercial growers in order to get them to grow as quickly as possible to saleable size. For this purpose the pea-sized seedlings are grafted on young soft-fleshed seedlings of *Cereus* about 1 in. high. When transplanting later on, the stock plant should be half embedded in the soil and when potted it should be completely hidden so that the graft seems to grow on its own roots. Generally the scion will make roots as soon as it is in touch with the soil and then one can take off the old stock plant. If the stock plant has become too tall, the lower part may be cut away, leaving only as much as 1 or 2 in. at the scion. This grafted cutting should be placed in a dry atmosphere for one day or more until a kind of cuticle has formed over the cut surface. Then it is treated like all cuttings of Cacti (rooted in sand or pulverised

charcoal, being placed not deeper than $\frac{1}{2}$ to 1 in. below the surface of the sand). Sometimes also a temporary intermediate grafting is made on *Opuntias* or *Echinopsis*, which are so juicy that the scion reaches several times its original size in the very shortest time imaginable. But after some time the scion must be removed and rooted or re-grafted as this is not a permanent union.

Methods of Grafting. If you have a fine plant of *Astrophytum asterias* which is decaying at the base and you wish to preserve it, a stock is selected which has at least the same diameter as the scion and which corresponds to the further directions given under "Selection and cultivation of Stocks." A clean sharp knife (razor) is indispensable; for larger plants a rustproof and carefully sharpened kitchen knife is best. The head of the stock plant is cut away at the desired height with one stroke of the knife so that a perfectly smooth surface is left on the cut ends. Now you must work on quickly and pare away slantwise the edges all round the cut surface, removing one long triangular strip about $\frac{1}{8}$ to $\frac{1}{4}$ in. thick outside and as broad. Then put the knife in water in order to prevent tarnishing, dry it and cut away the base of the *Astrophytum asterias* as far as necessary in the same manner. If the cut surface of the head should have brown or black spots or veinings another slice must be cut away until a quite healthy tissue is left. Then the scion is pressed firmly on the cut surface of the stock plant.

In order to avoid the sap drying on the cut surface of the stock plant it is advisable, after having removed the top, to cut a thin slice off which remains as protection on the stock plant until the scion is prepared. Then the slice is drawn away and the cut surfaces are quickly pressed together. The mucilaginous sap of the plants causes the scion to slip away very easily. In order to prevent this, two to five thin rubber rings are drawn over the bottom of the pot and from above over the centre of the scion so that they firmly press the two parts together in the desired position. Instead of rubber rings, ends of woollen thread, bearing a weight of about $1\frac{1}{2}$ oz. at each end may be hung over the scion to press it down and also the elasticity of a split bamboo may be used for the same effect by fixing one end of it horizontally to the wall and placing the scion under the other elastic free end of the cane. By all these methods a constant gentle pressure is obtained, which causes the cells to heal and grow together if the graft remains untouched.

During this time the graft must be placed in a close and warm room and be kept fairly moist, with little or no shade. Cold, rainy days sometimes prevent success, especially with larger plants, whilst during very hot weather grafted seedlings easily dry up and must be shaded somewhat. The best time for grafting is, in a northern climate, from mid-May until July, and in sunny warm weather the tissues have become thoroughly united within three or four days. Then the rubber rings, etc., may be taken away carefully. After eight days the grafts are best planted in a hot bed. But great care must be taken that no water comes in contact with the fresh cut surface until the wounds are healed and dried.

In one German Cactus Nursery where many thousands of plants are grafted, the following method is practised. A wire grating, the holes of which are just large enough to pass the finished grafts through, is placed over a wooden box and tightened over the upper edges and fixed with nails. The box must be so deep that the finished graft just passes through the trellis when the head of the scion is passed foremost through the trellis into the box, so that the wire prevents the graft from tilting over. Then coarse sand is filled through the trellis until the bottom of the box is covered about $\frac{1}{2}$ in. deep. Some long *Cereus Spachianus* or other stock plants are cut into several pieces of the desired height for grafting. The growing tip is cut away (and treated later as a cutting), whilst the upper ends of all pieces—as far as they are not woody, which makes them useless for grafting—are prepared to receive the scion as described above. Then the cut surface of the scion is pressed on the top-end of the stock, to which it adheres when the whole graft is inverted and passed with the head foremost through the wire grating into the box. The other pieces of the stock plant are treated in the same way and placed side by side in the box when ready. The weight of the stock itself lying on the scion presses the cut surfaces together, thus replacing the rubber rings with upright grafts, while the growing tip of the scion is gently pressed into the sand without being damaged. In sunny, warm weather the plants unite in three days and can be lifted and turned into the upright position again. At the same time the lower cut surface of the stock plant is dried somewhat and can be placed on sand or pulverised charcoal, where it will quickly form new roots.

(To be continued.)

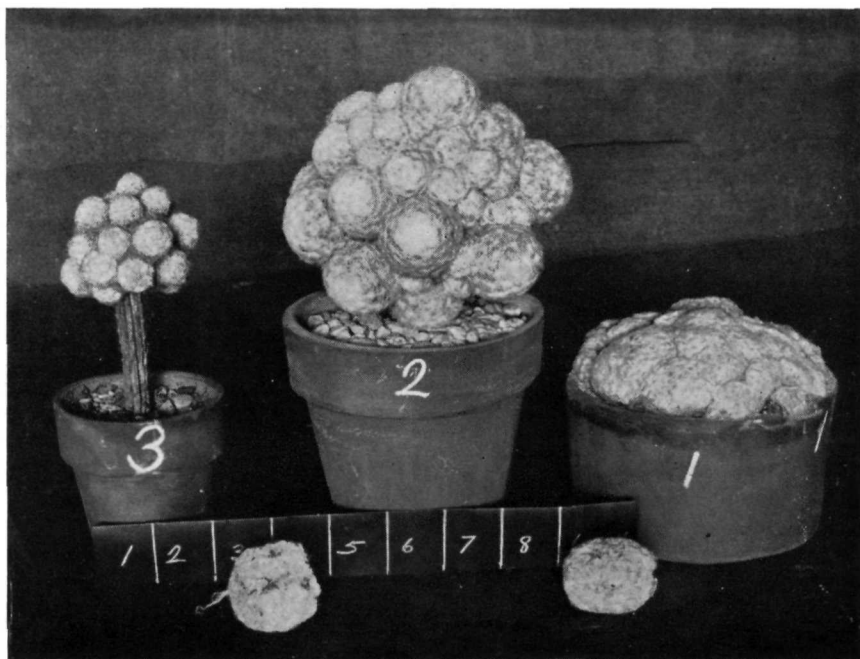
Annual Meeting

The fourth Annual Meeting was held on February 11th, at the Royal Horticultural Hall. The Report of the Council for 1935 (see p. 56) and the Balance Sheet were presented and adopted. The Officers and Council were then elected; the Earl of Mansfield having kindly consented to act again, was re-elected President; Mrs. Vera

Cactus in Canada

By C. W. Armstrong

Mammillaria plumosa Weber. About five years ago I bought a single head (similar to those in the foreground of the illustration) of this interesting little "Feather Cactus" from a dealer in England; in two years it increased only a quarter of an inch, so I cut off the top



Mammillaria plumosa.

Higgins and Mr. J. Haddon were re-appointed Hon. Secretary and Hon. Treasurer, and Miss Hetty Mackenzie was elected to fill the vacancy on the Council. Mr. W. F. Athawes consented to act as auditor again in 1936. Mr. Laverick, seconded by Miss Durham, proposed a vote of thanks to the Officers and Council for their work during the year.

CORRECTION.—In Capt. Dunston's article, "Euphorbias" (*Cact. Journ.*, Vol. iv, No. 2, p. 38) it was stated that *Euphorbia lophogona* has been placed in another genus; Berger incorrectly placed this species in the Gonistoma Section which is not considered a succulent group. It should be in the Dianthium Section and remains in the genus *Euphorbia*.

half inch and grafted it on *Nyctocereus serpentinus*; in the accompanying photograph fig. 2 shows it in its fourth year, with thirty-eight heads. Then I cut off the roots of the lower half and grafted that, and fig. 3 shows the second crop of cuttings ready for next spring. I took the entire growth of heads off two years after grafting, and these shown have grown since. Fig. 1 shows a group as collected in old Mexico; under a magnifying glass the spines show up like tiny feathers, the fine hairs at right angles to the spine; they are of a snowy whiteness.

Dates of Meetings in 1936

March 10th.

April 7th.

June 9th.

June 23rd.

June 24th.

} EXHIBITION.

July 21st.

September 29th.

October 27th.

November 24th.

Book Review

"KAKTUS ABC," by Curt Backeberg and F. M. Knuth, published by Gyldendalske Boghandel, Copenhagen, 1935; pp. 432.

In 1923 Drs. Britton and Rose published their classical work, *The Cactaceae*, which reviewed the whole of the Cactus family, and put forward a revised classification based on the examination of much material collected in the field and preserved in the main herbaria of the world. The outstanding feature of this work was the division of the family into a much larger number of genera than had hitherto been recognised. Britton and Rose enumerated 123 genera in place of about 25 of the earlier authorities. This new division was not immediately accepted on the continent and in 1929 Alwin Berger in his handbook, *Kakteen*, retained to a large extent the earlier nomenclature of Schumann and others although he indicated the need for division of many of the large genera by grouping the species in sub-genera. Since the publication of the *Cactaceae*, collecting of cacti has been continued and much attention has been given to districts not previously explored thoroughly from the botanical point of view. In particular, numerous expeditions have visited South America and Lower California. In consequence a very large number of new species have been discovered and much more information has been made available regarding the distribution of the species and genera. Much of this work has been carried out by Curt Backeberg in the course of his collecting trips and, as a result of his observations he, in collaboration with Count Knuth, has put forward a revised classification of the family Cactaceae, largely following Britton and Rose, but differing from them in the important direction of splitting the tribe Cereae into two sections, A Sectio australis (the southern division), and B Sectio borealis (the northern section). In putting forward this scheme he has followed up the work of Berger on the evolution of the Cactaceae and by careful examination of their geographical distribution, he postulates a region of origin in the West Indies, followed by two contemporaneous paths of development, one a broad band sweeping through the upper part of South America and turning southwards along the western seaboard of the continent and the other band taking a northerly course and embracing the areas of Central America, Mexico and North America. Development in these two bands has naturally followed on somewhat similar lines and the occurrence of

parallel forms in the north and south divisions becomes understandable. Thus the Echinocactus is regarded as a later form of development on account of its highly specialised character, but Echinocacti are found in both South and North America, viz. the Malacocarpus, Gymnocalycium and allied genera in South America and Ferocactus, etc., in North America. None of the genera actually are common to both, but their characteristics are so similar that they must be included in the section Echinocactae; the theory put forward of parallel development along two lines affords a rational explanation of the difficulties which would otherwise result.

The full classification is set out clearly in the book under review and this forms the first complete publication of the revised system although the general lines have already been indicated in the monthly publication by C. Backeberg, the *Bulletin of Cactus Research*. The new classification necessarily leads to some revision of existing genera and the inclusion of some new ones with the result that the total number of genera now reaches 153. Most of these follow Britton and Rose, some of Berger's sub-genera have been raised to generic rank, while a few new genera have been introduced by Backeberg to include new plants discovered by him on his expeditions.

From the point of view of the English reader, it is unfortunate that *Kaktus ABC* is in Danish, and it is hoped that the authors will be able in due course to prepare an English edition so that the new system may be studied more fully in this country and America; nevertheless, the scheme is so clearly set out that many who do not have the advantage of reading Danish will find the book of interest. Following chapters on the system of classification, geographical distribution, history and cultivation, the bulk of the book is devoted to detailed descriptions of the species, freely illustrated with excellent photographs. Each entry gives the date of discovery, the chief synonyms and occurrence of the plants in addition to the description. The value of the work would have been enhanced if the botanical reference to the first description had been added. In an appendix are given the descriptions in Latin of species not previously published; it is noted that this includes about one hundred new plants exclusive of varieties. The authors and publishers are to be congratulated on the very clear way in which the matter has been presented, the selection and size of type used makes reference to individual plants an easy operation.

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Cactus in South Africa



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Fig. 10. *Testudinaria elephantipes*.

Some Plants in My Collection

By Thomas Sharp, Westbury

(Continued from Vol. iv, p. 52)

Euphorbia caput-medusae (S. Africa). This plant is of considerable age and most of the branches range from 5 to 6 ft. 6 in., the longest being 7 ft. 10 in. When I described this plant to the late Dr. N. E. Brown, he observed that *caput-medusae* branches rarely reach 2 ft. and the plant at Kew supports Dr. Brown. For several years the longest branches have been dying, presumably from old age. Three years ago a young crown of twenty-two growths started; these range in length from 2 to 12 inches, but grow much slower than the old ones did at their age. The plant is never at complete rest but grows fastest in the autumn, the S. African spring.

Aloe distans (S. Africa). Its position on a wall and its length preclude photographing. The plant was purchased about twenty years ago when it was about 9 in. tall. It was placed on a ledge (brick wall set-off) and this wall was damp; aerial roots soon appeared and made for the wall (hydrotropism and chemiotaxis). After about four years the stem was severed from the roots and the pot and roots removed; the plant continued to thrive, putting forth here and there aerial roots, most of which grew to the wall. It tolerates from 35° to 110° F. The plant now has three stems, the longest about 12 ft., the next about 7 ft. and the other about

3 ft. ; it has, through the years, given many side growths which have been removed and rooted—they root readily ; they make attractive gifts to child and grown-up visitors.

Euphorbia lignosa (S. Africa) (Fig. 6). According to the *Euphorbia Review* of America, this is one of two species in the Acicular Section. The plant shown has a horseradish-like root 8 in. long, which necessitated telescoping three pots together ; the bottoms of the two upper ones were chipped

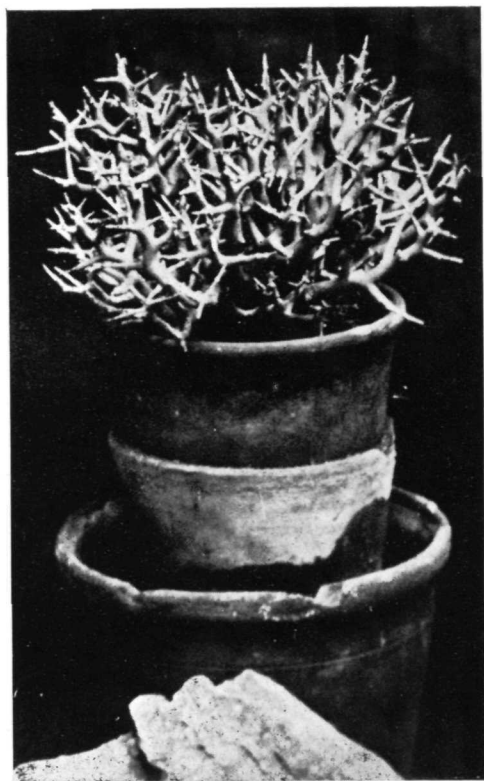


Fig. 6. *Euphorbia lignosa*

away, the two lower ones were cemented together. The plant is semi-plunged as shown.

Brachystelma barbertonensis (Transvaal). The tuber is 5 in. in diameter ; the inflorescence (Fig. 7) consisted of eighty-six flowers, all perfect ; the scent of the flowers is the quintessence of putrescence and is so persistent that one's clothes carried it to a room 70 ft. distant, half the distance being out of doors. It rests for six or seven months but has adapted itself to our seasons. It reached me from the Transvaal seven years ago.

Euphorbia lophogona (Madagascar) (Fig. 8). With me this plant, which is 21 in. high,

thrives in heat, humidity and partial shade ; it flowers and grows all the year round, more slowly in winter. I grow it in a compost of loam, peat and sand in equal proportions.

Cotyledon reticulata (S. Africa) (Fig. 9). The flower stalks persist and become spinose. Although it has been here eighteen years it adheres to its S. African season of growth. The English-grown stems are much smaller than those which grew in the Cape Botanic Gardens.

Cereus formosus monstrosus (Brazil) is grafted on *Cereus peruvianus* and is 26 in. high from the union of scion and stock. In the first week in June, 1920, two cuttings, each 12 in. long, were taken from the plant at the base

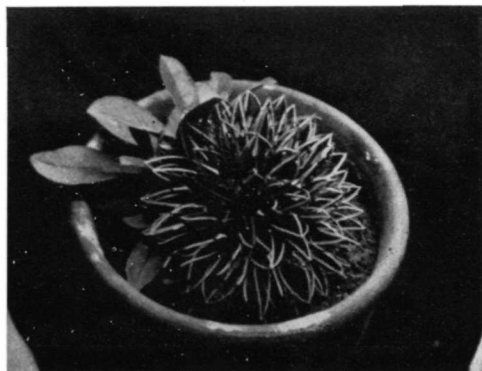


Fig. 7. *Brachystelma barbertonensis*.

of the graft, one was used as scion, the other as a cutting. The parent plant is about thirty years old and nothing yet tried will induce it to grow ; when put in new conditions it makes a few roots which stop growth at about 1 in. long and become stubby.

Bowiea volubilis (S. Africa). This member of the lily family sends up annual shoots from a swollen stem which, in my specimen, is 19 in. in circumference. It sometimes produces a narrow leaf about an inch long, which has a short life. The whole annual growth is an inflorescence, reaching 6 to 7 ft. (one year it was put in heat, where it made 19 ft. in seven weeks) by far the greater part of which is furnished with sterile flower stalks, which with its stem and bulb function as leaves. Towards the top very small pale green flowers are produced. Bulb scales taken off produce bulbs from their base, an excellent example of vegetable reproduction ; one piece of a scale produced eleven perfect bulbs, identical in size ; that is preserved in a University Botanical Museum.

Testudinaria elephantipes (S. Africa) (Fig. 10) is a close relative of our Black Bryony, *Tamus communis*. The plant on the left came from S. Africa, the others are seedlings raised here. Both are small plants, their annual growths reaching 20 to 25 ft.

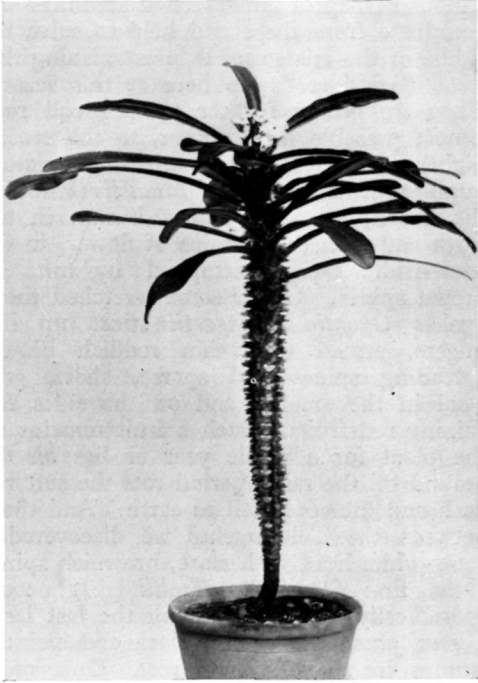


Fig. 8. *Euphorbia lophogona*.

My collection numbers about 800 plants, ranging in height from half-an-inch, as in *Lithops turbiniformis* to 16 ft. in *Cereus macrogonus*; half way below this are eleven beheaded columnar plants comprising *Euphorbia arborea*, *natalensis*, *abyssinica*, *grandcornis*, *Cereus peruvianus*, *validus*, *Jamacaru*, *macrogonus*. These tall plants are from the end of October to the end of April stacked out of the ground close together standing on bricks; during this period they receive no water. At the end of April they are placed 2 ft. apart in the unheated span house, tied to a roof wire, bricks are placed round close to the roots and any spaces filled in with any soil to hand; they are given water from June to September, whenever they are dry. Exception is made with *Euphorbia abyssinica*; this reached beheading height in August 1934; in 1935 it was simply stood on the hard soil and bricks placed round its bare and scanty roots, but no soil put to it; it has had no water since September 1934 other than that absorbed from the hard soil beneath it. It was beheaded

in August 1935. This is one of the most massive plants I have.

In this general collection of 800 are 65 species of cactiform Euphorbias, including one unnamed seedling and the unnamed species from Amami, Tanganyika.



Fig. 9. *Cotyledon reticulata*.

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ROBERT BLOSSFELD, Neue Koenigstrasse 94, Potsdam, Germany. Seeds of Cacti and Succulents; also beautifully illustrated supplement.

ALBERT SCHENKEL, Blankenese, Hamburg, Germany. Seeds of Succulents.

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F. A. HAAGE, Jun., Erfurt, Germany. Seeds of Cacti and Succulents; illustrated.

H. WINTER, Fechenheim, Frankfurt-am-Main, Germany. Cacti and Succulents.

Collecting Cacti in the Puña

One day's collecting in the Puña, from Harry Blossfeld's diary (see Figure 5, page 33, Cactus Journal, December, 1935); the description from the diary is of a trip from Humahuaca (3000 miles).

MONDAY, JULY 1st, 1935.

Here behind Humahuaca in the eastern Quebrada in a wide valley are thousands of *Oreocereus Trollii*. There should be a good motor road to it, used regularly by a German Evangelical Pastor living out here. We started off just behind Humahuaca, but the road disappears in a river bed. This former "international motor road" to Bolivia has, months ago, been cut up by flood water, washed away and strewn with stones. Often the way, still visible in places, ends in cracks a yard deep at the bottom of which the river gurgles. Each time we have to turn, to go back and seek a passage across the river. But we never find the actual branch road that the pastor uses, even when we reduce our requirements for passability to a minimum. So we climb up, retrace our steps and finally find quite near the outlet of the place a really good road. But in front of it is an impassable bog with a few islands of stones. So we fetch our van, traverse the "international road" back to the village and then obliquely across the river valley, up the easy gradient in a rising curve to the left of the mountain slope. Up above we suddenly stick, the road is knee deep in fine, blown sand. These stretches are only a hundred metres across, but they are enough, together with the steepness, to bar our progress completely. Even with chains no progress can be made in such sand. With great difficulty we back out again, turn and once more go back.

In the village we get a peon who takes us some 8 km. northwards, along the international road, which fortunately here is passable for a stretch, for it goes up along the side of the valley. We halt where a lateral Quebrada branches off, leave the peon as guardian of the lorry and load ourselves up with saws, ropes, sacks, field-glasses, photographic apparatus, bread and water-flasks and rucksacks. So we go westwards, further up the slope, which rises high in the distance in gigantic steps. Far off one can see with the glasses the houses of a village and near it, the encircling rocks. Up here too we see several gigantic cristates of *Cereus pasacana* with snow-white

bristles, alluring objects. We climb up the first stage and come out in a ravine, in which is a house and near it a fine *C. pasacana cristata* with a snow-white, bristly crest. Because of its enormous weight unfortunately we cannot take it with us, but we photograph it from all sides and collect a dozen ripe fruits. Perhaps a few fasciated seedlings will germinate from these and help to solve the riddle of the cristates. It is astonishing that we still find seeds up here at this season. Then we go on further up a broad road almost passable for a motor, to the second higher level. Up here are an enormous number of *Echinocactus Maassii* (Parodia), the broad, claw-like spines buried in the earth and with the remains of flowers in the snow-white caps, overtopped by tufts of brown spines. Under some wretched thorn bushes *Opuntia Weingartii* sticks up like fingers, armed with thin reddish brown, spreading spines and sparse, short, grey wool in the areoles, and on the sides fat, shining red fruits. Such a fruit remains on the plant for a whole year or lies on the ground till the rainy period rots the soft red flesh and the seeds fall to earth. And then, between the Tola bushes we discovered a snow-white head with close, brownish spines—the first *Oreocereus Trollii*. It occurs sporadically up here between the last large *Cereus pasacana*, whose blackened pointed stumps are signs of hard frost. Once more we go up to a higher terrace. We gasp—the Puña has got us! Already for more than two hours we have endured the broiling mid-day heat. Below by the river we crossed a creaking covering of ice on the pools and up here not the slightest breath of wind brings us coolness. But we refuse to give up, will not rest on these sun-baked slopes, but climb ever upwards and not let ourselves be overcome by mountain sickness. I am hungry and want to eat dry bread. It cannot be done for want of breath, I cannot chew and have to sit down for a moment to be able to swallow a couple of mouthfuls. Then on again further. What heavy going this last climb is, as if ton weights drag at our feet, as if the rucksacks were filled with lead—don't look back or giddiness will overtake us—Herr Marsoner is already spitting blood—mechanically we drag ourselves along, one thought only in our minds: onwards, onwards. And at last it is surmounted, we have arrived on the plateau, gasping for breath and with wildly beating hearts, indeed, but here we soon feel better, the dangerous part, where the Puña rules, is conquered.

Thence onwards the ground rises slowly, *Oreocereus Trollii* becomes more plentiful, but no more *C. pasacana*, as far as we can see. And all the time the distant village lies before us, not nearer apparently, as it had appeared from the valley below. On the left, made of large stones is a double-seated bench. Here during processions the bearers of the sacred images set down their heavy load, so as to rest and stretch themselves. The Puña is here again, we rest ourselves for a little while. Herr Marsoner is at the end of his strength and stays behind. We leave in his keeping all the luggage we can dispense with and march forward for another half hour. Then the road divides, we go left through a dry river bed deep in sand where we can only make progress slowly and wearily. Then we climb up a steep cliff to look round and see where we have to go. There we see a small house and near it an enormous snow-white *C. pasacana*. That must be our direction then! With renewed hope we run a kilometer in this direction over stock and stone. We have lost the road, but that does not bother us now, the giant *pasacana* is our objective. At last we are in the river bed under the place where the house must be, we climb a goat track, clamber over a rough stone wall surrounding a stock yard and there is another giant *Cereus* immediately beside us. We are awestruck: there is the thick white column and on it—a snow-white, shell-shaped, giant crest, a meter across. A monster in size and thickness, a monster also the giant column which bears it. As we go round the wall of the farm buildings where the house stands, a horrid, old, coca-chewing Indian woman straightens herself with anxious eyes behind the wall, whence she has watched our coming through its cracks. We pacify her and ask permission to photograph the cristate, which is only given grudgingly. Whilst we produced the apparatus and set it up, we enquired if there are other such plants about and receive the discouraging answer that we may not cut down anything, her husband has sternly forbidden it. But we discover that further on is another such plant. When the photograph had been taken we looked round a bit and naturally our glance fell on that enormous *Cereus* which had been our objective down below in the river bed. The old giant was more than 9 m. high with many white bristly arms stretching upwards. And on one arm was another broad patch—quickly we go to the other side of the house and there this giant also has two ancient,

comb-like cristates already greying, on which however up above, are two small, newly formed, snow-white crests. We must have these! Quickly we fetched the woman, told her that we only wanted very carefully to cut down the two little pieces since these ugly deformities would just suit us. After a present of money she finally agreed and even gave us a rickety hen-ladder to climb up with. As the tallest I had to stand on the uppermost rung and to saw through the thick white crest with outstretched arm, in a most uncomfortable position. From below it looked so small and dainty, but it was a stout heavy specimen. There was no means of holding it, standing myself on the top of that rickety ladder, nor could we fix or rope it. So we used all the sacks we had brought with us as a cushion after clearing the ground of stones. But even this seemed to us too risky, for even with this cushion the specimen would be shattered by a drop of five metres. So Frank stood below the cristate with arms outstretched to catch it—hands and arms protected from the spines by a thick sack—and I sawed away merrily; then a push and down fell the specimen. Crash! Frank was knocked over by the blow, quite red from fright and effort, but he held the cristate intact and safe in his arms. My goodness, how large and thick and heavy it was! Now for the second one! And then we wondered if we should be able to collect it. The ladder was too short, I had first to climb up into the spiny branches of the cactus whose white bristles looked so beautiful from below, draw the ladder up after me and mount it once more, to get there. Then I fastened the rope to the cristate, laid it across another thick branch and below Frank hauled on the end. Then I started to saw. Soon there was a threatening dull cracking sound. Suddenly it gave a fearsome creak, I saw the cristate falling, drew back, the saw flew out of my hand, the whole tree rocked mightily and then, ten times over, came great crashing sounds—a dreadful dull thud—and silence. I closed my eyes for fear and dust and when I opened them it suddenly seemed quite light round me, where previously I had been standing amongst many close stems. Below me I saw a great broken stump, against which the ladder on which I was still standing, was leaning. Down below, on the ground, was a chaos of metre-long broken giant stems, often smashed to pulp. Somewhere amongst all that must be the cristate! Down below Frank too moved. I climbed down and amongst all the lumps of mush we found one

end of the rope and up above, sound and undamaged, the one crest of this completely shattered cristate. One at least saved then! We cut off the specimen and quickly cleared the great stems to one side beyond the wall. Then we saw how it had happened. The rope had held the cristate fast, but its enormous weight dropping suddenly on the other branch had simply brought this stem down with it. This in its turn had torn off two other branches in its fall. But when we saw the damage from below, we both realised that it hardly showed on that gigantic tree that a few branches were missing. Fortunately I had previously taken two photographs of it. But now we had to disappear quickly before the master of the house and owner of the Cactus returned. Thank goodness the woman did not see the accident. We gave her back the ladder and also money and coca as a present and departed heavily laden with our two cristates. And indeed the booty was mighty heavy!! But we run and run, meet Herr Marsoner and run further and further. Nor do we stop to rest, tired though we are. The two pieces weigh 15 kg., but they seem to us fifty kilograms and there is far to go. Below the first lower level, the Puña plays tricks with us, then a further level, the second slope, again a long level part and then finally our first giant cristate near the house, the embankment, out through the entrance to the Quebrada. My goodness, was it possible. Here in the shade of trees was firm ice at four o'clock in the afternoon!! and in the broiling sun we had been sweating under our load. At last we reached our lorry and, exhausted, threw down our rucksacks, ate and drank. How good it tasted! Since early morning we had worked hard and eaten nothing but a crust of bread and an orange. And then triumphant we returned home with our booty. We soon get to sleep this evening.

[Translated]

Rock Gardening Abroad

At the Conference held in May by the Alpine Garden Society conjointly with the Royal Horticultural Society, one session was devoted to Rock Gardening in Sunny Countries; two papers were given, one by Miss Stanford on "Rock Gardening in South Africa" and the other by Mr. W. Hertrich on "Rock Gardening in California."

Miss Stanford, who is one of the early members of this Society, spoke chiefly of the

beautiful South African bulbs and other wild plants whose size and hardness make them suitable for cultivation here; she purposely omitted the succulent plants as these were to be referred to later, but mentioned that rock gardens, which are becoming increasingly popular, are usually planted with succulents as these are especially suitable for such a dry situation. A series of coloured photographs shown by epidiascope gave an excellent idea of the vivid colouring of such plants as the Felicias, Gazanias, Moraeas, Babianas and Kniphofias.

Mr. Hertrich has been Curator of the Huntingdon Botanic Gardens, San Marino, California, since 1909; these Gardens are devoted to various types of plants but are especially noted for the very fine collection of succulent plants grown there; the lecture was illustrated by a wonderful series of lantern slides which showed that Mr. Hertrich is as skilful in the art of taking photographs in colour as he is in growing the plants. Mammillarias and Echinocerei planted amongst the rocks were in full flower; tall Cerei were in flower and fruit; Aloes in full flower covered the slopes; wonderful Yuccas with great spikes of pearly white flowers stood out against the blue Californian sky, and individual plants of Haworthias, Stapelias, Ceropegias and many other species were shown. Mr. Hertrich explained that the rainy season begins in autumn and lasts till spring, followed by six or eight months of complete drought, when artificial watering is necessary; but such conditions make it possible to grow most of the Mexican and South American succulents as well as a large number of the South African ones; it is interesting to learn that these latter do not change their flowering period but come into bloom during the Californian winter and so are especially useful in providing a sequence of bloom through what would otherwise be a duller period in the gardens. The introduction of Trichocaulons, Stapelias and Carallumas out of doors is being attempted and has been partially successful, and some of the African succulent Euphorbias can be grown but not all are hardy enough.

The Succulent Garden at San Marino was begun in 1909, and the pictures showed how well it has been developed and how well the climate suits these plants, for many of them have attained a considerable size and the hillsides are well clothed. An account of these Gardens was given in the CACTUS JOURNAL (Vol. IV, No. 1, p. 16).

Lines of Evolution in Cacti

By Vera Higgins

(Read at the Meeting on March 10th, 1936.)

EVERYONE nowadays is familiar with the idea of evolution; growing things are not static but there is a constant tendency to variation due to inherited qualities or to environment. The older idea that such changes were gradual, so that at some time transition forms had existed which made a continuous chain of development, is not now maintained; slight changes due to environment are seldom handed on to the next generation. The most usual way for a definite heritable variation to occur is by mutation, or what the gardener calls "sporting"; the cause of these distinct variations is not yet understood but is almost certainly the result of some outside agency acting on the germ plasm; apparently the possibility of producing "sports" is in herentall in plants, though in some genera it is much more common than in others; in plants removed from their natural environment the tendency to sporting is probably increased. One has to be rather careful in making such a statement for, whereas in nature hundreds of "sports" may occur which are never seen or noted by man, any deviation from the normal which occurs in cultivation is liable to be given very special treatment and consideration by the grower who hopes he may be getting something better than the original species.

This conception of evolution as proceeding by a series of "jumps" implies that its progress will not be found, as was previously anticipated, to be a continuous line but will be discontinuous; it is no good looking for "missing links" which have probably never existed; the course of development will not necessarily be easy to trace, especially as some of the stages may have proved unstable and died out or been overwhelmed by more vigorous competitors.

Another point should be borne in mind. Evolution is often taken as synonymous with progress but many mutations show retrogression; a plant is as likely to throw a sport with smaller flowers as it is to produce the finer flowers that the florist would like, so that there are likely to be many branch lines and if these species have reached a stable condition with regard to their environment, the tendency to form sports will be greatly reduced. Hybridisation between closely allied species

may account for further development. Similar causes will produce similar effects which may lead to what is known as parallel development; two species may closely resemble each other but before their position can be definitely assigned to them it is necessary to be sure that they really are closely allied and have not just assumed a similar form owing to outside circumstances. For instance, such a Euphorbia as *E. Echinus* closely resembles a columnar Cactus; investigation shows that they belong to entirely different families and that the similarity of their outward appearance is due to the fact that both are adapted to withstand excessive drought and insolation.

The family of plants in which we are interested, the Cactaceae, shows in all its species a very marked adaptation to environment; yet they are closely related to the other flowering plants and so it should be of interest to try and trace out the probable lines of evolution in this family. This has been done with considerable thoroughness by Alwin Berger, at one time Curator of Sir Thomas Hanbury's famous gardens at La Mortola, in his book *Die Entwicklungs linien der Kakteen*; research in the field by Herr Backeberg and others in recent years has suggested that some of Berger's conclusions are not now tenable. It would be impossible in the time available to go into this question at all thoroughly but I think a summary of the conclusions will not be without interest.

One point should perhaps be stressed and this applies generally and not merely to Cacti; it is found that the vegetative characters of a plant are much more liable to change than the floral; it is for this reason that botanists use the floral characteristics chiefly when arranging plants systematically though the habit must also be taken into account. A somewhat extreme case is seen in the Haworthias where the variation in the vegetative character has so far outstripped any change in the flowers that these are almost useless in attempting to separate the species, which is one reason why this interesting genus is so very difficult to name satisfactorily. The seedling stage is the most conservative of all and the earlier history of a plant may often be indicated by the shape of

its first few leaves, especially when these differ from the adult form.

The position of the Cactaceae with regard to other families of flowering plants is not very easy to determine though probably it is most closely related to the Aizoaceae, which includes the Mesembryanthemums. There seems to be an idea that Cacti are "recent plants," whatever that may mean; the exact time at which any plant family came into existence can, of course, never be known; plants bearing true flowers are certainly more "recent," geologically speaking, than

Cactus growers are not familiar with them except perhaps as grafting stocks. They occur in the warmer and moister parts of America, though it is a little difficult to say now where they actually occur wild owing to the fact that from very early times they were planted as protective hedges by the Indians and often the plants remain when all trace of the settlement has gone. Pereskias are straggly bushes or climbers with woody stems and true leaves, resembling those of the Orange Tree. Spines occur at intervals along the stem and it is interesting to note that they are found

<i>Period</i>		<i>Epoch</i>	<i>Fossils</i>
Post-pliocene		Recent Palæolithic Glacial	MAN
Tertiary	Pliocene		Flowering Plants (<i>Temperate</i>),
	Miocene		Flowering Plants (<i>Sub-tropical</i>)
	Eocene		Flowering Plants (<i>Tropical</i>)
Secondary	Cretaceous		Flowering Plants
	Jurassic		Cycads and Conifers
	Triassic		Cycads and Conifers
Primary	Permian		Ferns and Cycads
	Carboniferous		Coal Measures
	Devonian		Ferns and Marine Forms
Primary	Silurian		Marine Forms
	Ordovician		Marine Forms
	Cambrian		Marine Forms
Archæan			Marine Forms

The whole of written human history, from the earliest Egyptian and Babylonian records to the present day forms a small part of the later half of the Recent Epoch.

ferns and other primitive types; their fossil remains are first found in the Cretaceous period but they had already achieved a very high state of evolution and a large number of our present day genera are represented, such as the Willow, the Poplar, the Aralia, and the Fig; some conditions not yet understood—perhaps never to be fully understood—made the sudden development of flowering plants possible; the main lines were laid down in those early times and evolution since that time has consisted chiefly, as far as we can tell, of minor variations; there is no reason to suppose that early representatives of the Cacti were not present in Cretaceous times—that is long before man appeared on the earth.

The most primitive members of the Cactus family are thought to be the Pereskias; these plants are not well known, in fact, many

several together in woolly areoles very like the areoles of the more highly developed Cacti; the areole is an organ only found in the family Cactaceae. The flowers have an indefinite number of petals and stamens, but these do not form a tube such as we find in Echinopsis and Mammillaria; without going into botanical details one might say that the flowers are altogether more primitive than those found in later groups and also they have stalks. The seedlings have a slender hypocotyl and flat green cotyledons, much like other plants.

The Cacti most nearly related to the Pereskias are the Opunteae, a group which includes the Opuntias, Pereskiaopsis, Grusonia and several other less well known genera. Anyone who has raised Opuntias from seed will remember that the first two leaves are

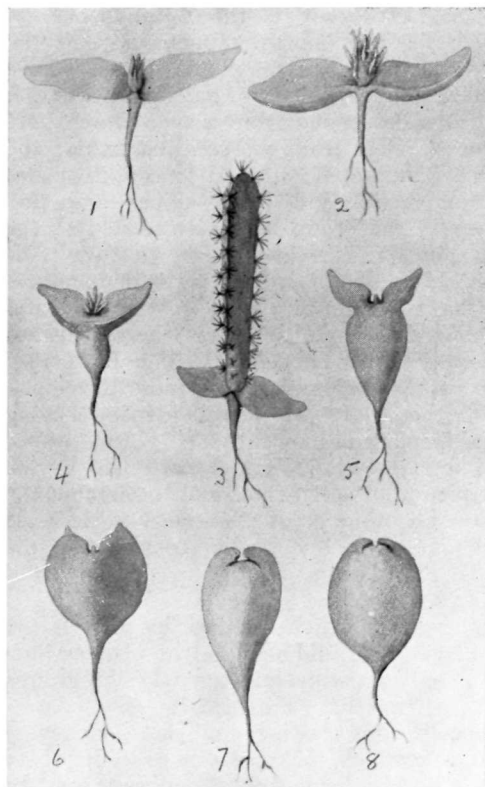
flat and widespread, though rather thick, and the hypocotyl is still quite slender. The genus *Pereskia*, as its name implies, resembles *Pereskia*; these again are branched shrubs bearing true leaves though smaller and more succulent, but in the areoles is a new development; besides the spines, glochids are found; these tufts of barbed bristles, familiar to anyone who has ever touched *Opuntia microdasys* inadvisedly, are typical of the group *Opuntiae* and are not found in any other group. The range of *Pereskia* is wider than that of *Pereskia* and goes as far as Central Mexico, that is into drier regions.

From the thickened, somewhat succulent stems of *Pereskia* to the type found in the *Cylindropuntias* is but a short step; these *Opuntias* with cylindrical stems bear leaves when they are young, but these are usually quite small and soon fall off. *Cylindropuntias* are found in desert regions in both North and South America, though there are distinctions between the two groups such as form of spines and colour of flowers which will be referred to again later. The dwarf *Opuntias* of South America, such as *O. papyracantha*, are possibly a development from these.

The next development is found in the *Platyopuntias* or *Opuntias* with flat joints; it seems probable that these are descended from similar plants with cylindrical stems, because in the seedlings a small cylindrical stem is first formed which later becomes flattened. *Platyopuntias* are the most numerous of the various types of *Opuntia*; they occur in North and South America and a few are common to both; this very wide range, wider than any other genus of Cacti, is taken as yet another indication of the age of the group as experience tends to show that wide distribution corresponds as a rule with considerable age (geologically speaking) since, if they have, as is presumed, spread from a common source, considerable time is required to get far from their point of origin. The small genus *Grusonia* is interesting because, though it undoubtedly belongs to the *Opuntiae*, the stem is definitely ribbed like a *Cereus* and though no glochids are found on the stem they still occur in areoles on the fruit. Thus we see that in the group *Opuntiae*, the tendency is to develop from plants with cylindrical stems to those where the stems are flattened or even, in one case, ribbed.

The great group of the *Cereeae*, containing all the other types of Cacti, is not directly

descended from the *Opuntias* but must have come from some common ancestor, since there are many points of resemblance in their structure. The *Cereeae* are grouped together for purposes of classification but Berger considers that they are probably



Types of seedling.

- | | |
|---------------------------|--------------------------|
| 1. <i>Pereskia</i> . | 2. <i>Platyopuntia</i> . |
| 3. <i>Phyllocactus</i> . | 4. <i>Cereus</i> . |
| 5. <i>Ferocactus</i> . | 6. <i>Echinocactus</i> . |
| 7. <i>Gymnocalycium</i> . | 8. <i>Mammillaria</i> . |

derived from four different but closely related ancestors, of whom to-day there are no representatives living; these ancestors gave rise then to four groups, which we will consider separately, namely *Rhipsalidanae*, *Epiphyllanae*, *Hylocereanae* and *Cereeanae*.

The *Rhipsalidanae* include such plants as the *Rhipsalis* and *Zygocactus*, the Crab Cactus; most of the *Rhipsalidanae* have round stems whose method of branching is unusual; the flowers have few petals and no tube and in many ways therefore they resemble *Opuntias*; they have developed along similar lines too for the later types, such as the Crab Cactus, have flattened stems. They are almost all native of the tropical forests

of South America and many are epiphytic, that is to say, they use other plants as supports to help them to get nearer to the light but do not take nourishment from them. A result of this change of habitat is that aerial roots are developed; these are never found in *Pereskia* or *Opuntia*.

The next group is the *Epiphyllanae*, of which the best known representative is the *Phyllocactus*; these plants usually have flattened stems and few if any spines, but that they are descended from a type which bore spines is clear from the seedlings where the first shoot to be formed is round or has several angles and bears spines and tiny leaves. The group is closely related to the next one, the *Hylocereanae*, in fact it is possible to obtain crosses between members of the two groups, some of the beautiful *Phyllocactus* hybrid being the result of crossing with *Hylocereus*. The flowers of this group are considerably more developed than those of the *Rhipsalidanae*, having many petals and long tubes.

The *Hylocereanae* are characterised by the production of aerial roots and throughout the group the number of ribs tends to decrease and, except in one genus *Aporocactus*, the Rat's Tail Cactus, all the species flower at night.

The group which interests us most is the *Cereanae* since this includes the plants which we chiefly grow. Unfortunately the groups into which they are usually divided for purposes of classification are somewhat artificial, which makes it more difficult to follow the probable line of development. In any case, these genera represent the highest development so far attained and without making a detailed botanical investigation it is only possible to indicate briefly the general tendencies. Omitting smaller though important groups whose members are not so well known in cultivation, we may turn to the large group of the *Trichocerei*; this includes a number of genera in which the habit of the plant is *Cereus*-like or cereoid, like the *Hylocereanae*, but with large many-petalled flowers on long slender tubes; the tendency throughout the group is to the formation of more ribs and greater succulence till we come to the so-called cactoid types such as *Echinopsis* and *Echinocereus* and others where the plant body is usually spherical; it may become elongated with age but is never truly columnar; the flowers however closely resemble those of the cereoid types.

Berger considers that from similar ancestors

come the *Gymnocerei* which also has a cereoid branch containing such genera as *Cereus* proper and *Cephalocereus* and a cactoid branch which includes the *Gymnocalyciums* and *Melocacti*.

The last two great groups, *Echinocactanae* and *Coryphanthanae*, are entirely cactoid in form; none of the species have columnar or climbing stems and none produce aerial roots; the flowers are all highly developed and the seedlings are markedly different from those of earlier groups; the hypocotyl is now very succulent and the cotyledons are hardly represented at all; anyone who has grown *Mammillarias* from seed will be familiar with the little green spheres that first appear marked at the top with a tiny groove where further development takes place.

In the cereoid types the areoles are borne at first on distinct tubercles which later fuse together to form the ribs, but later, as in the *Coryphanthas* and *Mammillarias*, this fusion no longer takes place and the tubercles remain separate throughout the adult life of the plant; indeed in the most highly developed forms the tubercles themselves are further changing into the queer long fingers of *Leuchtenbergia principis* or the leaf-like form of *Ariocarpus*. The position of the flowers in *Mammillaria* may be regarded as a later development; in the majority of *Cacti* they are produced in the areoles, occasionally, as in the *Coryphanthas*, they are found in a groove running from the areole, but in *Mammillaria* the groove has disappeared and the flowers are found in the axils of the tubercles themselves but never in an areole.

Where, as in *Astrophytum myriostigma* or *Lophophora Williamsii*, the Dumpling Cactus, the areoles are spineless it will be found that the first few areoles in the seedlings bear spines, thus indicating their origin from spine-bearing ancestors.

The fact that a large number of genera are found in very restricted areas only, tends to prove that they are comparatively young (geologically speaking) and have not had time to spread far. On the other hand, marked changes of climate such as have been known to occur in South America particularly may have the effect of causing a species to die out as the conditions of existence become impossible for it. The host of new *Rebutias*, *Lobivias*, etc., which have lately been discovered probably mean that these types have not yet reached a condition of stability with their environment,

so that many new but closely related forms are found.

In Berger's opinion the original home of the Cactus family was probably South America, whence they migrated northwards; at this time the West Indies were connected to the mainland and must have been colonised by Cacti while this connection still persisted; the land bridge between Central America and the West Indies was probably broken during the Eocene period; later in the Miocene, the land bridge along Panama was formed and a new invasion of North America became possible, but no further additions to the Cactus flora of the West Indies, now isolated islands, could take place. The Cacti in Florida show relationships with those in the West Indies, but those in Western North America, where in Mexico the Cactus flora was probably considerable before the Ice Age, are mostly derived from later influxes from Central America, a northward spread following the retreating ice. The tendency in the development of Cacti has always been away from the tropical regions where they originated towards dry and desert regions where their marked tendency to succulence made it possible for them so to adapt themselves that they could not only exist but spread.

The geographical distribution of Cacti has a very important bearing on the question of their probable lines of evolution and the work of Herr Backeberg in South America has done much to clear up certain difficulties. For instance, the older collective group Echinocactus included plants found in both North and South America; they bear considerable resemblance to each other but it seems probable that this is a case of parallel development along similar lines but in quite distinct districts; if the more specialised genera of Britton and Rose are used, these plants fall into very distinct groups which the grower early learns to recognise, such as the Gymnocalyciums, the Ferocacti and others; this division of the older artificial group seems amply justified when we find that the Gymnocalyciums occur in South America and the Ferocacti in North America exclusively. Then again the genus Echinopsis with the closely related genera Lobivia and Rebutia is entirely confined to South America, whilst the Echinocerei are only found in North America though both appear to be descended from similar Cereus-like types; the enormous genus Opuntia has the widest distribution of any and is found over the whole range of both Americas where Cacti

can grow, but though the type with cylindrical stems occurs in both Continents it is only in North America that any of the species are found with sheathed spines, whilst the dwarf Opuntias with papery spines are exclusively South American.

As a result of his work Herr Backeberg has come to the conclusion that the centre of origin of Cacti was most probably on land now submerged by the Caribbean Sea and that from thence two streams of migration went forth, the one from the West Indian region northwards, the other from the La Plata southwards. The southerly migration gave rise to the Cerei with much wool, such as Cephalocereus and Borzicactus, to Echinocacti such as Gymnocalyciums and on the higher ground to Echinopsis and its allies, whilst the other stream went northwards, giving rise to the columnar Cerei like Pachycereus and Carnegiea, to Echinocereus, to Echinocacti such as Ferocactus, Astrophytum and others, and the great group of the Coryphanthanae (including the Mammillarias) of which there are no counterparts in South America.

Library

SINCE the circulation of the Library List the Society has received the following additions and is most grateful to the two donors for sending them.

From Mr. A. D. Fort :—

Gesamtbeschreibung der Kakteen, Karl Schumann, 1903.

Die Entwicklungslinien der Kakteen, A. Berger, 1926.

Unsere Kakteen und Sukkulenten, W. O. Rother, 1923.

From Mr. F. H. Bowler :—

Agave in the West Indies, W. Trelease, 1913.

Contributions from the United States National Herbarium (Smithsonian Institution).

Bulletin of U.S. Department of Agriculture. New Aloe from Swaziland, I. B. Pole Evans, 1915.

Grafting Cacti

By Harry Blossfield

(Continued from Vol. iv, p. 58)

In order to avoid mistaking the upper and lower ends of the cuttings of the stock plants, the lower cut surface which is nearer the roots, may be put into charcoal dust immediately after being cut. This precaution at the same time prevents rot and makes that part which will later on form the roots distinguishable from the upper end which will take the scion. This method of grafting has many advantages and saves the time of rooting cuttings from large stock plants before they are used for grafting. In fact it is preferable to use such fresh cuttings for grafting, which are rooted afterwards, as such stock is strong and thick at the base and can carry the scion without tilting over, if it becomes very large and heavy after some years.

In some cases, e.g. with cristates which are cut into small pieces, a cleft graft or saddle graft will be better. Then needle-like cactus spines may be thrust through the portions, fixing them in the desired position. Slender and weak-stemmed plants like *Aporocactus flagelliformis*, *Cereus tuberosus*, *C. Anisitzii*, etc., are either divided by a longitudinal section from the growing tip down to the base, when both parts are grafted horizontally so that they will grow on by numerous branches; or they are grafted slant-wise so that they grow on with a single growth, which can be cut down later on and induced to form branches. Epiphyllum (*Zygocactus*) and *Rhipsalis* are joined slantwise to the stock, bevelling the scion and the stock plant instead of making the transverse cut described above. The two long-oval cut surfaces are pressed well together and one or two cactus spines are thrust through both parts transversely. If necessary, the scion may be fixed in an upright position on a stick.

Selection and Cultivation of Stocks. Though there seems to be no limit to which the species and genera of cacti will unite, experience has shown that some species are especially well fitted for certain purposes. One grower recommends the use of a stock coming from cool regions for plants from tropical climates. However, no general rule can be given for the selection of a stock plant. Only two points are essential:—

The stock plant shall supply just as much

food as the scion is able to assimilate and it should have the same growing and resting periods as the scion. Only in this case is a continuous sound growth of both portions secured and the scion will keep its characteristic appearance. One exception of this rule is practised with temporary intermediate graftings on a very soft, fleshy stock for the purpose of recovery and recuperation of the scion or in order to secure a very vigorous growth of young seedlings for a limited time. The following list with description of the qualities of several good stocks may be a guide to the selection.

1. Vigorous growing, juicy stocks for temporary intermediate grafts.

Opuntia robusta, *O. ficus indica*, *O. nopalea*, *O. tomentosa*, *O. cylindrica* (the latter cannot stand much moisture together with low temperature in winter) and some other species of *Opuntia* which do not shrivel during the winter and which give a good large cut surface for the scion, are well fitted and induce the most rapid growth of the scion. But they are generally spent in the first year. One branch of *Chamaecereus Silvestrii*, divided into halves and grafted on a strong plant of *Opuntia* produced thirty-five thick new branches in one year. But in the following winter the *Opuntia* was spent, the weight of the enormous head bowed it over and it died. *Opuntias* are sometimes also used for *Rebutias* in order to have these in flower twice a year and for grafting seedlings.

Seedlings of Echinopsis are good temporary stocks for other seedlings, e.g. one small seedling of *Cephalocereus senilis* (Old Man) three months old, grafted on an *Echinopsis* seedling grew to walnut size within one year. They are also suitable for the recovery of larger globular cacti giving a large surface for the union. Sprouting may be restricted by cutting away the areoles together with the spines.

The above species are mainly used as a nursing stock and are not suitable for permanent graftings, except perhaps for species (cristates) of the same genus.

2. Easy growing stocks which keep well.

Trichocereus Spachianus. The most favoured stock of medium sized diameter,

rich in juice, becoming woody only when very old. A stock suited to nearly all species. It easily makes branches at the base which must be removed when they are about $\frac{1}{2}$ in. long. These cuttings are rooted and grown on for propagation. *C. Spachianus* is readily grown from seed and likes a rather nutritious soil. The only disadvantage is that the green colour easily turns blackish-brown, beginning at the areoles. In order to prevent this it is advisable to keep the stock plant always in active growth and to water from time to time with weak liquid cow manure.

Trichocereus macrogonus. A fine bluish coloured species with a very good root-system securing vigorous growth of the scion, resistant to red spider and rot. Recommended for Mammillarias, Echinocerei, *Cereus Silvestrii*, cristates, etc. Sometimes the scion does not unite or only at one side so the rubber rings should be left for a week or so on the fresh graft. The stock plants must be in full growing condition at the time of grafting, otherwise they will be sapless in a few days.

Trichocereus lamprochlorus. A soft, juicy, robust, thick growing, very resistant species. The best stock for delicate soft scions coming from warm regions, like Echinocereus, *Pilocereus Guentheri*, *P. Palmeri*, *P. Sartorianus*, *P. chrysanthus*, *P. Collinsii*, etc. (The perfectly white-haired species of *Pilocereus* and *Cephalocereus* are better grafted on *C. Spachianus*.)

Lemaireocereus (*Pachycereus*) *marginatus*. A good stock for Rebutias and Lobivias and many other species. *Echinocereus Knipelianus* reached three to four times its original size within one year on this stock. The sap contains acid and quickly turns black and very sticky on the fresh cut surface. Therefore the scion should be cut first and a rustproof knife used which does not become tarnished with acid. The branches or shoots must be detached before they grow too large.

Harrisia Jusbertainii. A much favoured slender stock for seedlings and especially for Rebutias and Lobivias, cristates and thin species of *Pilocereus*. Even graftings of Mesembryanthemum (*Lithops*) succeeded on this stock, which is, of course, an interesting curiosity, but of no practical value. *Harrisia Jusbertainii* is not very spiny and can be handled easily. As a stock plant it keeps well for decades. It is easily propagated from cuttings. But even three-year-old branches turn woody at the base, which makes them worthless for short grafts. If, however, the soft growing tip is cut away early in the year and rooted, the woody stem of the mother plant will

branch very freely and numerous young soft cuttings may be detached for further grafting purposes.

Cereus Hassleri. Being of much more slender habit this is especially suitable for grafting seedlings and, as it keeps very well, it may generally be left as the permanent stock. It is of very robust growth and branches freely.

Most species of *Piptanthocereus* Berger (*Cereus lepidotus*, *jamacaru peruvianus*, *alacriportanus* = *paraguayensis*, *Hankeanus*, *stenogonus*, *chalybaeus*, *azureus*, *coerulescens*) which belong to the very quickest growing of the columnar cacti, are good stocks for grafting, especially as seedlings, for grafting other small seedlings. They like a warm, sunny place in summer and can be grown rather cool and dry in winter. The soil should be nutritious but well drained like that for *Opuntias*. All species are easily propagated from seed or cuttings.

Trichocereus Schickendantzii is often used instead of *T. Spachianus* as a rather thick stock.

The following species are best for tall grafts: *Lemaireocereus stellatus*, *Nyctocereus serpentinus*, *Selenicereus hamatus* (*rostratus*), *S. Boeckmannii*, *S. grandiflorus*, *S. McDonaldiae* for grafting *Aporocactus flagelliformis*, *A. flagriformis*, Epiphyllum (*Zygocactus*, the Christmas Cactus), *Rhipsalis*, etc., and *Peireskia aculeata*, *P. discolor* and *Phyllocactus* for grafting Epiphyllum and *Rhipsalis*. Some of these are weak-stemmed and cannot be used for tall grafts unless supported by a stake. Such tall grafts of bushy plants as *A. flagelliformis* or *Zygocactus* branch and bloom very freely and with proper care a very charming plant can be obtained. *Rhipsalis* and others are also very decorative plants for hanging baskets. For this purpose they should first be grafted on a *Peireskia* about 11 to 15 in. high. If the scion has become a fine bushy plant, the stock may be cut back to about 4 in. and rooted again and planted into the hanging basket. The roots form very quickly in summer.

Among other succulents, robust branches of *Stapelia* are occasionally used as stock for *Trichocaulon*, *Hoodia*, *Tavaresia*, etc. The sap of these succulents should be dried somewhat before the portions are united, otherwise the cut surfaces slip apart.

For the successful cultivation of *Rebutias*, which are now coming into great favour owing to their beautiful flowers, it is essential to give them a resting period in winter, when they form the flower-buds. Then they need very little moisture and should be kept at an average

temperature of 40 to 43 degrees F., giving as much light as possible. These dwarf cacti will flourish best when they are grafted. For propagation purposes nurserymen use preferably *Trichocereus Spachianus* or macrogonus as stock-plant which should be rather tall. They induce a vigorous and sound growth, and if the top of the section is cut away, practically all areoles will form new sprouts which soon grow up to large clusters under which the original scion disappears. All these growths can be detached and grafted on the following stock-species which secure besides a healthy growth also a great profusion of blooms: *Cereus Dayamii*, *formosus*, *Peruvianus*, etc. Practically all species of *Trichocereus* coming from cooler climate, also *Tc. pasacana* and *Pachycereus marginatus* as well as the common robust growing *Echinopsis* are suitable stocks for *Rebutias*, whilst *Opuntias* should only be used as temporary nurse-stock.

Cultivation of Stock Plants. Some cactus growers place their plants in damp, close glass houses with bottom heat. This treatment induces a most vigorous growth, but after some months or in our winter the more delicate varieties damp off or are infected by diseases as they are grown too weak. Generally such plants lose their characteristic appearance and colour and the cells are so soft and so saturated with water that infecting germs enter easily, and from there the disease rapidly penetrates the whole plant. Though the species named as stock plants are more robust growing and would stand that treatment, yet their tissues are grown too quickly and have not the necessary firm texture for grafting. On the other hand, if the plants are grown too dry in poor soil the body turns woody and the scion would not receive enough food. A treatment securing quick sound, growth and dark green colour for the plants, a firm texture of the flesh and especially a good strong root system is best. The plants must be grown in as much light as possible and the houses well ventilated during the hot season. Only a week or so before the stock plants are used for grafting, they must be placed in a rather hot, damp, close room in order to have them in active growing condition and full of sap for grafting. Some easy growing varieties of *Opuntia*, *Echinopsis* and *Cereus* may receive in their growing period a weak solution of liquid cow manure in order to strengthen them for their heavy task. But in general cacti should not be given manure.

General Remarks on the Cultivation of Cacti.

The soil should consist of two parts of well
Seventy-four

rotted leaf mould, one part of coarse sand and one smaller part of matured loam mixed with carbonate of lime from old walls and perhaps charcoal dust which prevents rot. *Opuntias*, *Coryphanthas* and most varieties with a thick, turnip-shaped root like more loam in the soil, whilst other species which are more or less covered with white hair or wool generally want more lime. Good drainage should be secured by a layer of crocks or other coarse material at the bottom of the pots. Permanent out-of-door plantings in warmer climates should be placed where the ground slopes sufficiently. Otherwise a perfect drainage must be insured by a system of drainage tiles and abundant addition of gravel and coarse sand to the soil. In order to prevent the roots from drying off, the soil must be kept slightly moist at all times, but it is essential that a thorough drainage prevents constant saturation. When the growing activity is decreased by natural climatic conditions, the water supply must be reduced accordingly, for cacti and other succulent plants cannot stand much moisture in the cold season. In a northern climate cacti should be given a resting period in winter with reduced watering; they should be kept rather cool, but as light as possible and just moist enough to keep the roots alive. If the pots are embedded in moist sand near a window in a cool chamber or even in a light cellar, they will stand the winter very well. Many varieties (*Rebutia*, *Lobivia*, *Echinopsis*, etc.) are preparing their buds in the resting period and will not bloom if they are kept in constant growth in a hot house during the winter.

Early in spring they are best planted out in a hot bed, where they must be shaded at first. Then they will at once start to grow wonderfully and flower profusely. The plants may remain there, well ventilated during the summer and well hardened off in autumn. They should be potted up by August and the pots embedded in the soil so that they are pot-bound in late autumn, when the danger of frost makes it necessary to bring them into the conservatory again.

Altogether the cultivation of cacti is easy, in fact there are few plants which are so tenacious of life, and surely the modern methods of grafting the more difficult varieties among them will greatly help to make this fascinating genus of plants still more popular.

(All rights reserved by Robert Blossfeld, Potsdam, Germany.)

Mammillarias I Have Flowered

By A. Boarder

(Read at the Meeting on April 7th, 1936).

IT is well known amongst Cactus growers that Mammillarias are as a rule plants which have rather small flowers, but among them are a few which stand out from the others by reason of their exceptional size or fine colour. Where the flowers are small they are generally numerous, forming rings around the top of the plant. Some again are scented and most of them are followed by berries. The general colour of the flowers is pink and there are all shades of pink and cerise. Some have very pale brownish green flowers.

What has surprised me in recent years has been the number of Mammillarias which have flowered within two years of sowing the seed, some in fact in one year. The length of the flowering period is practically throughout the year; there has not been a month in the year without a flower on one of my Mammillarias; *M. decipiens* flowers in the winter months and *M. Scheideana* flowered in January and had a fine crop of pink berries in March. Several others flowered in February and about a dozen in March, including *M. ocamponis*, *gracilis*, *Gasseriana*, *bombycina*, *pachytele*, *pilisphina*, *Runyonii*, *cephalophora* and *ancistrohamata*.

The *Dolichothele* group have the largest flowers, all yellow and up to about 2½ inches across; among the *Coryphanthas* one finds grand purple flowers such as *C. grandiflora*.

The Mammillarias are an intriguing family, as, although some of them flower year after year, others will not flower at all. Why this should be I am unable to say, unless it is that the plants have come from different parts of America with somewhat different conditions. In my greenhouse all Mammillarias have the same treatment and are potted in the same mixture, but I am now experimenting with some of those which have not flowered to see what can be done.

I suppose the most outstanding Mammillaria when in flower is *ocamponis*. When seen as a small seedling of about 1½ inches across with several large cerise flowers on long tubes, it is a thing of beauty and it is very free-flowering; I have flowered it three years running and it has increased the number of flowers from five to fifteen or more. Among the very handsome Mammillarias when in flower are the type like *M. bombycina* which

are very showy with their white spines and wool and large red hooks and, when in flower, with their bright pink flowers they look very fine. Most of the Mammillarias which have a thick covering of wool or fine white hairs have bright pink, red or cerise flowers, which make the plants appear to be dotted with rubies.

I have noticed that many Mammillarias flower much more easily from seed raised in this country than if they are imported plants. This may be due to the fact that seedlings have known no other conditions, whereas the conditions in which the imported plants were grown cannot be imitated in this country.

Many freshly imported Mammillarias will flower when they are first imported but often do not repeat this in following years. This appears to uphold the belief that a plant ripens in one year to flower the next, but I cannot subscribe to this view as I have had young seedlings in bud by the end of their first year of growth. I think that to obtain flowers on Mammillarias one must grow them well and not treat them to too arid conditions. The healthiest and quickest growing of my seedlings have been the first to flower and so I would recommend a rather richer compost than some people appear to use. I like a good loam from rotted turves with a liberal addition of anything in the coarse sand line to make the soil more porous. I keep the plants fairly plump all the winter and water fairly freely when I notice that they are growing. I re-potted all my Mammillarias in late January and early February this year and do not find that the re-potting has retarded the flowers. I have a few plants budded now which have not flowered before and so they do not appear to have come to any harm. I do not shade my plants from the sun but I am giving *Coryphantha elephantidens* partial shade this year to try and flower it, as this is a plant I have never flowered. I have had a *M. plumosa* for the past eight years with never a flower (an imported plant) and yet I have a tiny seedling of *M. lasiacantha*, very similar to *plumosa*, which is already budded, although only about half an inch across. I have had several Mammillarias flower when no more than one inch across, which I have raised from seed.

The majority of the *Mammillaria* flowers open only in sunlight and close in the late afternoon; I have not yet found a night opening one. The sun and warmth has a great effect on the buds, for one notices that they do not appear to increase in size for nine or ten days if there is no sun, whereas a day or two of bright sunshine sees a wonderful increase in size and a rapid opening of the flowers. The average length of time that a *Mammillaria* flower lasts is about four to five days, but the berries which follow are in many species very bright and they last a considerable time. I think that April and May are the months when most *Mammillarias* are in flower, at least that is the time when most of my plants are flowering.

The berries which follow vary very much in the different varieties. Many berries do not appear until the following year when they push out suddenly from the place occupied by flowers the year before. Many have large bright red berries like *applanata* and the *centricirrha* types and the berries on *dioica* are a nice shade of pinkish terra-cotta. *M. Schiedeana* has bright pink berries and these showing between the star-like bunches of white hair-like spines make the plant very attractive.

There are still many of my *Mammillarias* which have not flowered and that only makes things much more interesting, as one never knows what the plant has in store. The following are some of the *Mammillarias* that I have flowered:—

M. applanata, pink, large red berry the following year.
M. albicoma, flower white, small, several at a time, small berry.
M. amoena, ring of cerise flowers.
M. angularis, flowers red, average size, berries red.
M. angularis longispina (as above).
M. angularis rufispina (as above).
M. aurihamata, flowers small, yellowish white.
Coryphantha Andreae, large yellow flower, numerous stamens which move when touched.
M. Baumii, flowers larger than average, yellow, scented like lemonade crystals.
M. bocasana, flowers prolific, whitish.
M. bombycina, flowers pretty cerise red.
M. bombycina rosea (as above).
M. Brandegeei, sown 1933, flowered 1935, budded 1936, pink.
M. Blossfeldiana, fine flowers, pink with cerise stripes, above average size.
Bartschella Schumannii, flowers almost white, rather large, red berries.

M. Boedekeriana, sown 1933, small flowers, pale greenish brown.
M. candida, average size, pink.
M. carnea, smallish flowers, pink.
M. castanoides, numerous small flowers followed by persistent coral berries.
M. camptotricha, small, white flowers, scented like lime trees.
M. chionocephala, small carmine flowers.
M. collina, small flowers, bright pink.
M. centricirrha, sown 1932, flowers carmine, rather above average.
M. centricirrha Krameri (as above).
M. centricirrha macracantha (as above).
M. centricirrha Hopperiana, sown 1931, (as above).
M. centricirrha recurva, sown 1928 (as above).
M. centricirrha Payganii (as above).
M. coronaria, sown 1932, flowered 1934, small cerise.
M. centrispina, sown 1932, flowered 1934.
M. cruigera, sown 1932, flowered 1934, bright cerise.
M. caput medusa, sown 1933, budded 1936.
M. Chaffeyi, sown 1933, flowered 1935, small white.
M. cephalophora, sown 1933, flowered 1934, very fine large cerise and pink.
M. decipiens, free flowering in winter, white tinged with pink, scented.
M. dioica, sown 1932, large flowers, white tinged pink, handsome terra-cotta berries.
M. dolichocentra, ring of pink flowers, many berries.
M. durispina, ring of pale flowers.
M. denudata, sown 1933, budded 1936.
M. elegans, bright pink flowers.
M. elongata and varieties, flowers small, colourless, coloured berries.
M. erythrosperma similis, small flowers.
M. falcata, flowers like *M. centricirrha*.
M. fuscata esperanza, small ring around top, pinkish red.
M. Fischeri, flowers rather above average, pink.
M. fertilis, cerise flowers.
M. Fraileana, large flowers like *M. dioica*.
M. gracilis and varieties, flowers small, colourless, small berries.
M. grandidens, cerise flowers, average, red berries.
M. glochidiata, small, pale greenish white flowers.
M. Gabbii, average flowers, large berries.
M. Gates No. 500, flower larger than average, greenish white, pointed petals.
M. Goodridgei, sown 1933, flowered 1935, small, white, numerous.
M. Gasseriana, sown 1933, small, white.

- M. grandiflora*, fine large flower, purple, broad petals.
M. gladiata, sown 1932, flowers average to large, cerise, red berries.
M. Hahniana, flowers small, cerise.
M. Heyderi, sown 1929, flowers pinkish white.
M. Hidalgensis, ring round the top, cerise, followed by berries.
M. jaliscana, sown 1932, flowered 1934, small.
M. Karwinskiana, flowers larger than average, pink.
M. Kunzeana, sown 1929, flowers numerous, whitish.
M. Halei, in bud.
M. Kewensis, rings of flowers round top, cerise, red berries.
M. Lesaunieri, sown 1932, flowered 1934, small pale.
M. longimamma, large yellow flowers, large green berry.
M. longimamma major (as above).
M. longimamma hexacantha (as above).
M. longimamma melaleuca, more reddish than above.
M. uberiformis, yellow, scented like a Hyacinth.
M. lasiacantha, sown 1934, budded 1936.
M. Mainiae, sown 1932, flowered 1934, fine sized, cerise pink, long petals.
M. maschulacantha, medium sized pink flowers.
M. mutabilis, red.
M. mystax, red, in bud.
M. Marchalleanus, small flowers.
M. microhelia, small greenish white.
M. Martinezii, small pink flowers.
M. nigra, sown 1933, flowered 1935, small pink.
M. Ocamponis, sown 1932, flowered 1933, very fine, long tube, cerise.
M. pilispina, rather small, pale flowers.
M. Praelii, small pale pink flowers.
M. procera, small, pale cerise.
M. pachythele, very fine dark cerise, larger than usual.
M. pyrocephala, sown 1932, pink flowers.
M. Pringlei, many small pink flowers.
M. Ochoderenai, in bud.
M. rhodantha pyramidalis, many flowers in rings round the top.
M. pusilla, pale whitish pink, good berries.
M. pusilla albida (as above).
M. pusilla Haitensis (as above).
M. pusilla texensis (as above).
Coryphantha pectinata, large yellow flowers.
M. petrophila, average size.
M. phitauiana, flower larger than average.
Cochemia Poselgeri, in bud.
M. Painteri, sown 1933, flowered in two years, numerous.
M. pygmaea, sown 1933, flowered in one year, small, pale pink.
M. polyedra, sown 1933, flowered in two years, small, pink.
M. Runyonii, fine, large pale pink flower.
M. rhodantha, red flowers, many round the top.
M. rhodantha crassispina (as above).
M. rhodantha Pfeifferii (as above).
M. rhodantha stenocephala (as above).
M. rhodantha sulphurea (as above).
M. rhodantha rubra, pink flowers, numerous.
M. rhodantha fuscata, pink flowers.
Coryphantha radiosa, large yellow flowers; seedlings flowered in three years.
M. retigiana, many small flowers.
M. Saffordii, rather large yellow flowers, lemon-scented.
M. sanguinea, sown 1932, many red flowers.
M. Schelhasei, pink, rather long petals.
M. sphaerica, very large free flowering, one of the best, yellow.
M. Seitziana, sown 1932, red flowers.
M. Scheidiana, small whitish flowers, followed by many pink berries.
M. simplex, small pink flowers.
M. Scrippsiana, sown 1932, flowered 1935, small pale.
M. Sheldonii, sown 1932, large pink cerise, long petals, like *ocamponis* without the long tube.
M. sempervivi, small pink flowers.
M. spinosissima, red flowers, very numerous round the top.
M. spinosissima brunea (as above).
M. solisii, sown 1933, in bud, red.
M. stellaris, small pale pink flowers, fine berries.
M. Schaefferi, sown 1931, flowered 1934, small pink flowers.
M. tetragona, pink, flowers numerous.
M. Trohartii, average sized pale flowers.
Escobaria tuberculosa, pink, rather large.
M. trichacantha, sown 1932, flowered 1934, small flowered.
M. Vaupelii, small pink flowers.
M. Martinezii, small pink flowers.
M. viperina, small pink flowers.
M. Viereckii, sown 1934, flowered in one year, small greenish white flowers.
M. Wildiana, small, brownish white flowers, numerous.
M. Wildiana rosea, slightly pinker.
M. Wildiana cristata, as *Wildiana*.
M. Waltheri, smallish, pale pink flowers.
 Mammillarias which flowered the year after sowing: *M. Scheideana*, *ocamponis*, *dioica*,

Mainiae, pygmeae, Boedekeriana, cephalophora, Hidalgensis, Viereckii.

Mammillarias which flowered two years after sowing: M. coronaria, Wildeana, nigra, Pringlei, centricirrha, centricirrha longispina, gladiata, Lesaunieri, ancistrohamata, Sheldonii, Painteri, jaliscana, pachythele, polyedra, sinistrohamata, trichacantha, Escobaria Chaffeyii.

The Exhibition

THE fourth Annual Exhibition arranged by this Society will be held on June 23rd and 24th, 1936, and it is hoped that everyone will do their best to make it a success. The Schedule has already been circulated, but extra copies can be obtained from the Hon. Secretary; the classes are much the same as in the previous year, only minor alterations having been made with a view to making them more attractive; attention is especially called to Class 12; Mr. Boarder very kindly distributed seed two years ago, the object being to find the different results produced by different growers under varying conditions. Only a few members brought up their results last year, though others had young seedlings but felt they were too small to show; actually the prize winners were not much larger than peas, as this is a slow growing Mammillaria. It is hoped that everyone who had seeds and still has a plantlet (or more) will try to bring them along for comparison; after all, if your plants are not the largest there, some one may be able to tell you how to grow them faster if you want to.

The success of such a Show depends on two things—plenty of exhibits and plenty of visitors to see them. Members who enjoy coming to the Exhibition should endeavour to contribute also, even if they can only bring one or two plants; the organisers are delighted to welcome those people who will enter in a number of classes, but they are no less pleased to welcome members who have not the facilities for bringing a number of heavy pots but will contribute to one class only. Do not be deterred because you are a beginner; you may have “beginner’s luck” and have the prize-winning plants. The Exhibition is a friendly gathering and provides an excellent opportunity for enthusiasts to meet others of like persuasion; the Committee is always glad to make the personal acquaintance of members and to introduce them to others if they wish.

Seventy-eight

Editorial

WITH this number the fourth volume of the *Cactus Journal* comes to its close and it seems an appropriate moment again to thank all those people who have so kindly contributed articles, notes and illustrations; we hope they will continue to do so and that their ranks will be joined by others; the Editor is always glad to receive and pass on anything of interest to Cactus growers.

It is particularly welcome when members will comment on each other’s information; the fact that the Journal only appears quarterly makes the carrying out of a discussion in its pages perhaps rather slow, but it is an excellent way to get different points of view aired.

We are especially grateful to members overseas who will write and tell us how they grow the plants in which we all have a common interest, and the Editor is therefore all the more sorry that a most interesting letter received from New Zealand has gone astray; it appears that the wastepaper-basket must somehow have been mistaken for the appropriate file, anyway it is not available for printing in the Journal as was hoped, which is especially a pity for it told of remarkable success with Cacti, even in a district of winter rains, and the flowering Echinopses described must have been a wonderful sight. We hope this contributor will be forgiving and write again.

It is really most interesting to find what excellent results are obtained under conditions which do not at first sight appear at all ideal; but even here, in our greenhouses, where most of the succulent plants have to be kept, they do not always respond so well to our best efforts for their comfort and occasionally a neglected plant will burst into unexpected flower when hope had been abandoned and care no longer bestowed. Which all goes to show that we have a lot to learn yet. There are so many factors to be considered, water, light, soil, ventilation, and so much gardening is done on the principle of giving a sickly plant entirely different conditions on the chance that it may find it more to its liking, that definite information is hard to obtain. If anyone had the time to carry out a series of experiments in which one factor only was changed at a time, very useful data would probably be arrived at, but unfortunately most of us find both our time and space too restricted and have to be content to assume our conditions are about right if our plants are reasonably healthy.

Euphorbia Articulata

Cactus in South Africa

WHEN at Glasnevin not long ago I noted that the label on this plant indicated its origin was the Galapagos Islands. My plant has now flowered and the flower resembles that of *E. globosa*, but mine has assumed the same characteristic as that of its parent plant at Glasnevin, that of the roots running under the earth and sprouting up at various points. I wonder if any other reader has any plant under the name of *E. globosa* which grows in this manner, or any plant under the name of *E. articulata* which grows like the Glasnevin plant, or in any other way.

A. E. A. DUNSTON.

"Succulent Plants"

A FEW corrections to the English Edition of "Succulent Plants" by H. Jacobsen have been collected together by the author and are available as a typed sheet. If any member would care to have these corrections to add to their copy of the book they can be obtained from the Hon. Secretary; it would be a convenience if an addressed envelope ($\frac{1}{2}$ d. stamp) were enclosed.

Index

It is proposed to issue the Index of Volumes III and IV with the September number of the Journal.

No special arrangements for binding these volumes are being made as, judging by the number of applications received last time, members prefer to make their own arrangements.

Exchange

MR. BOARDER, Marsworth, Mead Way, Ruislip, Middlesex, has a number of seedling Mammillarias that he would like to exchange for other species of the same genus; will anyone interested please communicate with him.



A Trichocereus at Johannesburg

THE picture of a *Trichocereus* in flower has been sent by Mr. E. Read of Johannesburg and shows a plant about three years old flowering in his garden. He says:—"As it goes on growing it should be a magnificent sight when flowering in a few more years," with which everyone will agree.

Lecture

MEMBERS will be glad to learn that it has been found possible to arrange for a visit to this country of Herr Jacobsen, Curator of the Kiel Botanic Gardens and Author of "Succulent Plants," of which the English Edition appeared last year. Herr Jacobsen will give a lecture before the Society on "Succulent Plants," illustrated by lantern slides. This lecture will be held on July 21st at 6 p.m., in the Lecture Room of the Royal Horticultural Society's New Hall. Members are invited to bring friends; tickets of admission for friends can be obtained from the Hon. Secretary if required; Membership Cards of the Cactus Society or Fellowship Tickets of the R.H.S. will admit.

Cactus and Succulent Society of Great Britain

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Mrs. V. Higgins is also Editor of the *Cactus Journal* and all communications should be addressed to her except those referring to advertising matters, which should be sent to BLANDFORD PRESS, 43, Blandford Street, London, W.1.

Members who wish to borrow books from the Library should communicate with Mr. P. V. COLLINGS, St. John, Northumberland Road, New Barnet; postage is paid to the borrower who is responsible for the return postage.

Members who wish to exchange seeds or plants should write to the Exchange Secretary, Mr. A. BOARDER, Marsworth, Meadway, Ruislip, Middlesex.

REMINDER. — Entries for the Cactus Exhibition should reach the Hon. Secretary by June 18th.

Book Review

"BLUEHENDE KAKTEEN UND ANDERE SUKKULENTE PFLANZEN," by Dr. Erich Werderman, published by J. Neumann, Neudamm; 6 parts per annum. Price R.M. 22.80 per annum.

Number 25 of this beautiful work contains an unusual picture of *Opuntia clavarioides* Pfeiffer bearing a large orange flower and several buds; the curious "Nigger Hand," whose round stems end in club-like swellings, is generally grafted on a *Platyopuntia* and very rarely produces flowers. *Rathbunia alamosensis* Br. & R. is a columnar *Cereus* with deep pink flowers, the lovely colour photograph reproduced being of a plant in the Huntingdon Botanic Gardens, California. A new species of *Rebutia*, *R. oculata* Werd. is described and illustrated; the small round plant bears thin white, interlacing spines and the scarlet flowers are paler in the centre; it appears to be a very fine addition to this interesting genus. The fourth illustration is of *Pleiospilos Roodiae* Schwantes, originally discovered some twenty years ago by Dr. Marloth, and the plants illustrated were raised from seed sent by him to the Botanic Garden at Dahlem; it grows well and regularly produces its bright yellow flowers.

Number 26 includes four *Rebutias* and one *Lobivia*; *Rebutia Spegazziniana* Bckbg. is a free flowering type with numerous carmine flowers; *Rebutia aureiflora* Bckbg. which, like the foregoing, comes from the Province of Salta, North Argentina, bears very lovely orange flowers in profusion and appears to be somewhat variable in the arrangement of the spines and in the size and colour of the flowers. *Rebutia dasyphrisa* Werd. and *Rebutia senilis* Bckbg. are reproduced on the same plate; the former is a new species and both are nearly related to the well-known *Rebutia minuscula*, but have more prominent, white spines. *Lobivia Jajoiana* Bckbg. is another Cactus from North Argentina and though there has been some discussion about its correct name, there can be no question about the beauty of the large flowers, varying in colour from wine red to tomato, enhanced by the black throat. This series of colour photographs, admirably reproduced, is of great interest and value to anyone interested in Cacti and other Succulent Plants.



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