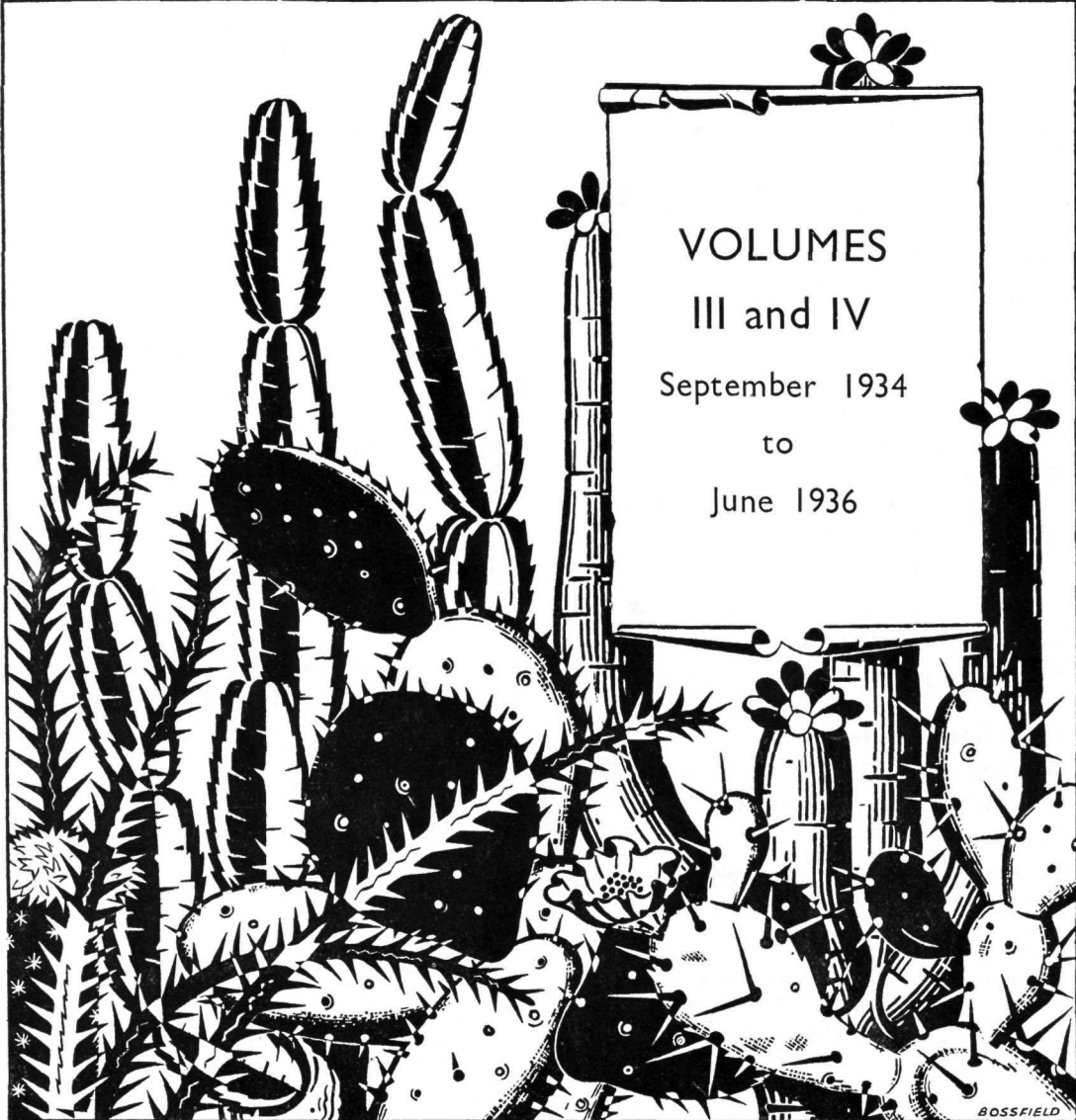


THE CACTUS JOURNAL



*The Cactus Journal is the official organ of the Cactus and Succulent Society of Great Britain.
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THE CACTUS JOURNAL

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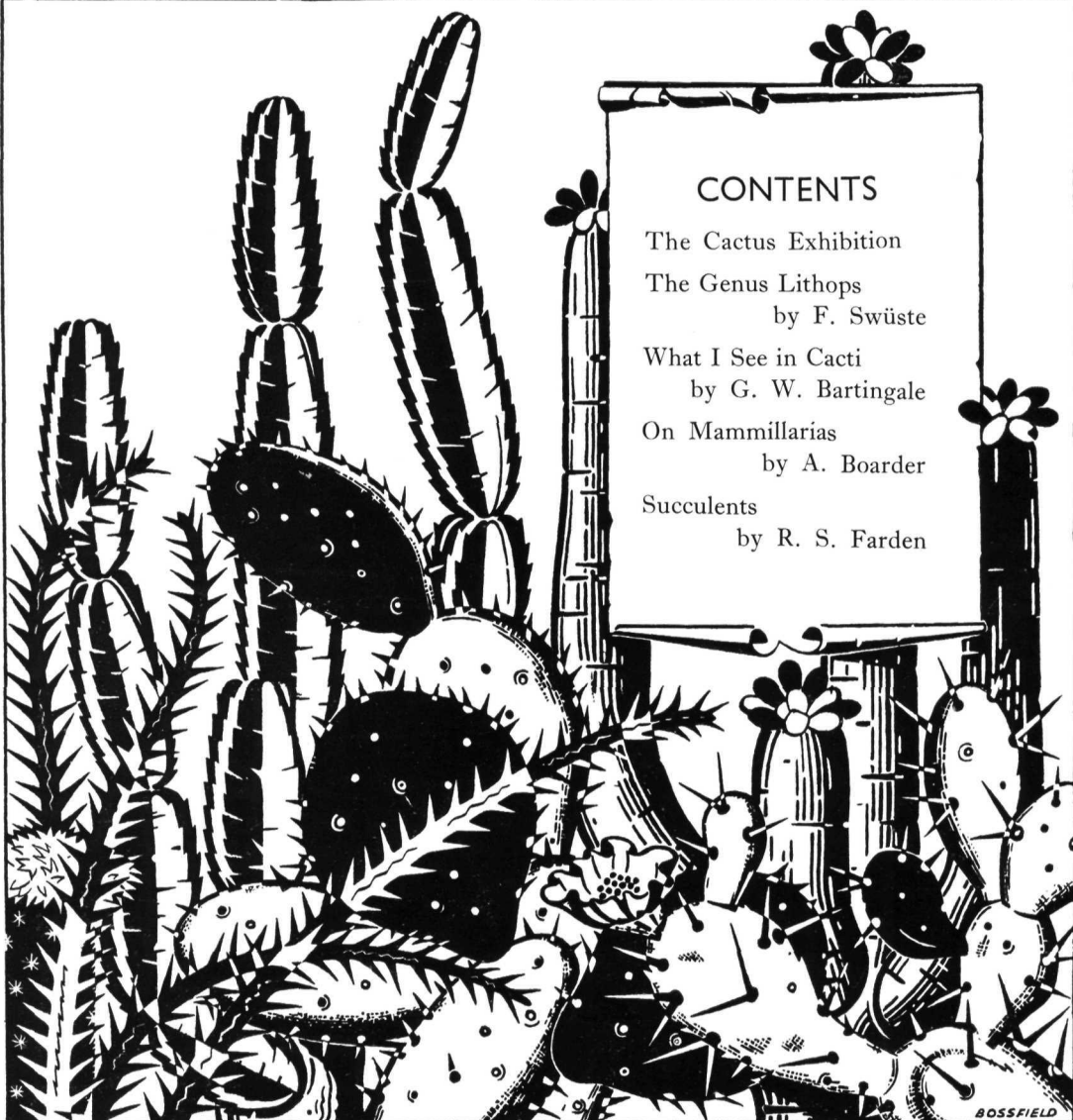
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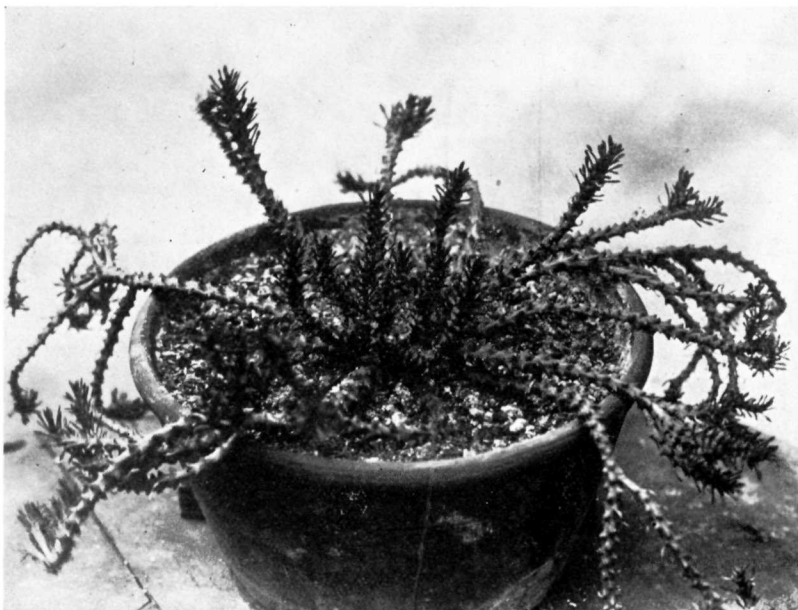
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Euphorbia passa.

Photograph by Dr. Marrable.

The Cactus Exhibition

ON July 24th, the second Exhibition organised by the Society was held in the Royal Horticultural Society's Old Hall. There were rather more entrants in the Competitive Classes than in the previous year and, in the opinion of the judges, the plants exhibited were of a higher standard.

Messrs. W. T. and H. E. Neale put up an even more comprehensive exhibit than on the previous occasion, the arrangement of the plants in groups being in accordance with their botanical affinities. About one fifth of the known species were represented. A large number of new introductions were shown including *Pterocactus pumilis* in flower, a fine example of *Melocactus intortus* with fruit

emerging from the woolly cephalium, a new *Wilcoxia*, *W. senilis* and interesting *Lobivias* and *Mammillarias*. A number of the plants were in bud and would have opened had the day been brighter; unfortunately the thunderstorms at mid-day prevented a good display of expanded flowers. Mr. Neale's exhibit occupied the whole of one side of the Hall and on a central table he showed some interesting succulent plants; *Cotyledon grandiflora* was bearing a spray of flowers from its stout but, at this time of year, leafless stem.

The London Garden Stores had an extensive exhibit which consisted chiefly of young plants, both cacti and other succulents, and

also some suitably planted miniature gardens. They were showing the so-called "cactus pots," decorated with raised ridges, which used to be obtainable only on the Continent but are now made in this country.

The Lindley (R.H.S.) Library put up a most interesting exhibit of some of the classic works on succulent plants; these included Richard Bradley's *History of Succulent Plants*, ed. 2 (1739), the first book entirely devoted to succulents to be published in English; Paul Hermann's *Horti Academici-Batavi, Catalogus* (1690); J. J. Dillenius' *Hortus Elthamensis* (1732); Caspar Commelin's *Horti Medici Amstelædamensis, Plantae Rariores* (1706); A. H. Haworth's *Miscellanea Naturalia* (1803); A. P. De Candolle's *Plantes Grasses*, the very beautiful illustrations being by P. J. Redoute (1799); N. J. Jacquin's *Stapeliarum Descriptiones* (1806); Pfeiffer and Otto's *Abbildung Blühender Cacteen* (1843); *Blühende Kakteen* (1913), and Britton and Rose's *The Cactaceae* (1920), together with various plates from *Curtis's Botanical Magazine*. This exhibit was much appreciated by members of the Society and other visitors to the Exhibition.

Beautiful photographs of cacti in flower were shown by Mr. R. Gorbald; paintings of Cotyledons from Mr. Theobald's collection by Mrs. Stephenson, drawings of cacti and other succulents by Miss W. Cowey, and water colour drawings of cacti by Mrs. Higgins, were also shown.

Two members, Mrs. B. E. Craig and Dr. Marrable, put up non-competitive exhibits of Euphorbias which attracted much attention; both groups contained rare and very interesting plants, in fact it rather looks as if Euphorbias were one of the most popular genera amongst succulent collectors at the moment, for the competitive classes, also included some unusual specimens.

The awards in the competitive classes were as follows:—The Evelyn Theobald Cup for a Group of Cacti (*Class 1*) was awarded to Mr. P. V. Collings, who showed some fine plants which included a large *Echinocactus Grusonii*, *Machaerocereus eruca*, whose semi-prostrate position attracted much comment, tall specimens of *Cephalocereus senilis* with beautiful white hair and a very large *Mammillaria candida var rosea* bearing a wonderful crown of red fruits; 2nd Prize, Mrs. V. Higgins. In *Class 2*, Mr. S. J. Pullen was awarded 1st Prize for 15 Echinocacti. The King Medal went to Mr. J. W. Joyce for 15 well grown Mammillarias. (*Class 3*): 2nd Prize, Mrs. Higgins. In *Class 4*, for

12 cacti, Mr. Collings was first, Mrs. Craig second, and Mrs. Davey third. In *Class 5*, for six cacti, Mr. E. Saville was first and showed amongst other plants *Cereus nycticalis* in flower; 2nd Prize, Dr. Marrable; 3rd Prize, Mr. J. Tyson. Mr. Saville also gained 1st Prize in *Class 6* for three cacti; 2nd Prize, Dr. Marrable; 3rd Prize, Mr. C. D. O'Donoghue. Mr. A. Boarder was awarded 1st Prize in *Class 7* for cacti raised from seed, showing a remarkable collection of plants,



Euphorbia squarrosa. Photo by Dr. Marrable.

many of which bore flowers and fruits, though only two or three years old; 2nd Prize, Dr. Marrable; 3rd Prize, Mr. O'Donoghue. In *Class 8* (four cristates), Mr. A. Emm obtained 1st Prize. Dr. Marrable was awarded the Miniature Garden Cup in *Class 9* for a most attractive garden, planted chiefly with Euphorbia and Mesembryanthemum seedlings; other entries also reached a high standard, but had unfortunately contravened the requirements of the schedule which, this year, stipulated Succulents or Cacti.

The Lawrence Cup for a Group of Succulents (*Class 10*) was won by Mrs. Vera Higgins; the group included *Ibervillea sonorae*, *Agave*

Victoria-Reginae, *Senecio stapelliformis* and *Stapelia mutabilis*, both in flower, and *Anacampseros papyracea*; 2nd Prize, Mr. W. G. Theobald. In Class 11, for 12 succulents, Mr. Theobald gained first prize with examples of his beautiful Cotyledons and Crassulas; 2nd Prize, Mr. Collings. The first prize in Class 12, for six succulents was won by Mrs. Craig, who included *Testudinaria elephanticeps*, *Ceropegia fusca* and a fine *Trichocaulon*; 2nd Prize, Mr. W. Denton; 3rd Prize, Mrs. Davey. In Class 14, for nine Euphorbias, Mr. W. F. Higgins won the 1st Prize, *E. Suzanne*, *valida*, *inermis* and *falsa* being included; 2nd Prize, Mrs. Craig; 3rd Prize, Mr. Denton. Mr. Denton was first in Class 15, for nine Mesembryanthemums;



Pilocercus Trolli.

Shown by Mr. Collings.

he included good *Lithops*, *Frithia pulchra* and a beautiful specimen of *Titanopsis* surrounded by carefully chosen chips, which made it quite difficult for the uninitiated to sort out the plant from the stones. In Class 16, for nine Aloes, Agaves, Haworthias and/or Gasterias, Mrs. Higgins received 1st Prize, showing Haworthias, including *H. truncata*; 2nd Prize, Miss Mackenzie; 3rd Prize, Mr. Theobald. The first prize in Class 17, for nine Sedums or other Crassulaceae, was won by Mrs. Higgins; 2nd Prize, Mr. Theobald. And the first prize for Class 18, six succulents

from seed, was awarded to Mr. Theobald, who showed some very beautiful Cotyledon hybrids. The King Bronze Medal for the highest number of points in Classes 11, 12, 13 and 16 was awarded to Mr. Theobald. There were, unfortunately no entries in the Junior Classes, nor in Class 13 for three succulents.

The Exhibition makes such an excellent opportunity for members to meet each other and to show their own plants as well as to see those grown by others, that it is hoped to make this an annual event and arrangements are already being made for the third Exhibition to be held in July 1934. Members could help considerably if they would send in to the Hon. Secretary any suggestions they may care to make. It would be particularly helpful to know the sort of classes that would be considered most suitable, the number of plants that should be asked for in each, the groups into which the different species should be divided. The Exhibition does depend on the co-operation of everyone and members are especially urged to enter the various classes; it is realised that the transport of large numbers of these plants is by no means easy, but a few plants can be carried by anyone and we shall only get a really crowded hall if everyone does as much as they can. This year's Exhibition may be considered quite as successful as its predecessor, and the organisers would like to thank the many people who so kindly helped in various ways, with a special vote of thanks to the judges. The enthusiasm of members cannot be doubted when special journeys are made from places as distant as Manchester, Derby, Southampton, and even Jersey.

The Rev. F. Champion writes:—"It may be of interest to readers of the Journal to know that I am finding an increasing interest in Cacti in our cottage homes as I go about the parish. I have found quite good specimens of Echinocactus, Phyllocactus, Cereus and even Opuntias. At our local Flower Show last month I staged a small collection of Cacti and as I am Secretary of the Show, and was therefore nearby the exhibit, I was continuously asked questions about them and have now several parishioners who want me to go and tell them if they are giving right treatment to their plants. My own collection has done splendidly and benefited much by this summer's sunshine."

The Genus *Lithops*

By F. Swüste of the Hague, Holland.

(Translated from the Dutch by E. J. Labarre of Amsterdam.)

THE extraordinary success of Mr. Swüste in the cultivation of *Lithops* induced me to ask him to write an article which would give the members of the Cactus and Succulent Society of Great Britain the benefit of his great experience in a field which has proved so full of difficulties for amateurs. The recent restrictions upon the export from S. Africa of plants belonging to the mimicry species has particularly hit those belonging to this genus; it will, however, be seen from this article that the importation of these plants, always a risky and expensive undertaking, is no longer necessary. It is even possible that the scientific methods described by Mr. Swüste will enable the Botanical Society of South Africa to restore some of these interesting plants to their native deserts in large quantities, just as other countries reafforest their denuded timber lands or restock their rivers with fish.

E. J. LABARRE.

I. PROPAGATION BY SEED.

The Seeds.—Among this group of plants we find that the seeds vary considerably in size. Some of these, of *L. van Zijl*i for instance, are as minute as those of *Dinteranthus microspermus*, while those of *L. Fergusonii* are as large as the seeds of the popular cactus *Gymnocalycium denudatum*. Generally speaking, the smaller seeds germinate with greater difficulty than the larger; those of *L. van Zijl*i are notorious for their poor germinating power.

The smallest seeds should be sown with a teaspoon, and if several seeds happen to fall together, they should be separated with a fine brush or forceps. Such seeds should not be covered with soil. The larger seeds are easier to sow as they can easily be seen with the naked eye and may, although this is not absolutely necessary, be lightly covered with soil. If one can afford the time, it is always desirable to press the hilum or scar of the seeds into the soil and to give them a slant, as this is the most favourable position for germination.

Before sowing, the seeds should be washed in order to remove as far as possible, the remains of the funicle or seed stalk. If these fine strings are allowed to remain attached to

the seeds, they may, in a damp soil, give rise to rot, which favours moulds (hyphomycetes). It is also advisable that the seeds should be washed before sowing, because those of many species are frequently infected.

Soil to be used.—If we inspect leaf-mould under the magnifying glass in spring, we shall as a rule see a fairly large number of minute insects, roundish in shape, which immediately jump away on being touched, generally accompanied by another springer, pale coloured and of slender shape. Both kinds destroy our seeds for they feed on them. We must therefore sterilize the soil and we can do this by steaming it (not roasting). A saucepan with damp leaf-mould is placed on a gas burner, the soil being constantly stirred while heating. As soon as the earth is so hot that you cannot touch it with the back of the hand, all living organisms are destroyed. Most bacteria are also killed, the good with the bad. That the good ones are killed does not matter so much, as the soil need only nourish the plants for a very short time. I suggest that this sterilisation should be done about November, as the soil can then be allowed to freeze during the winter.

The soil should always be sifted through as fine a mesh as possible. River sand, a coarse variety of sand, should be mixed with the leaf-mould, one part of sand to two of mould, and should be washed and dried before use. It is possible, however, that a smaller proportion of sand is desirable. Fine or dune sand is useless because it soon closes up the soil. The chief constituent of sand is silica (Si O_2), which probably tends to turn the soil green, particularly if the sand has not been washed.

Sowing should preferably be done in shallow pans of porous material. When the seed has been sown, place the pan in a flat basin and pour into the latter warm water of about 122°F. (50°C.). As soon as the soil is thoroughly saturated right up to the surface, the pan is removed and covered with a sheet of glass. If the direct rays of the sun fall on the glass, it should be shaded with paper, and the drops of water which collect on the inside of the glass should be removed, for if these fall on the soil they encourage the growth of algae. During germination the soil should never be allowed to dry, even for a short time, as the seeds would die. As soon as a portion of them have sprouted, a little

air can be given by sliding the sheet of glass aside. If we look carefully, we shall see that soon after germinating, fine hair-roots appear on the young plants, which serve to convey nourishment to the seedlings during the first few days. These fine roots soon disappear, and the permanent root system begins to develop.

Time of Sowing.—The most suitable time in North West Europe is about the 1st of March, and if a greenhouse (with heat) is available, one may begin as early as February, which gives one about six weeks before the algae begin to appear. I always sow in the living room, placing the seed pans before the window during the day and behind the stove at night.* The temperature therefore varies between 50–68° F.

Many amateur growers are troubled with moulds (hyphomycetes), thread-like fungi of a glassy appearance; as soon as a plant is infected, the shining threads spread to the other plants, the result being invariably fatal. Such a fungus appears within a few hours; the diseased plant and its immediate surroundings should be removed at once, for even apparently healthy plants near the centre of infection are as a rule already infected. The remedy is not to use chemical preparations, which are expensive and bad, but to place the seed pans in the strong sun for a few hours without glass over them, which I have found to be an excellent and radical cure.

I have said that March 1st is a convenient date for sowing, but during the last few years I have always sown at the new moon, that is during the first quarter. At first I thought I had found something new, but later on I learnt that the peasants in South America have for many years sown their corn two days before the new moon, that a certain kind of tree in Central Africa is always felled after the new moon, because the flow of sap is strongest at this period and the resulting timber from these trees is at its best. In Germany favourable results have also been obtained when sowing under these conditions and I do not think I am at fault in this respect.

Pricking off the Seedlings.—The young Lithops I always prick off for the first time as soon as the plants are 18 to 21 days old, and then again a few times during the summer season. No further planting out should be done after the middle of August. The seedlings should always, within certain limits, be placed as near to each other as possible,

* In Holland the stove occasionally stands out 2–3 ft. from the chimney, thus allowing room to place the pans out of the draught.

but naturally should not inconvenience each other. This proximity greatly favours growth owing to mitogenetic radiation of living tissue. The transplanted seedlings should still be kept moderately moist, until the first "pair" of leaves begin to appear, at the same time the cotyledons gradually disappear. The further treatment is then as that for adult Lithops.

Germinating Power.—The seed-capsules of Lithops are ripe, in our latitudes, about the month of May. A few of the early flowering kinds, such as *L. pseudotruncatella*, *L. rugosa* and *L. alpina* ripen a little earlier. A ripe capsule will always be outside the newly formed pair of lobes and not only the capsule but the stalk also, will, when the seed is perfectly ripe, be of a straw-colour. If this is the case we then cut this capsule from the stalk and on examining it see that it consists of several sections, each closed by a lid or cover. These compartments are fitted with a set of hygroscopic frames; if we drop such a capsule into a cup of tepid water, the hygroscopic frames swell, the lids open and there lie the seeds in full view! This is what happens in nature, when it rains and the seed boxes are saturated. Consequently when the stalks are dry and limp, the seed pods are turned earthwards and the seeds fall out on the ground. In order to be thoroughly ripe, Lithops seed should, after being washed and dried, be allowed to lie for at least three months. We could therefore sow about the middle of August, but it is better not to do so because of the approaching winter. Seeds thus treated and sown in the following spring will give a 100 per cent. chance of germination, a figure which is not exaggerated.

II. MENDELISM AND HYBRIDISATION IN THE GENUS LITHOPS.

About the year 1865 Mendel made certain observations and propounded a theory regarding heredity of which we shall give a few examples in connection with the hybridisation of the genus Lithops.

If, as a known example, we cross *Urtica pilulifera*, which we will call A, and *Urtica dodartii* which we will call B, the former having dentate leaves and the latter smooth edges, then we shall see that these parents in the first generation only produce dentate leaves; in other words, although a cross or hybrid, this first generation is entirely A. In the second generation reproductive cells or gametes will produce plants consisting of 25 per cent. A. and 25 per cent. B, and 50 per cent. AB. In the third generation A and B

remain constant, while the descendants of the hybrids AB further "mendelise."

Another example is a red-flowered plant crossed with a white-flowered plant of the same species will, if this is a case of intermediary hybridisation, produce in the first generation a pink hybrid. On subsequent hybridisation of these hybrids we get in the second generation the proportions 1:2:1. Now returning to the first case in which we cross two plants which differ in one peculiarity (unit character) and in which one of these peculiarities is dominant, we shall therefore in the first generation obtain hybrids which resemble one of the parents, viz., those which have the dominant peculiarity of character. It must be observed here that the relation of all characteristics in all plants and animals are by no means always similar to those in the objects which were used by Mendel for his experiments, but it is frequently so and Mendel has by his studies laid a basis for the general laws of heredity.

When hybridising, certain hereditary changes of organisms may occur by way of sports or "saltatory variation" and these changes may sometimes be injurious and sometimes useful. In the first case the organism has no vitality and soon disappears. This occurs in seeds which have lost the power to form chlorophyll. For several years I have experimented with the hybridisation of various species of *Lithops*, knowing that Prof. Kurt Dinter states that in South Africa the *Lithops* do not tend to hybridise. First yellow flowers were fertilised with white flowers. A *Lithops* which has flowered but has not been fertilised always forms a seed capsule, but this does not contain seed. These capsules dry up early in the following spring, whereas those which have seed only ripen much later. The fertilisation of white and yellow flowers also produced empty seed capsules and in some cases the seed envelopes were present but without any contents. The fertilisation of yellow with yellow, or white with white flowers, produced well-filled seed capsules. I found, however, that these seeds were always slightly paler in colour than the true species, almost creamy-white. In all my experiments the seed germinated spontaneously, although the germinating period in most cases was longer than in the case of the true species, but the result was that all seedlings were without chlorophyll, with one or two exceptions. *Lithops terricolor* × *L. Leslei*, for instance, produced 170 plants from 187 seeds, only one of which possessed chlorophyll. This plant is thriving well and

is even apparently of purer colour and marking than *L. terricolor* from which it was produced.

Of course all the characteristics of *L. Leslei*, although invisible, are present. They are "recessive." *Lithops Eberlanzii* and *L. Fulleri* produced 562 seeds, six of which possessed chlorophyll. Of these six plants four had perished before the month of May and the remaining 556 seedlings (all seeds had germinated) were without chlorophyll and died after one month. The plants obtained from *L. Fulleri*, about 500, were all without chlorophyll and there are many similar cases.

Lithops Eberlanzii and *L. Francisci* we consider to be true species. Neither of these plants is at all easy to cultivate and as I have not so far been able to hybridise these two species, I ask myself whether these plants are not themselves hybrids.

It is quite a different thing if two *Lithops* are related to each other, such as *L. Kiubisensis* and *L. Schwantesi*, for the latter is the small edition of the former and they resemble each other very closely, as do also *L. Karasmontana* and *L. Erniana*. Mr. Rusch of Windhoek wrote me some time ago that Mr. Franz Erni had erroneously given the name *L. Erniana* to this plant and that both species were identical, although he wished to wait for it to flower. This year, however, he offers seeds of both *L. Karasmontana* and *L. Erniana*; I have these in cultivation and both are nearly strong enough to flower, but I cannot up to the present moment see any difference.

I crossed *L. floris albis* with *L. bella*. The former is slightly darker and with more embossed ridges, the markings being darker and more striking, while the whole growth is somewhat larger. The natural habitat of these is, however, quite different and according to information received from South Africa they are two quite different plants. The seeds received and sown this year have all germinated and produced plants with chlorophyll and are thriving well. This is probably also the case with *L. pseudotruncatella* and others from which the forms *L. Mundtii*, *L. pulmonuncuta* and *L. pseudotruncatella* var. *farinosa* have grown.

There is something to be said both for and against the cultivation of hybrid forms, but for me a true *Pleiospilos Bolusii* is worth more than one which has assumed the aspect of a *Pleiospilos simulans* or *Punctillaria*, to which a fancy name such as *Pleiospilos Dekenahi* has been given. It is quite possible that *Pl. Dekenahi* has been imported as a true species from South Africa, but nature also hybridises, in fact does so on a large scale.

It may interest some of the members of the Society to know something more about the action of Chlorophyll. The plants absorb carbon dioxide from the air and produce from this, with water under the influence of sunlight, and by means of chlorophyll, starch or carbo-hydrates. Consequently, owing to the action of sunlight upon the chlorophyll granules, the carbo-hydrates present in the green plants are converted into grape-sugar (glucose or dextrose), etc. The green portions of the plant can only assimilate carbon dioxide and liberate oxygen in the light but, like animals, all the organs of higher plants absorb oxygen and give off carbon dioxide both day and night. The carbon dioxide assimilation by means of the chlorophyll depends on the temperature. Its highest value is reached at about 37° C. (or about 98° F.) and ceases at about 45° C. (or about 103° F.). These cardinal points are not always constant with the same plants, but it is also true that in bright warm weather the assimilation has not reached its full value because the supply of carbon dioxide in the air is then not sufficient. Owing to the shortage or absence of iron (Ferric chloride Fe. Cl_2 or Ferric phosphate Fe. SO_4) the plants will not turn green. The chlorophyll for instance will be found in the leaves in quantities of 0.6-1.2 per cent. of their dry weight. The chlorophyll of all plants is identical and consists of a mixture of two allied combinations, of which the chemical formula is somewhat complicated, and also contains magnesium. I mention this magnesium because when this is substituted under the influence of certain substances, a certain product known as altoporyphrine is produced. The same compound is, however, also to be obtained from haemine, which proves the connection between chlorophyll and the colouring matter of the red corpuscles in our blood (Haemoglobin).

III. THE CULTIVATION OF LITHOPS.

Lithops are found in South Africa chiefly in the districts of Damaraland, Great and Little Namaqualand, Griqualand West, the Transvaal and in the Karoo from Lagnsburg to Willowmore, but the centre of origin is probably South-West Africa.

Imported plants can be received in North Western Europe during the whole year. If the plants have been dug out with the roots entire, the further cultivation will present no difficulties, particularly if the roots still carry some of the original soil, mostly clay. If received during the spring or summer they should simply be placed in their definite

mixture of soil and treated as plants which have been in cultivation a long time. If the roots are destroyed or damaged, these should first be removed and the plants then potted in fine sand, kept moderately moist and placed in a warm spot. Good light is imperative. When the plants have rooted, then the water supply is reduced and the plants are treated as normal growths. Transplantation can always take place in the spring and summer. Although, therefore, there is no objection, with a view to further cultivation, to receiving plants at any period of the year, it is on the other hand of great importance that one should only import growths which have properly matured in their native climate and consequently have reached the condition of rest. If we take this into consideration, the most suitable period will be the months of March and April, preferably not earlier in the year because of the risk of frost in transit. If the specimens have several growths these should if possible be kept intact. If we wish to take cuttings this should only be done after the plants have entirely recovered; these cuttings must be taken off the plant as close to the point of junction as possible, as otherwise we run the risk of damaging the point, which lies very low and close to the root. The scar produced by cutting off these growths should first be allowed to dry for a few days and the plant then potted in fine moist sand. Never cut in autumn and winter, for although these plants are at this time in full growth in their native country, it is summer season there, and the propagation by cuttings in winter in Europe would only result in disappointment.

The number of Lithops species known up to the present day is about 50. I can heartily recommend them to any one who has not yet made the acquaintance of these plants, for they are plant forms of such charm and attraction that we are constantly being fascinated by them. One of the first to flower is the well-known *Lithops pseudotruncatella*, and then *L. rugosa* and *L. alpina*. These show their buds about June 20th. The other species flower later, usually in the months of September and November, while *Lithops marmorata* and *L. Vallis-Mariae*, both specimens of five growths each, have not yet flowered in my collection. I should say that in their habitat they probably flower late and that owing to the smaller amount of sun available at that time in North Western Europe, the heat and light are insufficient to produce flowers. A Lithops of flowering strength averages 5 years old, although I have a few species (*L. Herrei*, *L. floris albis*, *L. Kiubisensis*)

which have flowered in their third year. In various works on succulents published on the Continent it is stated that *L. pseudotruncatella* will only flower when the fissure runs right across the growth; this is an error, for these plants also flower in their younger stages, before the fissure has extended right across.

Although all species of *Lithops* require the same treatment, some are stronger than others. As a rule it may be said that the pale coloured ones are more sensitive than the darker ones, although there are exceptions to this. *Lithops Eberlanzii* and *L. Fransisci* are somewhat difficult. *L. bella* and *L. Leslei* are strong plants, which are fond of water during the summer. The period of watering should be regulated as follows: the old pair of leaves should be entirely consumed or absorbed by the new growth, that is, the young pair of leaves should grow at the expense of the old until the latter is reduced to thin dry skin. Then give plenty of water, but not before, because before this time there are no capillary roots and the plant cannot absorb water. It is not natural for a *Lithops* to have more than its single pair of leaves at the same time. Here in Europe this question has not been given enough attention; one need not fear that a *Lithops* will dry up or die off under this treatment. In South Africa, where the sunlight is far more intensive than in Europe and where during the dry period, which usually lasts for eight months and sometimes for twenty months, not a single drop of rain falls, these plants thrive very well. We must also give the plants this dry treatment in order to avoid degeneration during the growing period in the summer, in fact during the whole year we must admit as much sunlight as possible, in which case during the growing period we need not be too chary with water. The water should penetrate readily through the soil and not be retained in the pot. From October 16 to the first of March we place the *Lithops* in a cool and dry position without a single drop of water, and during this time cool and fresh air is essential for their health and strength.

The epidermis or outer skin is, under cultivation in the moist climate of Europe, much softer than in their native habitat. There *Lithops* grow concealed in the soil and only the flat tops of the growths are visible, a condition which serves to prevent evaporation. In Europe the plants should not be placed in the soil deeper than the line between the root and the growth; in their natural state the skins of the old leaves remain fixed at this point and thus protect the growth

against evaporation. Under cultivation here, however, the old skins should be removed *if they are entirely dried up*, for they would only absorb moisture from the air and give rise to rot in the new growth. In their native soil it does not matter if a shower of rain passes over the plants, but here we take care that the growths should not be touched with water and, above all, that water is not allowed to remain in the fissure. It should be remembered that the neck or mark between the root and growth is the most sensitive part of these plants.

Lithops can be placed outside during the summer, under a pane of glass for instance, as this will make the skin stronger and more resistant, but the flower will be delayed or may not appear at all. The best place to keep them is in the greenhouse, not too close to horizontal or oblique panes, for a *Lithops* can also be burnt, but otherwise they should be given as much fresh air and sun as possible.

A rot disease will easily appear at the neck, particularly in seedlings of one or two years old, but also in some of the older plants. The nature of this disease, which is probably an infection of the respiratory organs, has not yet been determined, nor the remedy found. Of late years, however, I have obtained much better results; the average mixture of soil used is $\frac{1}{2}$ — $\frac{1}{3}$ of coarse sand and the remainder loam with a little clay and old mortar rubble. Instead of this old mortar rubble, lime marl or chalk or even crushed marble may be used, the latter being one of the fairly pure forms of carbonated lime (Ca CO_3). To this may be added a little fertiliser, not too much, only a teaspoonful in a 4 in. pot. One should preferably not give any nitrogenous fertiliser at all. For the rest, one may well omit any addition of fertiliser if the soil mixture is good enough. The addition of lime is always necessary but should not be overdone and the soil should not look white. Lime prevents the soil from becoming sour and the absence of lime may produce toxic symptoms. *L. pseudotruncatella* and *L. bella* both grow on non-calcareous soil in their native habitat; they have not a salt taste and are eaten by the children who find them. The other *Lithops* are also edible.

After I had suffered for some time from the loss of *Lithops* seedlings owing to this rot disease, I transferred the seedlings to a red clay soil instead of the grey alluvial clay. The red clay is formed by the presence of ferric oxide and any kind of red clay may be used. The clay should be tested for lime by dropping a few drops of hydrochloric acid or

spirits of salts on it. If the soil effervesces, lime is present, and if not, lime must be added. We should then add $\frac{1}{2}$ to $\frac{1}{3}$ of coarse sand and fertiliser or not, as stated above.

Most of my friends who are also amateur growers of succulents find the watering of these plants difficult because the moist clay splits up after it has dried. This difficulty will easily be avoided if, at some distance from the plant itself, holes are bored in the soil right down to the bottom of the pan, and the amount of water required is poured into these holes. The surface of the soil will then not crack and the plant above ground will remain dry. The results are amazing; no more rot, the plants are much stronger and their flowering is much increased, nor is it necessary to water so much because the clay retains the moisture longer than the loam.

Some species of *Lithops* will in the course of years form large groups such as, for instance, *L. Fransisci*, *L. Vallis-Mariae*, *L. olivacea*, etc. Others, like *L. alpina*, rarely form more than two growths. The normal increase takes place by doubling, that is to say, two fresh pairs of leaves or two new growths appear from one old growth, though in many cases new shoots grow from the base, as I have observed in *L. Fulleri* and *L. Herrei*. In the last mentioned species it may be said that vegetative propagation may take place in two different ways in the same plant.

In conclusion I may say that only yellow and white flowers are known in the genus *Lithops*.

Seedlings or Imported Plants

IT seems that we shall have to rely on seedling cacti much more than has hitherto been the case. The exportation of plants is becoming more difficult; the United States have prohibited the removal of cacti within certain distances of roads and may have prohibited the removal of some species altogether. Mexico has prohibited the exportation of some species altogether and also of some seeds. The list at present is:—*Thelocactus bicolor-tricolor*, *Thelocactus bicolor-bolansis*, *Ariocarpus fissuratus*, *Echinocactus horizonthalonius*, *Echinocereus rigidissimus*, *Lophophora Williamsii*, *Mammillaria Grahamii*, *M. Leona* and *Epithelantha micro-*

meris. But all these grow over the border in the United States and so are still available from there. But there are also on the list, others which seem to be inhabitants of Mexico only:—*Ariocarpus Kotschubeyanus*, *Ariocarpus retusus*, *Ariocarpus trigonus*, *Astrophytum capricornus*, *Astrophytum myriostigma*, *Cephalocereus senilis*, *Neolloydia Beguinii*, *Echinocactus Grusonii*, *Thelocactus heterochromus*, *Echinocereus conglomeratus*, *E. De Laetii*, *E. pectinatus*, *Solisia pectinata*, *Leuchtenbergia principis*, *Mammillaria candida*, *M. chionocephala*, *M. difficilis*, *M. elegans*, *M. lenta*, *M. Parkinsonii*, *M. rhodantha*, *Coryphantha Poselgeriana*, *Obregonia Denegrii*, *Grusonia Bradtiana*, *Pachycereus chrysomallus*, *Opuntia microdasys*, *Pelecyphora asseliformis*. Exportation is restricted to May, June and July, and the collectors and dealers have to obtain a permit at a fairly high figure before offering them for sale. A further difficulty is that, in that period, very many of the areas are unapproachable through the rains. It is advocated that seedlings are preferable in collections because the colours of the plants are much finer and remain so, than in imported specimens. In the desert the colours are wonderful, but when transplanted they become dull and displeasing.

Again, seedlings acclimatise themselves from the beginning, while imported plants find it difficult to take to the new conditions and a fair proportion do not survive. Some too are not a good shape or are deformed, whereas the seedlings are always regular.

South Africa has prohibited the exportation of *Euphorbia obesa* and *meloformis*. Of *E. obesa*, one plant was at Kew some 25 years ago but mysteriously disappeared, then no others were imported until the S. African Exhibit at Wembley; from then on they have been coming in fairly freely, but now that is finished. The South African Government has prohibited the export of the following plants, and also prohibits the growing of them for sale. The list does not seem long enough if prohibition is essential and in many cases unnecessary:—*Argeta petrensis*, *Argyroderma*, *Dinteranthus*, *Gibbaeum*, *Lapidaria*, *Lithops* (all species), *Cheirodopsis peculiaris*, *Didymaotus lapidiformis*, *Imitaria Muirii*, *Muiria hortenseae*, *Pleiospilus Bolusii*, *P. Nelii*, *P. simulans*, *Rimaria* (all species), *Aloe variegata*, *Haworthia Maughanii*, *Haworthia truncata*, *Euphorbia fasciculata*, *E. horrida*, *E. infausta*, *E. obesa*, *E. meloformis*. *Haworthia truncata* and *Maughanii* have only just been discovered, and although *Euphorbia meloformis* is on the list, its cousins *E. valida* and *E. falsa* are not.

R. S. FARDEN.

Dr. N. L. Britton

THE announcement of the death of Dr. Nathaniel Lord Britton on June 25th, at the age of 75, will be received with great regret by all botanists and horticulturists and especially by those interested in cacti. He was born in 1859 at New Dorp, Staten Island, and educated at Columbia University, where he took his degree; for the first nine years of his professional life he was working on geology but was always interested in botanical matters; in 1887 he was appointed Instructor in Botany and in 1890 became Professor of Botany at Columbia University.



In 1896 he became Director-in-Chief of the New York Botanical Gardens, a post which he held until his retirement in 1929; the one hundred and fifty acres of which he originally took charge were in a somewhat neglected condition, but during his tenure the Garden was increased to four hundred acres, and the Library and Herbarium also increased enormously under his energetic supervision.

Dr. Britton published various floras and other papers of botanical interest, but his most important work was *The Cactaceae*, in which he had the collaboration of the late Dr. J. N. Rose, of Washington. This monograph, published under the auspices of the Carnegie Institute, is one of the most important contributions to the subject that has been

made; the known genera and species of this large family were completely revised and the resulting classification has been of the greatest assistance in clearing up many doubtful points and putting the whole subject on a more scientific basis. Throughout his work, Dr. Britton had the assistance of his wife, who died earlier in the year; she was also a keen botanist, with a special interest in and knowledge of the Mosses.

We are indebted to the kindness of the New York Botanical Garden for the photograph of Dr. Britton, who was very infrequently photographed, the present picture having been taken in 1902.

The Genus *Mossia*, N.E.Br.

MOSSIA is a genus of the Mesembryanthemum group that has hitherto been monotypic, but last year a second species was discovered, and, as an error was made in the original generic description, I here revise that description and describe both species, which consist of small plants with prostrate stems, rooting at the nodes and forming matted clumps, in habit more nearly resembling *Drosanthemum* (*Mesembryanthemum*) *candens* than any other known to me. Generically it seems to be more nearly allied to *Rhinephyllum* than to any other, but differs in habit, and by its stamens being erect (not inflexed at the base) and beardless, and by its subulate or filiform (not plumose) stigmas. The following are its revised characters.

MOSSIA, N.E.Br.

Perennial, prostrate, succulent herbs, with distinct internodes to the main stems, which root at the nodes. Leaves opposite, united at the base, distinct on the main stems, crowded into tufts or masses on the very short axillary branchlets, and with a rough surface from being covered with prominent dots. Flowers terminal, solitary, sessile or subsessile. Calyx subequally 5-lobed, with the ovary-part campanulately obconic. Petals free, in about two series, arising at the base of the calyx-lobes and not or but slightly longer than the latter, linear. Stamens numerous,

erect around the stigmas, the filaments neither being inflexed nor bearded at the base. Glands forming a crenulated cup or 5 and large. Stigmas 5, erect, subulate or filiform; style none. Ovary inferior, concave or flat at the top, 5-celled; placentas on the floor of the cells. Capsule small, very shortly and broadly obconic, flattish at the top, with the sutures scarcely or but slightly prominent, and with 5 valves and cells; valves closing after expansion, their expanding keels contiguous or parallel to the tips of the valve as a stout central keel, with membranous marginal wings, (in the original description the keels are described as wingless; this is an error for which I cannot account, because in my original MS. description they are stated to be winged); cells open, with rudimentary cell-wings. Seeds smooth.—N.E.Br. in *Gard. Chron.* 1930, v. 87, pp. 71 and 151.

Species 2, natives of the Transvaal and Orange Free State.

The name was given to commemorate Professor C. E. Moss, one of the foremost of South African botanists, who unfortunately died before he could complete the vast work he had planned to do.

KEY TO THE SPECIES

Leaves $2\frac{1}{2}$ –3 lines broad and $1\frac{1}{2}$ –2 lines thick; petals 2–3 lines long, nearly white or creamy; stigmas 1 line long; top of ovary very concave. 1. *intervallaris*.

Leaves $1\frac{1}{4}$ –2 lines broad and $\frac{3}{4}$ –1 line thick; petals $1\frac{1}{2}$ –2 lines long, bright golden yellow; stigmas 2 lines long; top of ovary flattish. 2. *Verdoorniae*.

1. *M. intervallaris*, N.E.Br. in *Gard. Chron.* 1930, v. 87, p. 151. Plant glabrous, forming small matted clumps with prostrate stems $\frac{3}{4}$ –1 line thick, rooting at the nodes. Leaves on the short axillary branchlets 3–5 lines long, $2\frac{1}{2}$ –3 lines broad and $1\frac{1}{2}$ –2 lines thick, trigonous-ovate, subacute, narrowed to the base from about the middle, flat on the face, keeled on the back, often with 1–2 obscure blunt teeth or slight angles on the edges and keel near the apex, and covered with slightly prominent dots; all on the branchlet crowded into small oblong tufts 5–9 lines long. Calyxlobes $2\frac{1}{2}$ lines long, $1\frac{1}{4}$ – $1\frac{1}{2}$ lines broad, oblong, obtuse, the two outer with a compressed keel at the apex. Corolla expanding at night about 9.30 p.m. (ex Moss); outer petals 2–3 lines long and $\frac{1}{4}$ – $\frac{1}{3}$ line broad, the inner smaller, obtuse or subacute, almost white (ex Moss). Stamens $1\frac{1}{2}$ line long, whitish. Glandular top of the ovary concave and about $\frac{3}{4}$ line deep. Stigmas 1 line long. Capsule about

2 lines in diameter, obconic, flat on top, entirely dull brownish or honey-coloured within; expanding keels with narrow, membranous, marginal wings. Otherwise as for the genus.—*Mesembryanthemum intervallaris*, L. Bolus in *Ann. Bol. Herb.* v. 4, p. 81.

Transvaal: near Johannesburg, Moss 13870! 17274! near Alberton, Wood! near Lake Chrissie, *Blenkiron* in *Herb. Moss* 16565! Herschell Division: Sterkspruit, *Hepburn*!

Described from material preserved in formalin received from Prof. Moss.

2. *M. Verdoorniae*, N.E.Br.—Plant glabrous forming small matted clumps $\frac{1}{2}$ – $\frac{3}{4}$ inch high, and like *M. intervallaris* in habit and general appearance. Leaves $2\frac{1}{2}$ –4 lines long, $1\frac{1}{4}$ –2 lines broad and $\frac{3}{4}$ –1 line thick, oblong to ovate in general outline, flat on the face and with or without a small tooth near the apex on one or both edges, obtusely keeled or very convex on the back, obtuse at the apex; surface rough from being covered with prominent dots, glaucous-green, arranged in 2–5 pairs to each growth or branchlet, crowded, ascending-spreading, forming small compact masses. Flowers subsessile, when in fruit with pedicels about 1 line long. Calyx subequally 5-lobed, with a rough surface like the leaves; lobes $1\frac{3}{4}$ –2 lines long, about 1 line broad, oblong to deltoid-ovate, rounded or very obtusely keeled on the back; obtuse or subacute, some with membranous margins. Corolla about 5–5 $\frac{1}{2}$ lines in diameter expanding in the afternoon; petals in two series, the outer about 2 lines long and $\frac{1}{2}$ line broad, the inner shorter, linear, obtuse, bright golden yellow on both sides (ex Verdoorn). Stamens $1\frac{1}{2}$ – $1\frac{3}{4}$ lines long, filaments and anthers whitish. Glands 5, large. Stigmas 5, erect, 2 lines long, filiform, just exceeding the stamens, whitish. Top of the ovary flattish. Capsule $2\frac{1}{2}$ lines in diameter, flattish with slightly raised sutures on top, expanding. Keels pallid or dull ochreous, with broad, obtuse marginal wings, otherwise as for the genus.

Orange Free State: near Fauresmith, *Verdoorn* 1192!

Described partly from a living plant and partly from specimens preserved in fluid, kindly sent to me by Miss I. C. Verdoorn.

N. E. BROWN.

At the Royal Horticultural Society's Amateur Show, held on June 19th, Mr. P. V. Collings was awarded the Sherman Hoyt Trophy for a Group of Cacti.

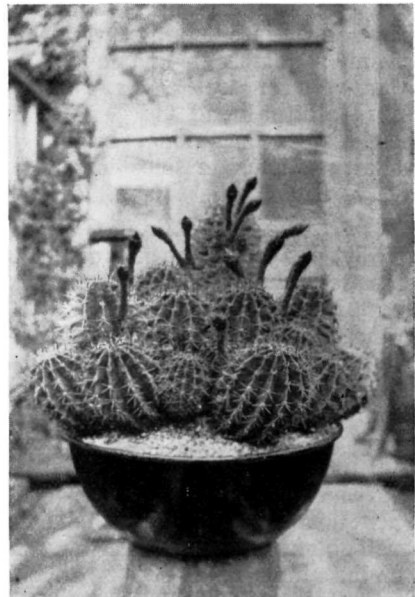
Editorial

WITH this issue the CACTUS JOURNAL begins its third volume; and we should like to take this opportunity of thanking all those who have contributed to its pages and of hoping that they will continue to do so and will be joined by other members and friends who have useful information to communicate.

Two articles in this number refer to hybridisation; the subject is one of great interest and experimental gardeners may well be tempted to try their hand at producing new forms. Horticulture generally has made enormous strides of late years, though the history of many of our garden plants go back so far that all trace of their origin is lost. The first hybrid corn may have been produced naturally as the result of the growing, by some primitive tribe, of species in proximity which otherwise would have grown too far apart for a cross to be possible; but some form of artificial fertilisation was probably practised in quite early times—though with little understanding of what was being accomplished. The methods of horticulturists have been for the most part empirical, though the age of scientific hybridisation initiated in the last century has resulted in a great increase of forms; most of the plants grown in our gardens nowadays are the result of improvements of the wild material made intentionally or otherwise by growers. One may ask if it is not almost time to call a halt to this spate of new forms; the urge to produce the largest and brightest flower possible has led in many cases to loss of other factors, scent and gracefulness being sacrificed, and gardeners are beginning to feel that this ability to make new varieties should be curbed so that only real “improvements” are achieved and not merely size for the sake of size.

Cactus growers have not on the whole indulged in hybridisation to any great extent. *Echinopsis* and *Phyllocactus* are the two genera that have been chiefly worked on and some very fine forms have been produced. It is doubtful, however, whether the crossing of species which are largely grown on account of their unusual form, a direct outcome of unusual conditions in nature, is an advantage, especially as the botanical relationships of the true species are of great interest to many collectors. But very useful investigations may be carried out by collecting and growing seed from plants whose origin is doubtful. Man is not alone in his love of crossing species; where closely allied species grow

near each other natural hybrids may easily occur. If these are imported as true species, the botanist may find on investigation that there are several forms which, though agreeing in many characteristics, are nevertheless distinguishable. If seed is collected and sown and the number and proportion of the resulting types noted, it should be possible to detect a hybrid and find what species have given rise to it. It is always worth while, if time and space are available, to collect any seed found on imported plants; it should be carefully labelled and the harvest from each plant kept distinct and sown separately; if the resulting offspring resemble the parent in every way, then it is a true species, but if there are definite variations in the offspring the probability is that the plant imported was a natural hybrid. This type of investigation reverses the usual order in horticulture, but for growers of succulent plants it offers very interesting possibilities.



This plant of *Echinopsis Eyriesii* var. in the collection of Mr. Thomas Sharp of Westbury has twenty-four heads and is four and a half feet in circumference; this year it bore thirteen of its beautiful flowers, here seen in the bud stage.

What I See in Cacti and Other Succulent Plants

By G. W. Bartingale

(Read at the meeting on June 12th.)

WHEN, in a glorious burst of optimism, I was requested to write these few remarks, the advice of George Bernard Shaw, "Never to resist temptation!" evidently had not fallen upon entirely deaf ears; for here I am, and here you are, and we are all for it. I have burnt my boats behind me, and I fear you will frequently notice that I am struggling in whirlpools of uncertainty and contradiction, in waters very much beyond my depth. However, enough of apology for now; let it be sufficient for me to explain that I have been given to understand that several members are rather curious to learn why I, in my position, should be interested in our favourite members of the plant world? I will therefore do my best to tell you, although I feel certain at the outset that I have set myself a well-nigh impossible task.

I think that cultivators of plants may safely be classified into two quite distinct classes, namely, those who look upon plants as attractive forms of furniture, calculated to please the eye of the casual visitor or passer-by; and secondly, those who try to grow plants because they like them and find them very interesting companions. I do not hesitate to place myself in this latter class, to which I am sure every member of this Society belongs. You will therefore see that my reason and your reason for collecting succulent plants are, broadly speaking, identical.

From my early childhood I have always been interested in natural history, deriving great pleasure from my visits to the Natural History Museum at South Kensington when quite small; you must understand that until my ninth year I possessed a little sight. I still fortunately retain the memory of colours and can always, when I desire, visualize any shade or combination of colours, which you will agree is rather useful. I can recall at this present moment of writing a massive yellow sunflower which I always had to pause and drink in, on my way to school. As a boy, I always claimed my own little garden, in which I tried to grow such plants that were not required in the flower-garden, either because of their weedy appearance or because there happened to be more seedlings than

could safely be squeezed into a limited space. How well I remember that little plot, with a Columbine nestling in the arms of a black currant bush that never bore fruit.

At the age of fourteen (not being of the gentler sex, I can admit that was twenty years ago) I came to possess my first Cacti quite by accident. I was given an *Echinopsis*, an *Opuntia* and a *Gasteria*. How marvellous it seems to me that these plants are still with me, for if you only knew or had seen the remarkable treatment these plants underwent you would groan in your sleep. Not being as fortunate as Mr. Boarder in having at my disposal an aquarium, I was unable to give them aquatic treatment, but really, they had some wonderful experiences, and should now be quite immune to fastidiousness. I probably watered them at regular intervals throughout the whole year, during the summer they basked upon the window ledge and during the "resting season" they reposed on the top of a cupboard. The *Echinopsis* has now become quite cylindrical, most of its lower part resembling the trunk of an oak; whilst the top still proudly produces offsets but never a flower! The *Gasteria* bears two flowers at the moment, but the *Opuntia* is a wreck, hopelessly beyond description; if only I could steel myself to throw it away!—I fear it is immortal.

I did not become Cactus-conscious until nearly another ten years had passed; and then, quite by accident I discovered Watson's book *Cactus Culture for Amateurs*. Upon having some of this book read to me, my imagination was fired; and I feel sure that no gold-miner, upon striking a rich claim, ever felt more elated. The glowing descriptions of plants, such as *Echinopsis Eyriesii* and *Cereus speciosissimus* made me determined to try and know these plants as first-hand acquaintances.

And now followed this difficulty. Nobody seemed to possess such plants. I hunted every florist's shop I could discover, and obtained a few plants, mostly small succulents. Then came the advertisement in a gardening weekly of a man who held an agency for De Laet. The last line of this advertisement seemed like manna from heaven, for it ran—"A thousand plants in stock." Never shall

I forget the few months that followed. I ordered a small greenhouse and obtained plants at random; anything that came my way in the nature of a succulent plant was enlisted in the mad rush to get a house filled to overflowing. And what fearful results! It was fortunate that the dust-bin was quite close to the greenhouse, for it saved me many walks. I kept my plants "warm" by means of a hot-water apparatus, heated by gas. I kept the temperature as high as I possibly could; the growing of pineapples I feel certain would have been far more successful. Every evening throughout the summer I watered my plants, holding them well below the water, with results I leave you to imagine. I also added to my weapons a beautiful syringe, which I delighted in using at every available opportunity. When I think of those fine plants I literally destroyed, I cannot help consoling myself with the thought that it was "Far better to have loved and lost, than never to have known them."

How well I remember the arrival of my first real consignment, which consisted of about thirty small plants: about a third of them are still with me. I was advised to grow these plants in a mixture of fibrous loam, two parts; leaf mould, two parts; peat, one part; and silver sand, one part, the whole of which was to be passed through a fine sieve. You will therefore quite realise what labour this entailed, when I tell you that this little consignment kept me busy until nearly midnight, before I succeeded in cramming them into the smallest pots possible. I have tried many experiments with different soils within the last few years and have found the following plan the most successful:—I grow all my Cacti, with the exception of *Phyllocacti*, *Epiphyllums*, *Rhipsalis* and the more robust *Opuntias*, in burnt clay. The more slowly the plant is reputed to grow normally, the coarser do I use my clay. As an illustration, I grow *Echinocactus Grusonii* in pieces as big as lump-sugar and find it is making good growth. Plants of the genus *Cereus*, and other less bulky plants I find do better in a denser medium. It is surprising how easily one may over-water a plant potted in clay, for it is rather difficult to ascertain when the soil has dried out. However, when I am uncertain, I generally wait until the following day before applying water by plunging. The epiphytes seem to appreciate a more generous supply of humus, whilst the *Opuntias* are not as a rule very particular.

Turning to succulent plants that are not cacti, I find that the *Crassulaceae* will

grow in any good open soil provided that good drainage is present. In fact, all succulents seem to thrive when given light and air with not too much moisture. However, I have found that the roots of *Haworthias* do not deteriorate during the winter if grown in a mixture of burnt clay and sand. When so potted, they may be given a little water during the dull months, if necessary, without doing any damage. Quite by accident I have found that my *Gasterias* will grow and fatten in sand alone. This sand is of a very fine nature, containing, I believe, a considerable quantity of chalk. I find this soft sand locally, for in St. Paul's Cray—the district from which I come—and the adjoining neighbourhoods, there is a considerable quantity on the chalk hills. This sand, being soft, allows the soft roots to swell and increase without interruption.

I am afraid my friends often shudder when they see me handling *Opuntias*, but really I would much rather re-pot one of these plants—when I think such a luxury is necessary—than pick a pint of gooseberries. Sometimes, however, when examining a plant like *Opuntia Engelmanni*, I am unfortunate enough to make the acquaintance of those little bunches of sociable spines that detach themselves and will not be shaken off. When this happens I generally dip my hand into a bucket of water, which seems to soften the spines, enabling me to wipe them off easily. I think this rather goes to show that spines absorb moisture in considerable quantities. In a comparatively dry atmosphere they are always sharper; this must mean that they have become thinner, I take it, the result of evaporation.

Probably by this time, some of you are consulting your watches and wondering when I am going to tell you what I see in my plants. Before I attempt this, however, there are just one or two incidents I think might interest you. I was once taken into a greenhouse containing a miscellaneous collection of plants—*pelargoniums*, *fuchsias*, *hyacinths*, etc.; in fact the average cool greenhouse, well filled. To my amazement, I encountered a large pot beautifully draped with *Cereus flagelliformis*; whilst growing in the same pot I discovered a fairly large fern. Both plants seemed to be equally happy, and I was told in quite a casual way that the cactus looked very pretty when it was in flower. I am afraid I look upon my plant too much as a cactus, for I have little success with it. One so often hears that this plant does very well in windows; does this point to the fact that it needs overhead shading?

One evening whilst some friends and I were sheltering from the rain in an old inn on the Kent-Surrey border, one of my friends to my great surprise, placed my hand on a fine *Epiphyllum* growing happily in the window. The landlord, overhearing me reply to my friend's question, that it was an *Epiphyllum*, kindly but firmly corrected me with: "No! not quite right; that is a cactus!" Upon my asking him whether it flowered, he once again patiently informed me that it was a cactus. Whenever I meet such isolated plants, I always feel tempted to go beyond the bounds of good taste and try and discover how they came to be there. This inquisitive spirit once placed me in a very uncomfortable position; I really think I must relate the incident. I once ordered from Mr. Cooper, among other plants, *Echinocactus setispinus longihamatus*. Upon unpacking this plant (it was a fine specimen) I was suddenly seized with a strong desire to smell it. Well, as you doubtless know, this plant carries long slender, flexible spines, about four inches in length, terminating in sharp hooks. All went well until I attempted to withdraw my face, when I was immediately angled by one of these little hooks passing through the skin of my nose. Just try to imagine my position! Whilst I was endeavouring to carefully pass the hook back the way it had come, all the rest of its companions rallied to its aid, feeling all over my face for a good spot upon which to take a firm hold. Believe me, this was one of the most uncomfortable experiences I have ever known: a truly thrilling five minutes, throughout which I had a horrible dread of injuring the plant. I now confine my investigations to plants like *Anhalonium Williamsii*; this particular plant I find gives off a faint odour after a hot day, somewhat resembling liquorice. Some of the *Crassulas* I notice are sweet-smelling, when in good health—*C. corymbulata* is a good example. There is also a pleasant odour given off by *Aloe arborescens* when it begins to need water.

I trust that you have gathered by this time that I am quite able to manage my plants without the assistance of other people. However, I must confess that I have not yet been able to detect the mighty Mealy Bug unaided. And now that the subject of insect pests is in my mind, I remember reading somewhere—I think it was in *Desert*—that if one or two naphthalene balls are placed at the bottom of the pot, root bug will never appear on that plant. I should be most interested to learn if anybody present has

ever tried this experiment; I always forget it myself, in my haste to fill an empty pot. This seems to me to be a very reasonable preventative, for when land is infected by grubs, naphthalene is usually recommended as a good soil fumigant.

Now, what do I see in cacti and other succulent plants. I fear that I shall not please everybody when I quite unreservedly state that these plants are not always grown because they are beautiful. Perhaps there are some of you who will expect me to justify this conclusion. I am not going to be foolish enough to deny that often the happy combination of colours produced by the spines and body of many of our plants must be very harmonious in its effects and therefore pleasing to the eye. I know from my friends' exclamations that the flowers are very beautiful or striking; of course I can appreciate their formation and texture myself. Admitting that these are by no means trifling points in our plants' favour, I feel that their appeal goes even deeper. I find it most difficult to explain why I find my plants so attractive; probably it is something peculiar to our mental make-up. I have no hesitation in saying that if a plant of *Ariocarpus trigonus* (a plant, you will agree, to be more unique than beautiful) was placed side by side with a lily bulb, however rare or difficult to grow, the cactus would receive most attention. How many of us, in a fit of day-dreaming, have not imagined themselves the owner of a greenhouse as capacious as the Crystal Palace, in which was privileged to grow every known form of succulent plant. How well I remember encountering a fine specimen of *Euphorbia resinifera* at Kew. The glorious solidarity and strength of this plant seemed to me to be something profound. Whenever I think of that *Euphorbia*, I seem to get the impression, varying in degrees, with the size of the plant. The charm and simplicity of our stemless *Mesembryanthemums* seems to awake another feeling or emotion, which compels one to say "How lovely!" and then hope that news will soon arrive of the discovery of an absolutely different form.

It is of no use me trying to put into language something that I can only feel. I have often tried to analyse my reasons for collecting these fascinating forms of life; but after all, why should I try. Perhaps one day a well-meaning psychologist will try to instruct me and point out that there is some happy association with my early existence that influences me. Or again, I may be informed that it is really a form of adult play. Well, if

this is the case, ladies and gentlemen, I can only conclude by saying that I find it to be one of the best games I have ever played; and I do not think it will ever tire me.

Winter Losses

ON May 8th there was a discussion on losses during the winter and the reasons for them, in which a number of members took part. Dr. Marrable reported that in December a specimen of *Pachycereus marginatus* became black at the top and began to shrivel; the damage worked downwards for about four inches and then stopped, there being a sharp line of demarcation. Though the plant had been received as a cutting, it had made a very fine root system. *Pachycereus Pringlei* also developed similar trouble but in a lower portion of the stem. He submitted the plant to a pestologist who reported that there was no sign of the presence of fungus or insect pest; the trouble appeared to be physiological. The tissue of the plant becomes "glassy," dark green translucent spots are formed which in the normal course turn black; in mild cases "wound cork" is formed and the damage spreads no further; in serious cases it spreads throughout the plant and is fatal; Cerei are particularly liable to be attacked. This "glassiness" is not due to bacterial invasion but to excessive humidity of the atmosphere; dry air and good lighting are the best cure. Dr. Marrable said that in the case of his plants the greenhouse was not damp; the plants were not watered during the winter and no water was left standing about, but it is possible that these Cerei may want a higher temperature; 50° F. was the minimum aimed at, but on occasion the temperature had been as low as 40° F.; of three specimens two were healthy and only one had been affected.

Mr. Higgins suggested that the humidity of the air is purely a matter of temperature; there may be no signs of moisture during the day at a temperature of 50° F. and yet enough water vapour present to saturate the air; when the temperature falls there would then be a deposition of moisture on the plants. Melocacti used to be grown in stoves and the plants may have been in active growth all the year; under the cooler conditions now usual, these plants are difficult to grow, even if kept dry during the winter, possibly for a similar reason. During the summer and when the plants are growing the deposition of dew at night is advantageous, but during the winter its effects are prejudicial.

Mr. Platford reported that some of his plants, especially *Opuntias*, suffered from what appeared to be red rust; if the affected portion was cut off, the rest remained healthy and sent out fresh shoots from the base. Another member suggested that manure in the soil was apt to cause the development of red spots. He had watered *Pachycereus marginatus* and *C. peruvianus* throughout the winter and both appeared to be perfectly healthy; his house had been as high as 60° F. and as low as freezing point.

Mr. Collings said that he had two casualties during the winter, and in both cases the plants appeared to have become woody throughout, though they had been growing well for the year or two previously; one was *Echinocactus polycephalus* and the other *Pelecypora asselliformis*. The damage in his opinion was not due to damp and he wondered if it could be senile decay. Mr. Smith said that he had a *Mammillaria rhodantha* in 1915 which appeared to be all right in 1929 but had since gone corky in the centre; he removed the top and put it in burnt clay but it had not survived; he thought the cause might be too thorough drying of the plant so that the roots were killed.

Mr. O'Donoghue said that his hard-skinned types of *Haworthia* had looked nice and green all the winter, but the sun had since turned them brown, though the roots were still sound. He suggested that a possible explanation was that the fine weather of 1933 had led to a longer period of watering than usual, so that possibly the plants were not so well ripened; the weather was mild in early January and some plants in the house were watered, so that the air may have been moist. *Euphorbia canariense* and *E. avasmontana* had succumbed during the winter, either due to this extra moisture or perhaps to a down draught.

Mr. Denton thought that much damage was caused by fog; he had watered earlier than usual this year and lost a number of plants, though the temperature was above 50° F. *Euphorbias*, on the other hand, had done better than ever before. He believed in keeping the ventilators open winter and summer and keeping the temperature up by means of the fire when necessary; this had the disadvantage, of course, of admitting fog when present. Dr. Marrable said that he had a plant of *Euphorbia grandidens* four feet high and the side branches died off suddenly; he found on enquiry that similar damage had been done to this species at Kew, where the cause was thought to be fog.

On Mammillarias

By A. Boarder

THE Mammillarias are one of the most interesting groups of cacti; there are hundreds of varieties with many varied forms. They are the best species to collect where space is limited, as a small greenhouse may house four or five hundred Mammillarias, whereas if large Echinocacti are kept they not only limit the number of plants that can be grown, but they also look out of place. Some catalogues of cacti show Mammillarias as being "easy to grow," "good for beginners," etc., but disappointment is likely to come to many beginners if they take these statements too seriously. Many Mammillarias are much more difficult to grow than some Echinocacti; while admitting that some are easy to grow, many are hard to grow and flower. I have grown Echinocacti from seed and flowered them more easily than I have some Mammillarias.

They are generally spoken of as having small flowers, but, while the majority have flowers from $\frac{3}{8}$ to $\frac{1}{2}$ in., some have them from $1\frac{1}{2}$ to $2\frac{1}{2}$ in. across. Most of the smaller flowering types produce dozens of small flowers in rings round the top of the plant, e.g. *M. spinosissima*. Another point to recommend them is that they usually form berries or fruits which are very attractive and in some plants such as *M. pusilla*, these stay on the plant for a year. The largest flowering ones are in the group Dolichothele, e.g. *M. longimamma* and its varieties and *M. sphaerica*. The latter is one of the largest flowering Mammillarias I have seen, yellow and spreading almost like a large *Echinocactus ottonis*. The *M. longimammæ* are also yellow, *melaluca* having reddish tints to the outside of the petals and *uberiformis* has a very delicate perfume, exactly like a hyacinth. The Coryphantha group also has large flowers, which are produced from the woolly growing centre of the plant. A small *C. grandiflora* of mine has had about six fine purple flowers; *C. andreae* has a large yellow flower and I noticed a very strange habit with this flower; I was pollinating the flower, when just after touching the stamens with a camel hair brush I noticed that they were moving. All the stamens which were previously straight doubled in towards the centre like the tiny tentacles of a sea-anemone when they catch a small shrimp. After about half an hour the stamens straightened out again, but the

slightest touch on any stamen sent that one doubling up again and if in its movement it touched any of the other stamens they too responded and bent towards the pistil.

I find that most Coryphanthas do not flower until they are fairly large plants. Many of the new Mammillarias found by Howard E. Gates and mentioned in the CACTUS JOURNAL have flowered freely in my collection this year. *M. ocampensis* has also been well in flower, but this has already been described in the Journal. A new one to flower for me this year is *M. Sheldonii*, which challenges *M. ocampensis* for size and beauty, but has not such a long flower tube. *M. dioica* appears very prolific, as a two year old plant from seed has already had a score of flowers and it has not finished yet. *M. campotricha* has small insignificant flowers but they have a beautiful perfume, which reminds me of Syringa. *M. decipiens* has almost the same perfume but fainter; *M. Saffordii*, a fair-sized yellow flower, has a lemon scent, and *M. Baumii*, also yellow but smaller, smells like lemonade crystals. I have often noticed an attractive smell in the greenhouse which I have now found to be the ripe fruits on the plants. *M. Pfersdorffii* has fruits which smell and taste very nice indeed; the flavour is half strawberry and half pineapple. I have eaten many Mammillaria fruits and find they vary considerably in flavour; some are sweet but many are rather tart. The best flavoured ones are those that do not last long, so should be eaten as soon as ripe.

I am often asked to name easy flowering ones and the following plants have all flowered in two years from seed:—*M. coronaria*, *trichiantha*, *Wildiana*, *nigra*, *Ocamponis*, *Pringlei*, *dioica*, *centricirra*, *longispina*, *gladiata*, *Lesanierii*, *pygmaea*, *cephalophora*, *ancistrohamata*, *Sheldonii*, *Mainae* and *Schiedeana*. Five of this group flowered at a year old. It must not be thought that all the Mammillarias flower as easily, as I have had some for years which have yet to flower, but this only adds to the attraction as one never knows what treasures the plants have in store until they do flower. Some growers recommend half shade for some of the Mammillarias and, while not disagreeing with them, I keep all my plants in one unshaded house, for convenience, which perhaps accounts for some of them not flowering.

There is no doubt that amongst the group are many beautiful varieties, and with either flowers or berries there is always an attraction of some kind, which is one of the reasons that they are my favourite cactus.

Succulents

Other than Cactaceae and Mesembryanthemae

By R. S. Farden

(Continued from page 78, Vol. II.)

ALOES (continued)

H. C. 5 *Magnae*.

This is divided into four subsections :—

H. C. 5 a *Comosae*.

A. *comosa*.

H. C. 5 b *Purpurascentes*.

A. *succotrina*, leaves 30–40 in a dense rosette, acuminate, scythe-like, $1\frac{1}{2}$ –2 ft. long, green, slightly glaucous, slightly channelled, sometimes spotted, margins with prickles. Socotra.

A. *microstigma*, elongated stem, leaves in a rosette, slender, 20–30, long, sword-like, 1 ft. long, in a dense rosette, glaucous green, with numerous small whitish spots and marginal prickles.

A. *purpurascens*, stem 2–3 ft. long, leaves in a dense rosette, 40–60, sword-like, very glaucous, often with a few scattered white spots, not striped, turning purple with age ; marginal prickles white and horny.

A. *Steudneri*. Eritrea.

A. *lineata*.

H. C. 5 d *Principales*.

A. *speciosa*, stem 20–25 ft., leaves in a dense rosette, 15–18 in. long, 2 in. wide near base, glaucous, margined with fine prickles. Great Fish River, Cape.

A. *longiflora*, stem $1\frac{1}{2}$ ft., leaves in rosette, spreading, sword-like, tapering, unspotted, glossy green, marginal teeth crowded. Flower in a dense simple raceme, 6–8 ft. long, that is longer than the stem itself.

A. *chloroleuca*, stem several feet, leaves in a dense rosette, sword-like, tapering, recurved at the apex, slightly glaucous, margins with brown, horny teeth.

A. *caesia*, stem 10–12 ft., leaves in a dense rosette, 30–40, tapering, unspotted, very glaucous, margined with red when young.

A. *drepanophylla*, stem slender 7–8 ft., leaves in a dense rosette, sword-like, slightly turned down, very glaucous, without spots or lines, nor prickles on the surface, margins with small red-brown, horny prickles.

A. *platyleptis*, stem 10–12 ft., leaves in a dense rosette, sword-like, tapering, dull green, hardly glaucous when mature, neither spotted nor striped, margins with brown, horny prickles.

A. *Salmodyckiana*, stem 10–12 ft., leaves in a dense rosette, dull green, hardly glaucous when mature, neither spotted nor striped,

slightly prickly on the keel towards the apex, no prickles on the face, margins with horny brown prickles.

A. *rubroviolaceae*, Yemen.

A. *schoelleri*. Eritrea.

A. *spicata*, stem elongated ; leaves 12–20, laxly disposed, 1 – $1\frac{1}{2}$ ft. long, tapering to a point, green, mottled with many irregular oblong, whitish spots ; margins with small prickles.

H. D. PACHYDENDRON.

A. *africana*, stems 20 ft., leaves in a dense rosette, 1 – $1\frac{1}{2}$ ft. long, no prickles on the face, but a few on the back towards the tip ; very glaucous with brown, horny prickles on the margin.

A. *supralaevis*, stem 5–6 ft. long, leaves in a dense rosette, sword-like, $1\frac{1}{2}$ –2 ft. long, $2\frac{1}{2}$ –3 in. wide near base, tapering to a pungent apex ; without spots, glaucous, with a few horny prickles on the face and upper part of the keel.

A. *nitens*, stem elongated, leaves in a dense rosette, sword-like, 18–20 in. long, bright green, not spotted nor striped ; margins with brown horny prickles.

A. *ferox*, stem 10–15 ft., leaves in a dense rosette, lanceolate, $1\frac{1}{2}$ –2 ft. long, very rigid, dull glaucous green with many prickles on face and back, margins with brownish-tipped prickles. Syn. *horrida* and *muricata*.

A. *ferox*, var. *subferox*, leaves less prickly on the face.

A. *ferox*, var. *incurvate*, leaves thinner, remarkably incurved, with no prickles on the face. Introduced by Cooper, this may be a species and not a variety.

A. *rupestris*, leaves sickle-shaped, glaucous, with no prickles on either side, marginal teeth small, horny, brown-tipped. Little Namaqualand.

A. *Thraskii*, leaves in a dense rosette, 2 ft. long, slightly glaucous, without spots, channelled on the face, margined with small brown-tipped prickles. Orange Free State.

A. *candelabrum*. Natal.

A. *excelsa*. E. and S. Africa.

A. *Marlothii*.

H. E. DRACALOE.

A. *dichotoma*, stem 20–30 ft., much branched, leaves in a dense rosette, lanceolate, very

glaucous, without spots, nearly flat on the face, rounded on the back, sometimes smooth and sometimes studded with minute prickles; margins with small white teeth. Great and Little Namaqualand.

H. F. ALOIDENDRON.

A. Bainesii, trunk 50-60 ft. high and 4-5 ft. in diameter; leafy head 20 ft. across. Leaves 2-3 ft. long in young plants but much shorter in mature trees, green margined with distant horny prickles. Natal.

H. G. SABAEALOE.

A. sabaea.

H. H. KUMARA.

A. plicatilis, stem shrubby, much branched, rising to 10-12 ft., leaves in two rows pointing right and left, strap-shaped, thin and pliant, very glaucous, without spots, with a narrow whitish margin, toothed towards the tip.

Genus I. Lomatophyllum.

L. purpureum. Isle Bourbon.

L. macrum. Mauritius.

L. rufocinctum. Mauritius.

(To be continued.)

Catalogues Received

Curt Backeberg has issued a Catalogue of the New Plants from his collecting expeditions 1928, 1929, 1931 and 1933; it contains 75 very beautiful photographs, the majority showing the plants in flower. The list of prices is issued separately so that the catalogue itself may be kept as a reference book.

Herr Backeberg is especially interested in the recognition of the relationships between the plants in each district and feels strongly that classification should be developed along these lines.

Prof. Schumann realised the importance of this connection though he was not always able to follow it out owing to insufficient material. Later Dr. Rose provided a classification which recognised the relation between evolution and occurrence, and it is this line which Herr Backeberg is following, hoping that his contribution will be a useful continuation to the work of Schumann and of Rose.

Cactus in Canada

By C. A. Armstrong

CORYPHANTHA VIVIPARA.—The accompanying photograph is of a group of many-headed clusters that flowered this year on my desert rockery, a brilliant satiny purple, the blooms opening at noon each day; they continued



coming for a period of two weeks or more, particularly on the larger clusters, some of which are nearly a foot across.

These came from Southern Alberta and are to be found growing in dense grass; although I have found no difficulty in flowering it, none of them set fruit, which is unfortunate, as it is an edible well-flavoured fruit, the size and taste resembling a gooseberry.

Book Review

"SUCCULENTS OTHER THAN CACTI," 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. 1934. Price £1.

Some members of this Society will have already seen the volume issued by the firm of Verkade of Zaandam on "Vetplanten," with its beautiful coloured illustrations and, if they do not read Dutch, will be glad to know

that an English translation is now available. The firm of Verkade has issued, over a period of years, coloured pictures in the form of coupons with their goods; when the series has been collected the album with letterpress may be obtained. The very high quality of these albums is well-known in Holland, and the one devoted to Succulents is quite in accordance with the usual high standard.

We are indebted to the enthusiasm of Mr. E. J. Labarre of Amsterdam for the present edition; wishing to make the book available to a much wider public he has undertaken the difficult task of translation and Mr. Scott Haselton, Editor of the *Cactus and Succulent Journal* of the Cactus and Succulent Society of America, has been responsible for the publication in America.

The book is divided into six chapters, as follows:—I. The Succulents as Grotesque Forms of Life. II. Interesting Succulents in the Family of Liliaceae. III. Mesembs.—Windowed Plants and Living Stones. IV. Plants similar to the Cacti; the Euphorbiaceae. V. Crassulas, their Beauty of Form and Colour. VI. Carrion and Lantern Flowers and the Compositae. The text is written in a popular manner by one who is familiar with his subject—A. J. van Laren is Curator of the Botanical Gardens of the University of Amsterdam—and, while not pretending to be a complete botanical treatise, mentions in each case a few of the better known species in each group. Cultural directions are also given and, though written originally for growers in Holland, are for the most part applicable to this country also.

The chief features of the book are the coloured illustrations, of which there are 126; these have been reproduced from paintings by C. Rol, J. Voerman, jun., and H. Rol, made from the living plants in the Botanical Gardens at Amsterdam, in the greenhouses of Th. Jansen and Zoon at The Hague and, in the case of the Mesembryanthemums, from plants in the collection of E. J. Labarre at Hilversum. They are faithful reproductions of the subjects chosen, as well as being works of art.

The American Edition follows the original Dutch publication very closely; a new cover has been designed, an effective wood-cut of *Aloe arborescens* by V. J. Morse being used; some of the illustrations have been renamed and, from an English point of view, it is a pity that the spelling of the names has been changed to the American Code, used by some botanists in America, instead of retaining the spelling under the International Rules used

almost universally elsewhere; but this will only trouble the botanically-minded, though the novice, for whom the book is designed, may find it confusing.

This book on Succulents will be very useful to beginners, especially as there is no modern book in English which collects together the genera most usually grown by collectors and our thanks are due to all those who have helped to produce an English edition.

Copies may be obtained from E. J. Labarre, Prins Hendrikkade 149, Amsterdam, price £1, post free.

Cereus flagelliformis



This plant of *Aporocactus* (*Cereus*) *flagelliformis* was grown by Mr. Elliot in Kent; it has been for three years in a 5-in. pot, and had more than one hundred flowers open when photographed on May 4th, 1934, and there were over one hundred still to open. The photograph was sent to us by Mr. G. Lamb.

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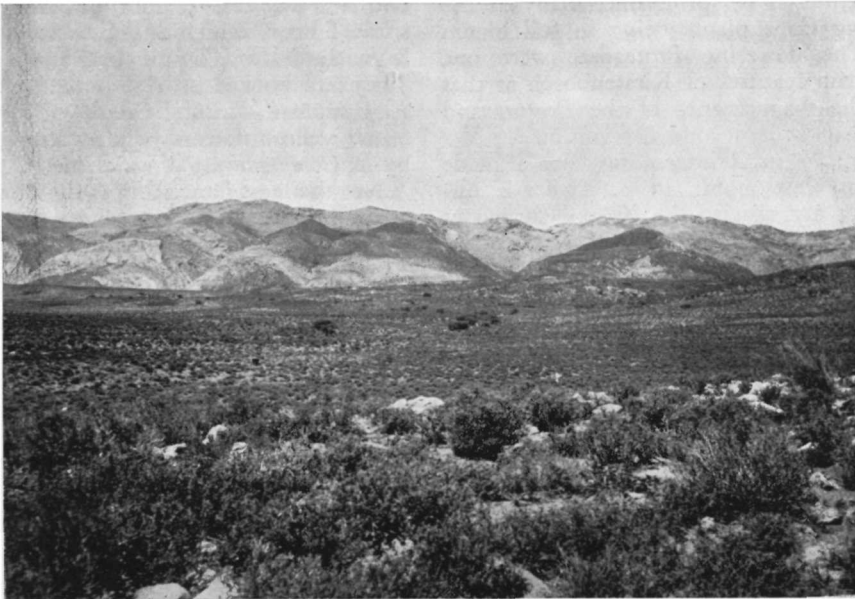
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The Karoo at Whitehill.

Photo., M. Karsten

The Karoo Garden at Whitehill near Matjesfontein

By Miss M. C. Karsten

WE may take it for granted that the South African Karoo is well known as the home of a great number of interesting succulents which are found in our collections, so we need not introduce it to the readers of our Journal. But comparatively few will have heard of the garden and nature reserve at Whitehill in the Western Karoo, which lies 168 miles from Cape Town on the main railway line to the Transvaal. It is a sub-station of the National Botanic Gardens at Kirstenbosch (Cape) for the cultivation of succulents and other plants

from the more arid districts of the country (Great and Little Karoo, Namaqualand, Bushmanland, Richtersveld, etc.). The average rainfall in the Whitehill area being 6 inches annually, the plants belonging to the vegetation of those very dry regions are grown here under approximately natural conditions. Although the Kirstenbosch Gardens contain quite a number of succulents, many Mesembs. (especially the mimics and "window plants," *Conophytum*, *Lithops*, *Rimaria*, *Gibbaeum*, *Pleiospilos*, etc.), some stemless and dwarf *Crassulas*, several *Stapeliae* (*Huernia*,

Hoodia, *Piранthus*, *Caralluma*, *Trichocaulon*) have to be kept under glass, the Kirstenbosch climate being too moist for them. This will be easily understood if one knows that in that area the rainfall averages about 57 inches per annum! As to the geographical situation of Kirstenbosch, it occupies the greater part of the eastward slope of Table Mountain.

When visiting the Union of South Africa in 1933, I was so fortunate as to stay at Kirstenbosch for one month, from September 22nd till October 25th, when I sailed back to Europe. It was a wonderful experience to be at Kirstenbosch in springtime, many of the interesting Cape plants being in full bloom then. The flowering Proteaceae were one of the main features of Kirstenbosch at that time; the magnificence of the *Proteas* and *Leucospermums* is beyond description.

One of the most interesting trips I made during my last month in S. Africa is undoubtedly my visit to the Karoo Garden at Whitehill (the next stop after Matjesfontein). One Sunday night about 9 p.m. I left Cape Town Station and arrived at Whitehill at 7 o'clock next morning. The only people who got out at Whitehill were the Superintendent of the Karoo Garden, Mr. J. Archer, who lives at Matjesfontein, and myself! The Garden and the surrounding veld did not look much as seen from the train, some *Aloes* near the little stationhouse gave some idea of a garden, and for the rest a grey stony plain scantily covered with shrubby plants of a brownish or grey-green colour. On the south arises the Witteberg range (to which Whitehill owes its name) standing out very clearly against the sky, as shown in the photograph which I took of this typical Karoo landscape and which is reproduced with this article. The light in the Karoo is very bright and clear, which makes photographing easy. But the use of a yellow screen is strongly advisable. The shrubby vegetation is formed by *Mesembr. spinosum*, L. (rather spiny!), *Pentzia virgata*, Less. (Afr. "skaapbos"), *Galenia africana*, L. (Afr. "kraalbos") which is a member of the Aizoaceae family, and some more plants of a xerophytic habit.

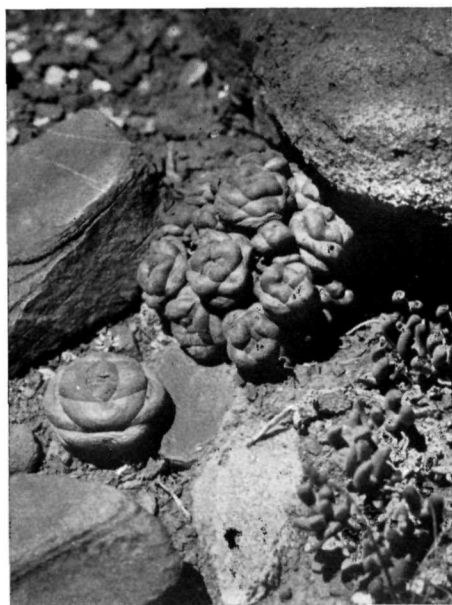
From a publication by the Director of the National Botanic Gardens (incl. the Karoo Garden), Professor R. H. Compton, we know that the Garden, which lies at an altitude of about 3,000 feet, covers about 40 acres, of which one-third is regarded as a nature reserve and protected from grazing and planting. The rock formation at Whitehill is Dwyka conglomerate with quartzitic inclusions.

In spite of the (apparently!) scanty vegeta-

tion the landscape did not make a desolate impression upon me which, I think, is partly due to the blue sky and the bright sunshine. Besides, the Karoo landscape is of a peculiar charm, which is not easily put into words.

Among the plants grown in this garden, the fine specimens of the "kokerboom,"* *Aloe dichotoma*, L., which comes from Namaqualand, and the famous "boterboom" (buttertree), *Cotyledon fascicularis*, Ait. were very conspicuous. Mimicries and "window plants" were fairly well represented several of them being in full bloom. We noticed two new *Rimarias*; both of them showed some flowers which make their appearance from the narrow fissure between the leaves. They are booked as *R. Primosii*, L.Bol. and *R. Comptonii*, L.Bol. On the first plant we found yellow flowers, while those produced by *R. Comptonii* are of a rich magenta colour.

Not the least interesting is the uncultivated area outside the fence, where I spent the morning "succulent hunting" with Mr. Archer.



Crassula columnaris L. Photo., M. Karsten

A very interesting succulent growing wild in this area is the "koesnaartje,"† *Crassula columnaris*, L., the entire plant consisting of a

* The literal translation of "kokerboom" is socket-tree. Pieces of the branches, when deprived of their pitch, served the Bushmen as quivers.

† The meaning of the African name "koesnaartje" is not quite clear. As far as I know "Naartje" is the S. African name for some Citrus fruit (mandarine).—M. K.

nearly spherical body of the size of a walnut or a small plum, formed by several pairs of leaves closely pressed together. We found several specimens of it, even a clump consisting of over twenty growths! *C. columnaris* being usually found as a single plant, a specimen of it grown into a clump is a most extraordinary feature. I took a photograph of this remarkable specimen which is reproduced herewith. On the same picture also a single-headed specimen is to be seen, which is of normal size. Since *C. columnaris* is generally known as a striking example of mimicry, I was rather surprised and more or less disappointed, we had no difficulty whatever in finding the plant. The small spherical bodies or growths are of a brownish colour, but grey is the soil and the stones surrounding them. This difference in colour made them rather conspicuous, even at a little distance. *Lithops Lesliei*, N.E.Br., which we found growing wild in the veld near Pretoria, is a far better example of mimicry. In a following article we will tell something about the mode of occurrence of this plant. To return to *C. columnaris*, it always grows on open ground fully exposed to the sun, just like *C. Archeri*, R. Compt., a species closely allied to *C. pyramidalis*, L., a handsome plant when in flower; the picture makes any further description superfluous! These were not the only *Crassulas* which grow wild at Whitehill, far from that. There was a lot of other species to be noticed, like *C. perfossa*, Lam. (with white inflorescences, which sometimes begin a little pinkish; its common name is "shaving brush flower"), *C. deltoides*, L. (with greyish angular leaves), *C. lycopodioides*, Lam., *C. rhomboidea*, N.E.Br., *C. nudicaulis*, L., *C. pyramidalis*, L., *C. quadrangularis*, Schönl. *C. Loganiana*.

The genus *Cotyledon*, another *Crassulacea*, is also represented by some very interesting species. *C. trigyna*, Burch., with obovate leaves, which are conspicuously marked with red dots, we found growing among grey lumps of stone. It was flowering with a long spike bearing minute flowers. Two species of *Cotyledon* which are rather plentiful at Whitehill are *C. Wallichii*, Harv., with a thick stem and spiny stalks (the persistent leaf-stalks) and *C. reticulata*, Thunb., whose stem is covered by a little net formed by last year's calyx coming down the stalk.

A very noteworthy plant is also *Anacampseros papyracea*, E. Mey. The plant which belongs to the *Portulacaceae*, consists of short branchlets which are entirely covered with white scales. These branchlets lie

nearly flat to the ground, and if seen from a little distance they really look like the excrement of birds! It is also growing wild in the veld at Whitehill, and though it is often mentioned as a mimicry plant, we had not to search for it a long time!

Before concluding, a few notes on the *Mesembryae* which are indigenous in the Whitehill area. Apart from the shrubby *Mesembr. spinosum*, L., which is a very common plant in this area, I noticed amongst others, fine cushions of *Cheiridopsis cigarettifera*, N.E.Br., a very remarkable plant because of the white papery sheaths which envelop the long and slender leaf pairs at their base. The name *cigarettifera* is well chosen;



Crassula Archeri R. Compt. Photo., M. Karsten

those white sheaths really look like cigarette ends. Also a dwarf *Conophytum* sp. is to be found here, wedged in small crevices of the rock. Interesting species are also *Ruschia pygmaea* and *Mesemb. resurgens*, Kensit, the latter being characterised by small cylindric leaves which are minutely papillose and by a thick tuberous root.

When I left Whitehill for Matjesfontein at about 5 p.m. in order to see Mr. J. D. Logan's collection of *Lithops*, I had got some good idea of the singularly rich succulent vegetation of this part of the Western Karoo. And I sincerely hope many more nature reserves of this kind will be established in South Africa within a measurable space of time.

What is a Borzicactus?

By Curt Backeberg

IN almost all collections one finds "Borzicactus" *Straussii*, which is one of the most popular of the columnar cacti. It is also known as *Cereus Straussii* or *Pilocereus Straussii*. It is remarkable that until now it has not occurred to any one thoroughly to investigate to which genus this *Cereus* really belongs. How is this?

The answer is simple; no one has seen a true *Borzicactus* flower in cultivation up to now.

The generic name *Borzicactus* was given by Riccobono who in 1909 described *Borzicactus ventimigliae*, a synonym of *Borzicactus sepium* (H.B.K.) Br. and Rose, as they say. *Cereus sepium*, *icosagonus* and *Humboldtii* (*Binghamia* = *Cereus plagiotoma* Vpl) were earlier considered as *Cleistocacti* by Weber.

In my new conception of the classification of Britton and Rose (see my Bulletin for Cactus Research, March 1934), I have constituted a tribe *Loxanthocerei*. This includes all the South American *Cerei* with more or less oblique flowers. I have also put the genera *Matucana* and *Arequipa* here, since these become more or less columnar with age and their flowers are red like all those of the *Loxanthocerei* (or reddish; in some cases reddish green and also in *Oreocereus fossilatus*). If one considers this tribe, one recognises the relationships of the various South American *Cerei*, which must, therefore, be removed from the tribe *Trichocerei* Berg.

In this tribe occur *Borzicactus* and *Cleistocactus*. The similarity of the flowers of *Borzicactus* and *Cleistocactus* caused Weber to designate the true *Borzicacti* as *Cleistocacti*, that is to say, to him all were species of *Cleistocactus* for he did not know the genus *Borzicactus*.

When the long-haired, rather weakly-bristled *Cereus Straussii* appeared, it was called a *Cereus*, since in Germany only the collective generic names were used. Later, on account of its white bristles, the plant was called "*Pilocereus*," a generic term which was once used collectively for all hairy or bristly "*Specimen Cerei*," which were thereby denoted as specially valuable. One sees here the danger of persisting in the old collective genera. There being no need to put the plant into a definite genus, removed from the authors the obligation of establishing the relationship in the genus. Thus *Cereus*

Straussii sailed through books and catalogues as *Borzicactus*, its relationships undefined!

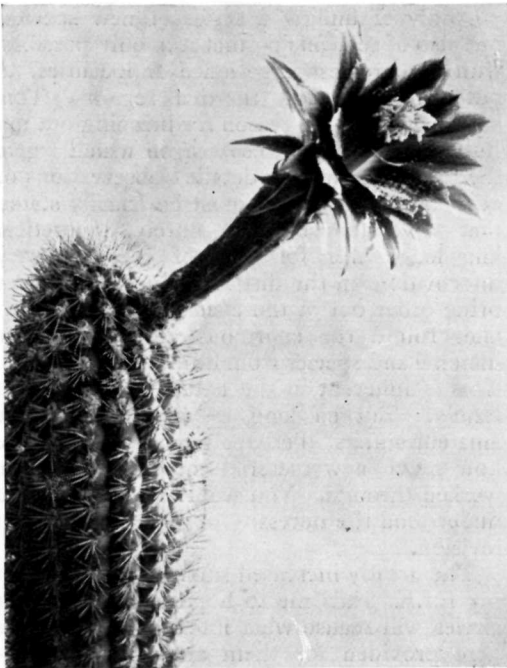
And it does not seem to have occurred to any one until now that all the *Borzicacti* of Britton and Rose occur in Peru, one species alone, *Cereus Straussii* (which Rose erroneously placed in *Oreocereus Celsianus* and in the Appendix corrected to "*Pilocereus*") occurs in Bolivia. In between lies an enormous region in which no *Borzicacti* are found.

This makes one think. Let us first consider the genus *Pilocereus*. It is distinguished from *Cephalocereus* in that the latter always develops a true cephalium from the crown (according to Prof. Werdermann; in some of them growth continues through this); fruits are developed in this cephalium and later are pushed out of it. *Pilocereus* only develops hairs in the areoles, often very thickly (e.g. *Piloc. Houlettii*) though sometimes this is not the case (*Piloc. pentadrophorus*). Further, the fruit should be flat and the remains of the flower persistent, which is not always the case since *Pilocereus Russelianus* and *albispinus* have elongated fruits without persistent floral remains. The form of the flower does not follow Dr. Werdermann's key in "Brazil and its Columnar Cacti." I only know that *Piloc. lanuginosus*, for example, has tulip-shaped flowers, but in *Piloc. pentadrophorus* the tube is more slender. In each case the shape of the fruit is so important a characteristic that it should be taken into consideration in classification.

In accordance with these characteristics alone, *Cereus Straussii* certainly is not a *Pilocereus*. Besides, there are no *Pilocerei* in the Argentina-Bolivian boundary. These facts may possibly surprise many people, but a study of my classification will show that *Pilocereus* belongs to the "northern group" and is only found on the western edge of the once large Brazilian region (e.g. *Cephaloc* (?) *Guentheri* (in Pilcomayo Valley at the exit from Chaco) and *Espostoa* or *Pseudoespostoa* and *Pilocereus Tweedyanus* in North Peru, whence they descended from the once nearer Brazilian region through the great pass across the Andes, which was probably lower at one time).

In the neighbourhood of *Cereus Straussii*, however, is the home of *Cleistocactus*. And *Cereus Straussii* is a—*Cleistocactus*!

When near Tupiza in Bolivia I first saw *Cleistocactus tupizensis* I thought I had found a fiery red *Straussii*. Habit, spines—everything was like *Cereus Straussii* except that in the plants in this locality the central spine was a shining red and longer than in *Cereus Straussii* (in its blunt, yellow-spined North Argentinian form). And the flowers are also similar—long, thin, with projecting pistil—true *Cleistocactus* flowers. Apparently only the white bristles of *Borzicactus* have been considered important, since thereby something “*Pilocereus*-like” was understood.



Borzicactus acanthurus

There are altogether the following species and varieties:—

1. *Cleistocactus tupizensis*, white spined to brown or bright red, with rather blunter spines than *C. Straussii* (Tupiza).
2. *Cleistocactus Straussii* (Heese) Bckbg. Type, whitish bristles with thin, needle-like yellowish central spines (Argentina-Bolivian boundary; North Argentina near Golgotha, Cola der zorro, Fox's Tail, native name).
- v. *juyuyensis* Bckbg. with brown to reddish central spine (Jujuy).
- v. *rosariensis* Bckbg., very poorly spined, thin “like a badly bristled *Straussii*.” (Rosario de Lerma.)

In poor situations seedlings were like the previous type and even in autumn had long

central spines. On strong shoots and many cuttings they were usually whiter, but the varieties of *Cereus Straussii* always have darker areoles, while in the type they are pure white!

Hence the relationships of *C. Straussii* have been settled definitely. Near it grow as well (to Central Bolivia as its most northerly station) the quick-growing *Cleistoc. Buchtieni* Bckbg. n. sp. and *Cleistoc. Herzogianus* Bckbg. n. sp. and also the other species of *Cleistocactus* (from Paraguay to North Argentina and Central Bolivia).

What then is a *Borzicactus*?

I give here an illustration of the flower of *Borzicactus acanthurus*. These arise from the young areoles at first as black buds with white hairs. The buds themselves grow slowly and usually come from a white pencil of hairs that appears first. The floral leaves are closed like a beak and already show the later oblique form of the flower. The tube is specially short and only appears long when the flower opens. It does not bear many scales (in contrast to the close scales of *Cleistocactus* flowers) and is very hairy, as are also the fruits, large as a cherry or walnut. The stamens lie close round the pistil. The flower itself is funnel-shaped and resembles the bare flowers of *Matucana*. The flowers are as much as 10 cm. long.

If one compares the accompanying illustration with one of a many-flowered *Cleistocactus Straussii* (this is a characteristic of *Cleistocactus*—*Borzicactus* has far fewer flowers), then one sees the difference at once.

As a result, the genus *Borzicactus* in Britton and Rose should be corrected as follows:—

- | | |
|----------------------------|--|
| No. 1. <i>Borz. sepium</i> | } All these are true <i>Borzicacti</i> , at all events <i>B. morleyanus</i> , the other two if they flower like <i>B. acanthurus</i> . |
| No. 2. „ <i>morleyanus</i> | |
| No. 3. „ <i>icosagonus</i> | |
| No. 4. „ <i>acanthurus</i> | |

- No. 5. *Borz. decumbens* is a white night-flowering species and therefore a *Haageocereus*. The drawing used by Rose of a flower found by Soehrens near Tacna clearly cuts it out of this genus.

- | | |
|--------------------------------|--|
| No. 6. <i>Borz. humboldtii</i> | } are one and the same plant (see B.f.K. Oct. 1934). Also they are not |
| No. 7. „ <i>plagiostoma</i> | |
| No. 8. „ <i>aurevillus</i> | |

Borzicacti but *Binghamias* in the sense of Rose's description, that is, they form on the side of the areoles a loose tuft of bristles.

(Rose's genus is therefore valid, only the established species is not, since "Binghamia" melanostele is a *Haageocereus* and a white night-flowerer (*Haageocereus pseudomelanostele* (Werd. and Bckbg.) Bckbg.) The name was erroneously used by Rose for Vaupel's white woolly *Cereus* (*Pseudoespostoa* Bckbg. n.g.) melanostele.

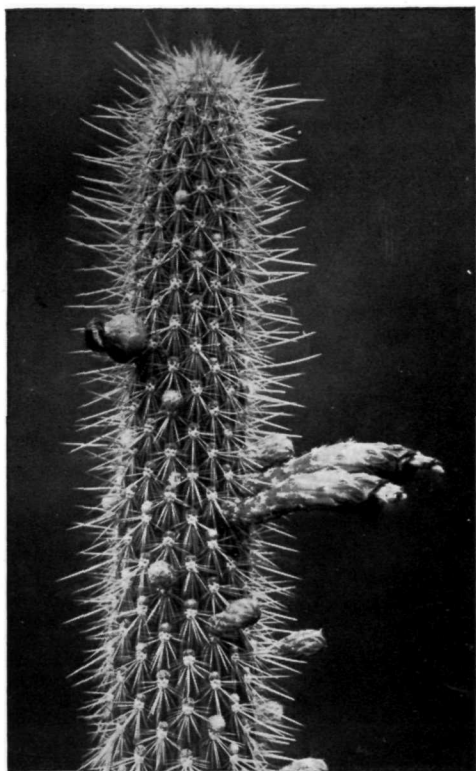
New true *Borzicacti* are :—

Borzicactus eriotrichus (Werd. and Bckbg.)

Bckbg. n. sp. with white woolly hairs at the top, and large, more bluish red flowers than *B. acanthurus*.

Borzicactus Faustinianus Bckbg. n. sp. with cinnabar red flowers and thicker dark golden brown spines.

These two species, like *B. acanthurus*, occur in the Rimac Valley (Central Peru). The



Cleistocactus Grossei

peculiarity of the Central Peruvian species is that they form luxuriant but low groups and even examples 25 cm. high may bear flowers.

The study of these lines shows how difficult the survey of the South American *Cerei* is. We find similar difficulties with the *Lobivias*, e.g. the *Pentlandii* group, as well as with the *Parodias* and *Rebutias*.

Even facts that had appeared as clear as daylight, must be corrected. One would think that the single species of the genus *Oroya* was quite clear. But no! The old *Oroya* looks quite different from what Rose collected as *Oroya* and what Ritter and I brought from over there. At the least there are three clearly-defined varieties, plants which from habit alone, bear no resemblance to the old *Echinocactus peruvianus*. The flowers, however, as I saw them in cultivation, are the same.

Since I have travelled the whole Cordilleras alone twice over, I have had the opportunity not only of finding a series of new species, but also of recognising that it is only possible, with the greatest experience of localities, to put things straight in this region. This knowledge was the reason for bringing out my *Bulletin for Cactus Research*, in which I give the locality as well as detailed observations of genus and species. It must be frankly stated that a systemist with purely theoretical knowledge will for lack of the necessary information on the districts concerned, never bring order out of the chaos, which accumulates round the enormous amount of new material and species from little-known regions. This is inherent in the nature of the cactus family. But so long as chaos exists, the amateur suffers. Perhaps many do not realise how much new material there is still to be worked through. You would realise it if you understood the necessity of a speedy uniform revision.

The greatly increased number of readers of my *B.f.K.* leads me to hope that yet further circles will realise what interesting reading is here provided for them and that the professional botanist who always regards competition with mixed feelings, will realise that here is a practical man who feels compelled to take a hand, because the theoreticians lose so much time—because they have no clear perspective of these interesting cactus regions, so full of information.

[Translated.]

Catalogues Received

Stuart H. Griffin, Churt, Near Farnham, Surrey. Cacti and succulents. Plants.

Friedrich A. Haage, Jun., Erfurt, Germany. Cacti and succulents. Seeds.

F. Hoogvliet, Rockanje, South Holland. Cacti and succulents. Plants.

J. J. Kruik, "Minuscule," Rockanje, South Holland. Cacti and succulents. Plants.

Succulents

Other than Cactaceae and Mesembryanthemae

By R. S. Farden

(Continued from page 19.)

HAWORTHIAS

These are named after Haworth, a great enthusiast in succulents; they were formerly included in the Aloes, to which they are closely allied; *Aloe aristata* is their nearest relative. Duval, about 1800-1810, took them out and made them into a new genus; this is the only genus I know of that is not classified by its flowers; these are so similar or identical that they are therefore classified by their growth forms. The first Haworthia introduced into this country was *H. recurva* in 1701. In 1812 Haworth, who died in 1833, listed 24 species. In 1836-60 Prince Salm-Dyck listed 53 species; J. G. Baker in *Flora Capensis*, Vol. VI, 1898, listed 60 species and 27 varieties, and Alwin Berger, in 1908, also lists 60 species and some varieties, so that in the period 1898-1908 only one or two new species turned up, but from that time up to now there have been discovered some 30-40 more.

Some Haworthias send up offshoots from the base of the stem, others give out new plantlets by suckers (like the Aloes) and some are always solitary. *Haworthia viscosa*, *tesse-lata*, *asperula*, *Reinwardtii*, *chlorocanthis*, *Peacockii*, *attenuata*, and all *Margaritiferae* are sun lovers; the transparent-tipped varieties such as *H. pilifera*, *Cooperi*, etc., require to be more or less under the soil, with the tips of the leaves only exposed, or, if all exposed, should be shaded from the mid-day sun; this also applies to *H. Bolusii* and *arachnoides*. They require but very little water in the winter and the soft-leaved species are better for being watered from below only, by means of a tray or shallow pan. The flowers of all sections are practically identical, small white tubes with six petals, striped green, three of which stand up and three turn down and all are recurved.

Mr. Thos. Cooper, of Reigate, wrote in the CACTUS JOURNAL, 1898, p. 39, saying:—"Some species are very scarce and many that have been introduced are now lost." Perhaps since then some have turned up again; he had plants in his collection that he had had for 30-50 years. He produced plants from seeds of *H. margaritifera erecta*, plants resembling *H. fasciata*, *H. subulata*, *H. rugosa* and *H. papillosa*; these results are all figured in a paper by Dr. N. E. Brown in

the *Gardener's Chronicle*, 1878, Vol. IX, p. 820, Figs. 140-145, and a good series of dried specimens of them is preserved in the Kew Herbarium. Some time ago when I read this article, I suspected that his plant *H. erecta* was not of pure stock. It is described as a variety of *H. margaritifera*; would it not be more correct to call it a hybrid? But I have been reading *The Science of Life* by the trinity, H. G. Wells, Julian Huxley and G. R. Wells, and in talking of hybridisation it says there is a well-defined law of nature of the vegetable kingdom (as well as the animal kingdom) which is this:—the first family of a cross will have some of the characteristics of both parents and all the offspring will be uniform. That is the explanation of Mr. Cooper's curious family, but that law of nature evidently was not known then. And that too brings up the question:—What is a variety, and when is it a hybrid, and when is it raised to generic rank? But I am digressing.

The following descriptions are from Baker and the classification is according to Berger. All the Haworthias come from South Africa, south-eastern shore districts and some from the Karoo, Natal and the Transvaal. (In the descriptions "Tubercles" are raised markings, "spots" are not raised.)

Genus Haworthia

Section A. TRIFARIAE.

- H. cordifolia*. Stem leafy, 6-8 in. long, 2-2½ in. wide, including leaves; leaves, regularly trifarious, ascending, ovate, acute, dark green without spots or tubercles. Young leaves concave, old ones nearly flat on the surface, rough, rounded on the back, faintly keeled towards the tip.
- H. asperiuscula*. Stem leafy, 4-6 in. long, 1-1½ in. in diameter including leaves which are egg-shaped, all ascending regularly trifarious, under an inch long, thick, dark green, no spots or tubercles; concave when young, nearly flat when old, rough on both sides; semi-circular on the back with a faint keel towards the tip.
- H. viscosa*. Stem ½-1 ft. long, 1¼-1½ in. diameter, including leaves, which are regularly trifarious, all ascending, ovate, dull green, all deeply concave on the surface, without spots or tubercles, rough

and sticky as a rule, acutely keeled towards the tip.

- H. viscosa, var. indurata. Leaves fewer, thicker, longer, less concave on the face.
- H. viscosa, var. concinna. Leaves longer and more recurved than the type.
- H. viscosa, var. pseudotortuosa. Rows of leaves more or less spirally twisted.
- H. viscosa, var. torquata. Leaves broad at the base, spirally trifarious.

Section B. TORTUOSAE.

- H. tortuosa. Leafy stem 6 inches, 2-3 in. in diameter, including the leaves, which are all ascending, in three spirally twisted rows, thick at base, narrowing, dark green, unspotted, face concave, rounded and acutely keeled on the back, very rough on both sides, with minute tubercles the colour of the plant.
- H. tortuosa, var. major. More robust.
- H. tortuosa, var. curta. A dwarf form with greenish black leaves about 1 in. long.
- H. tortuosa, var. tortella. Leafy stem very twisted, branched at the base, leaves blackish green.

Section C. RIGIDAE.

- H. hybrida. Fleshy stem 3-4 in. long, 2-3 in. in diameter, including leaves crowded in many rows, wide at base, tapering, very dull green, nearly flat on the face, rounded on the back with a faint keel, rough on the margins and covered all over with large irregular tubercles, tinged with white at their tips.
- H. rigida. Leafy stem 3-4 in. long, 2-3 in. in diameter, with the leaves, which are dense in many rows, wide at the base, narrowing recurved, very dull green and red-brown when old, flat on face, rounded on back, with one or two faint keels. Minute tubercles same colour as plant.
- H. rigida, var. expansa. Leaves not so rough.
- H. nigra. Leafy stem about 6 in. long, 3 in. in diameter; leaves in many rows, wide at base, tapering sharply, recurved, flat or slightly concave on the face, rounded on the back with 1 or 2 faint keels, very dull green, red brown when old, rough all over, with minute tubercles the same colour as plant.

Section D. COARCTATAE.

- H. glauca. Leafy stem 2-3 in. long, 1-1½ in. in diameter with the leaves, which are in many rows, crowded, all ascending, narrow and tapering, pale green when young and dull purple when old, unspotted, smooth, flat on the face, rounded on the back, with a central keel down the upper half and 5-7 indistinct, vertical ribs of darker green.

- H. Peacockii. Leafy stem 6-9 in. long, 2-2½ in. in diameter with the leaves, which are in many rows, triangular, all ascending, green, concave on face, round on the back with a faint keel in the upper half, slightly rough on the margin, covered on both sides with small round, immersed, greenish white spots.

- H. cassytha. Leafy stem 4 in. long, 2 in. in diameter, with the leaves; producing suckers at the base, leaves wide at base, in many rows, ascending, dull green, concave and slightly tubercled on the face, very rough and whitish on the margin, round on the back, which has copious raised tubercles with a whitish tip, faintly double keeled towards the apex.

- H. coarctata. Leafy stem 4-8 in. long, 2-3 in. in diameter with the leaves; grows many basal off-shoots; leaves in many rows, ascending, wide at the base, tapering sharply, dull green, purplish when old, flat on the face, rounded on the back, keeled in the upper half, with about 7 vertical rows of slightly raised greenish white tubercles.

- H. Reinwardtii. Leafy stem 4-6 in. long, 1½-2 in. in diameter with the leaves; grows many basal offshoots; leaves all ascending, in many rows, wide at the base, narrowing sharply, pale green when young, reddish when old, swollen on the face, rounded on the back, faintly keeled and with 9-11 vertical rows of white tubercles.

- H. Reinwardtii, var. minor. Smaller, with leaves ¾-1 in. long, tubercles as type.

- H. Reinwardtii, var. major. Plant taller than type; tubercles larger and more raised.

- H. Greenii. Leafy stem 6-8 in. long, 2 in. in diameter with the leaves, which are ascending in many rows, pointed-triangular, dull green with smooth flat face and rounded back with a faint circular keel and seven indistinct, vertical ribs and with as many irregular rows of immersed whitish tubercles.

- H. Chaldwinii. Stem 1-1½ in. in diameter; leaves triangular, incurved, face rather concave; without spots or tubercles back keeled towards the apex with 6 full rows of middle sized tubercles and 6 half-length rows between them.

Section E. MARGARITIFERAE

- (These are arranged in order from the largest tubercles down to the smallest.)

- H. attenuata. Leafy stems 2½-3 in. long, the rosette of leaves 4-5 in. broad; leaves 30-40, in many rows, wide at base, tapering to a point, the outers recurved, bright dark green, flat on the face, rough with minute whitish tubercles, rounded back, keeled

- towards apex and with middle-sized white tubercles joined in a series of regular bands.
- H. attenuata*, var. *clariperle*. Tubercles on the back larger and in less regular rows.
- H. fasciata*. Leafy stems short, rosette of leaves about 3 in. in diameter, leaves 40-60, in many rows, ascending, triangular, tapering, glaucous green, flat on face or rather concave with no tubercles; back rounded and keeled towards the apex, with about 20 transverse bands of white middle-sized tubercles.
- H. fasciata*, var. *major*. More robust with stem 3-4 in. long and larger, thicker leaves.
- H. fasciata*, var. *argyrostigma*. Smaller and narrower leaves than the type, with smaller and more crowded tubercles on the back.
- H. subfasciata*. Stem short, rosette of leaves 5-6 in. in diameter; leaves 30-40, crowded in many rows, triangular, tapering very sharply, flat and unspotted on the face, back rounded and keeled towards apex, with middle-sized white tubercles joined into irregular transverse bands.
- H. margaritifera*. Stem short, rosette 3-4 in. in diameter, leaves 30-40 in a dense rosette in many rows, triangular, tapering, flat on the face, back rounded and keeled near the tip, copious, scattered large white tubercles in both sides.
- H. margaritifera*, var. *erecta*. Leaves smaller, tubercles smaller and more crowded.
- H. margaritifera*, var. *granata*. Much smaller, leaves more triangular, with tubercles much smaller and more crowded.
- H. margaritifera*, var. *demimargaritifera*. Leaves of size and shape of type, strongly keeled on the back and faintly on the face; tubercles fewer on back than in the type and on the face almost restricted to the keel.
- H. margaritifera*, var. *corallina*. Leaves rough and sparsely tubercled on face, those on back aggregated into irregular transverse bands.
- H. semiglabrata*. Stem short, rosette, 3-4 in. in diameter, leaves 30-40, crowded, in many rows, ascending, triangular, tapering sharply, bright green, flat and almost without tubercles on the face, rounded on the back and keel towards the apex and with copious middle-sized white tubercles in very irregular cross rows, especially developed in the central half of the leaf.
- H. subattenuata*. Stem short, rosette 4-5 in. in diameter, leaves 40-50, crowded, in many rows, triangular, tapering, green when young and dullish purple when old, face flat and almost destitute of tubercles, back rounded, keeled towards the apex and with many middle-sized scattered white tubercles.
- H. glabrata*. Stem short, rosette 5-6 in. in diameter, leaves 20-30, in dense rosettes, triangular, tapering to a point, glaucous green; nearly flat on the face, without tubercles; back rounded and keeled to-wards apex and with distant scattered middle-sized whitish tubercles; the upper part of the margin is a continuous white horny line.
- H. glabrata*, var. *perviridis*. Tubercles much more crowded and greenish white.
- H. glabrata*, var. *concolor*. Leaves rough on the back with minute tubercles the same colour as the plant.
- H. radula*. Stem short, rosette 5-6 in. in diameter, leaves 30-40, crowded, triangular, tapering very sharply, recurved, green, flat on the face, back rounded and keeled upwards, rough on both sides with minute white tubercles.
- H. subulata*. Stem short, rosette 5-6 in. in diameter; leaves 30-40, triangular, tapering to a fine point, green when young, red brown when old; face flat and rough with tubercles the colour of the plant; back rounded and keeled to the apex, wrinkled all over with crowded small white-tipped tubercles.
- H. rugosa*. Stem short, rosette 5-6 in. in diameter, leaves 30-40, crowded, triangular, tapering to a fine point, green, face flat, back rounded and keeled upwards to the apex, rough all over both sides with whitish tubercles, larger and less crowded than in *H. radula*.
- H. papillosa*. Stem 6-12 in. long, 5-6 in. in diameter with the leaves, which are ascending, wide at the base, tapering, glaucous green, covered with scattered white tubercles on both sides.

(To be continued.)

We have received from Herr Curt Backeberg a copy of the first volume of the *Bulletin of Cactus Research*. The spring-back cover in grey linen with gold lettering makes a most convenient form of binding in which to store the monthly parts, so that they are protected and always handy for reference. Members who are taking this useful periodical will have realised that, if the folded sheets are separated into single sheets, the descriptions issued during the year can be rearranged in their correct numerical order; this arrangement makes the work much more valuable, as references can be looked up more readily. The complete volume can be obtained from Herr Backeberg, Im Sorenfelde 15, Volksdorf, Bez. Hamburg, Germany.

A Short Account of the Succulent Flora of the Transvaal

By H. G. Schweickerdt, B.Sc., Ph.D.

THE Transvaal is the most northern of the four provinces constituting the Union of South Africa and, together with Swaziland, has an area of 117,000 square miles as compared with the 122,000 square miles of Great Britain and Ireland.

The eastern boundary is formed by the Lebombo mountains which botanically are an unknown territory. The eastern part of the province is furthermore traversed in its whole length from south to north by the Drakensbergen, a mountain range parallel to that of the Lebombo. At right angles to the former and running in a westerly direction, such ranges as the Magaliesbergen, the Waterbergen and the Zoutspanbergen traverse a great part of the province.

Roughly speaking, the area between the Drakensberg (8,500 ft.) and the Lebombo Range (4,000 ft.) to the east, and between the Zoutspanbergen (6,000 ft.) and the Limpopo River to the north is what is known as the true "Low-veld" (1,000–2,500 ft.). The country between the Magaliesbergen and the Zoutspanbergen constitutes roughly what is known as the "Bush-veld" (3,000–4,000 ft.). The southern and south-western part of the province is known as the "High-veld" and has an elevation ranging from 3,000–6,000 ft.

It is impossible to give exact figures of the annual rainfall, since this amount in any particular region is very variable. In the eastern mountain region (Drakensbergen) it is somewhere between 50–80 inches per annum, a fairly high rainfall for South Africa; in the remaining parts of the province it is much lower, varying from 15–40 inches per annum. The province falls within the area of summer rains; the rainy season extends from October to March, and the remaining months are generally dry, except for an occasional shower falling in the eastern mountain region. In a province of so large an area where the elevations range from below 1,000 ft. up to 8,500 ft. and where the rainfall varies from a few inches to 80 inches per annum, it is only natural that various types of vegetation are to be met with in various localities. As succulents occur in all parts of the province, the number of different types is a relatively large one. Certain species are restricted to certain localities; there are quite a large number of endemics.

As these succulents consist of many species belonging to a number of families, a detailed account would occupy the better part of a book. In the following pages the writer merely endeavours to give a very general outline of the succulent flora by the enumeration and description of a few representative species.

The photographs illustrating the text were taken by my friend, Dr. Herbert Lang, with whom I have had the great privilege of collaborating during the past six years.

Beautiful coloured illustrations of many succulents mentioned in this account have been prepared by Miss Cythna Letty of Pretoria. Reproductions of her most excellent work may be seen in that well-known publication, *The Flowering Plants of South Africa*.

The succulent flora of the province is mainly composed of genera belonging to the following families:—Aizoaceae, Crassulaceae, Asclepiadaceae, Euphorbiaceae, Liliaceae, Passifloraceae, Compositae, Apocynaceae, Portulacaceae, Bombacaceae, Vitaceae and Pedaliaceae. For the sake of clarity the various representative species will be dealt with under their respective family?

AIZOACEAE

This most difficult family comprising plants popularly known as "Mesembs." is represented by several genera. In the opinion of the writer relatively little is known at all about the Transvaal representatives of this family.

Psilocaulon absimile, N.E.Br., a much branched shrub up to 2 ft. high with ascending smooth cylindric green branches, is not uncommon in the Karrooid scrub of the south-western parts of the province. In the same regions various shrubby species of *Mesembrianthemum*, armed or unarmed, are met with. There is a lot of doubt as to their specific identity.

Roughly ten species of *Delosperma* are distributed fairly generally throughout the eastern mountain regions and the High-veld. They are dwarf shrubs with probably deciduous fleshy leaves; they favour the fissures of rocks and prefer a sheltered position with a southern aspect. The flowers of different species may be either white, pink, magenta or golden yellow in colour. A

fascinating genus about which relatively little is yet known.

Lithops Lesliei, N.E.Br., is so well known a plant in horticultural circles that description would be superfluous. It is only known to occur in about a half-dozen localities in the province. It appears to prefer exposed open slopes. On the Pretoria commonage it grows among withered outcrops of the red shale, the layers of which dip at an acute angle. The plants so closely resemble the surrounding shale that they can be found only with certainty when in full flower.

Frithia pulchra, N.E.Br., the endemic monotypic genus well known to all interested in succulents, has a very limited distribution. It is known from the Magaliesbergen and the parallel adjoining the extreme western spur of the Daspoort Range (furthermore doubtfully from the Witbank area). The plants are not very plentiful and invariably grow on the summit of these ranges between loose beds of gravel composed mainly of almost pure white quartzite. *Anacampseros filamentosa* Sims is a frequent associate of *Frithia*.

CRASSULACEAE

This family is extremely well represented by numerous species throughout the province. The plants belonging to four different genera usually exhibit xerophytic characters; all mountain slopes, gorges, ravines, dry plains and rocky outcrops are frequented by one or other of these species.

Thirty-five species of *Crassula* have so far been recorded. Some species are dwarf plants, whereas others again may reach fairly large dimensions. They do not as a rule possess conspicuous flowers and do not exhibit such striking characters as regards form, etc., as some of the Cape species and for this reason are not so popular with growers of succulents. *C. perfoliata* L. grows between rocks in the highest altitudes of the Zoutspanberg Range. *C. rubicunda* E. Mey, a crimson-flowered species, is fairly common along the Drakensbergen and flowers during late autumn. Species with appressed basal rosettes of leaves are generally met with in damp, shady localities, such as rocky ledges, fissures in rocks and bases of cliffs; *C. compacta* Schonl. and *C. minima* Diels are examples of such species.

Other species such as *C. filamentosa* Schonl. and *C. transvaalensis* O. Ktze inhabit the drier Karrooid veld and the Bush-veld. They are close allies of the well-known Cape *C. lycopodioides* L. but do not exhibit such markedly xerophytic characters.

In the eastern mountain region, the "giant" *C. acinaciformis* Schinz, grows on hillslopes in fairly moist places and may reach a height of 4 to 5 ft. The leaves up to 1½ ft. long and 3 in. broad, form a large rosette, and the inflorescence is a corymbose panicle up to 18 in. in diameter. Although in habit this is a very striking species it is not often met with in cultivation. *C. argyrophylla* Diels, with its obovate, rounded, fleshy leaves, is one of the more prevalent succulents of the Magaliesbergen. It often grows in dense clusters on rocky ledges or between rocks in association with a species of *Cotyledon* allied to *C. orbiculata* L.

Three shrubby species of *Cotyledon* are found in the province. *C. Wickensii* Schonl., from the northern Transvaal, is a bushy shrub attaining a height of 3½ ft., including the inflorescence; because of its showy cyme of orange-red pendulous flowers it is frequently met with in cultivation in South Africa.

The foliage of *Cotyledon orbiculata* L. is very striking; the obovate large fleshy leaves are covered by a white powdery layer of wax, and the margin in the upper half of the leaf is bright crimson; the cyme of pendulous orange-red flowers adds greatly to the charm of this species. It is fairly common on the Magaliesbergen and neighbouring smaller hills or "kopjes."

Species of *Kalanchoe* occur throughout the province. *K. thyrsiflora* Harv., a robust winter-flowering (biennial?) species, frequents rocky slopes of most hills with a warm aspect. Its spike-like inflorescence consists of numerous greenish-yellow inconspicuous flowers which are agreeably but somewhat heavily scented. *K. rotundifolia* Haw., with its orange-coloured flowers, is a much less robust, much-branched plant preferring the partial shade of bushes or shrubs. It flowers during the winter months and since many plants usually grow together, makes quite a conspicuous show. It is widely distributed in all the warmer parts of the province.

Bryophyllum pinnatum (Pers) S. Kurz is well known because of its extremely wide distribution in the tropics of both hemispheres. It has been recorded from the eastern mountain region and the Zoutspanbergen.

(To be continued.)

[We much regret that considerations of space have prevented the use of any of Dr. Lang's beautiful photographs in the present issue. These will be given in the next number of the Journal, together with the continuation of this article.—EDITOR.]

Cactus in Canada

By C W. Armstrong

ALL my cacti are placed out on the desert rockery in May after a long winter in the attic, which is warm and fairly well lighted ; it is wonderful how they respond to the air, light and dewy nights ; growth starts almost immediately. These

cool, and has the advantage of allowing for the changing of the plants round to alter various aspects and to make room for new acquisitions.

In the centre just beside the *Astrophytum ornatum* is a grafted specimen of *Mammillaria*



Cactus in Canada. 1.

pictures were taken on August 1st ; the top joint on *Opuntia pycnantha* developed a growth of six inches after May 15th (as a guide to size my labels are 5/8th inch wide), the *Opuntia Margarita* in the front left of the *Opuntia Ursina* showed no growth until August 1st, but in one month developed two growths two inches across. Both of these *Opuntias* are rare in collections and are found on separate islands about thirty miles apart at the most southerly tip of California.

These pictures were taken just after a heavy rain which left glistening drops on the long bristles of the *Opuntia erinacea* var. *ursina*, which show clearly in the picture ; it was a very pretty sight and it impressed me so much that I rushed in after my camera.

The majority of my cacti are potted and then plunged to the rim ; this keeps the pots

plumosa ; I bought this in England five years ago as a single head ; it only increased a quarter of an inch in two years so I cut the increased growth off horizontally and clamped it on a stock of *Trichocereus Spachianus* with the result as shown that it has eighteen normal-sized offsets in three years.

Next year I am going to discontinue potting the larger bodied types like the *Ferocacti* as I find that, after prolonged rainy spells, the pots take too long to drain out ; instead, I am going to prepare the soil by drawing it up into slight mounds and shall place the big fellows on them. I have some large *Brittonia Davisii* set out this way and the heavy rains left them comparatively dry next day ; then I will take care of them during the winter by resting them on flats of equal parts of sand and loam which will prevent undue drying out of the roots.

Quite a rare plant in this collection is *Coryphantha Alversonii* shown behind and to the right of *Cephalocereus leucocephalus*; the tall *Harrisia tortuosa* has a large bud on it and

I expect to see it flower before I take my cacti in next month. The leafy plants in the picture represent nineteen varieties of *Lewisia*, which, though not desert plants, require good drainage.



Cactus in Canada. 2.

Treasurer's Note.

THE Hon. Treasurer would like to ask those members whose subscriptions fall due on January 1st to forward these to him with as little delay as possible. Subscriptions are dated quarterly from January, April, July and October, according to the period of the year when the membership started. If preferred, subscriptions can be made renewable on January 1st by paying for the part of the year at the rate of 2/6 per quarter.

The Treasurer's address is :—

J. Haddon, Esq.,
90, Woodmansterne Road,
Streatham Vale, S.W.16.

Stapelia Nobilis

AT the Flower Show of the Royal Horticultural Society, held on October 23rd, the Curator of the Chelsea Physic Garden showed a plant of *Stapelia nobilis*, which received a Cultural Commendation. The plant was a fine specimen with three expanded flowers and several buds. The flowers are very large with recurved petals; the colour is pale creamy buff crossed by numerous thin, wavy, purple lines; the inner surface is covered with very fine hairs, though the outside, as seen in the buds, is quite smooth.

On Potting Cacti

By A. Boarder

AT this time of the year, a few notes on potting may be of some use to readers, but I would point out at the outset that some of the methods I am about to describe may be considered rather revolutionary. If you are satisfied with the way your plants grow and flower, just carry on as you are doing; but should you care to try a change, there is plenty of scope for experiment in the following.

There is no doubt that the manner of potting means a great deal with respect to the success or otherwise of Cactus culture, and it should not be undertaken without care in all details. In the first instance, the time to repot will depend a great deal on the condition of the plant. In my opinion, a cactus needs repotting at least once a year. This may seem strange to many people who may have heard that they need not be repotted for many years. If one realises the very small compass in which the generally lengthy roots of a cactus are crowded in a small pot and the state the small amount of soil will be in after months of watering, then it will be easily understood why many plants do not grow. Half the disease and rootbug would be avoided by more frequent potting. I have just repotted about one hundred and fifty plants and only found one with very slight rootbug, and this plant had not been repotted for at least two years, and, by the way, I had used burnt clay for crocks in this pot, whereas all the clean-rooted plants were repotted last year at least.

If one notices that a plant is not doing well it should be repotted at any time during the year. Also, if the soil in the pot takes much longer to dry out than that in other pots, then it requires a change.

The end of February is a good time to repot all Cacti; but the time will depend a little on the warmth of the greenhouse. I have also repotted in early September and have found that most plants grow well after this up to the end of November.

Before making a start on general repotting, make all preparations in good time. First get plenty of pots cleaned in readiness. By placing them in water for a few days they may be more easily cleaned by scrubbing. One should meanwhile get together all the potting materials. If you use burnt clay and find it a success you will need no advice from me, as I have not been successful with it. I have

found a good substitute for broken brick, which I consider the bugbear of potting; I have spent many weary hours smashing bricks with a hammer, to the detriment of my fingers, to use not only for crocks but also for mixing with the potting soil. This broken brick I now consider useless and have substituted charcoal, which can be easily broken with the fingers, and find it not only a great help to drainage but also of benefit to the plants. Charcoal may be bought either in lump or granulated. I mix granulated charcoal with the soil and use larger pieces for crocks. A good potting medium is: old turf loam made porous by the addition of plenty of clean, sharp sand, Bedford sand is very good. Then add $\frac{1}{4}$ inch charcoal, one part to about ten, and add a little crushed mortar rubble. A generous sprinkling of "Limax" will help to keep the soil free from pests. Moisten the mixture and leave it for a day or two.

When repotting, first remove the plant from the pot by pressing a small rounded stick into the hole at the base of the pot. The condition of the roots will indicate whether any trimming is necessary. If the roots appear healthy, do not disturb them any more than necessary. Just loosen the crocks and remove as much of the old soil as can be done without breaking the roots. Now take a clean pot large enough to take the roots comfortably; avoid cramming them into a small pot. Forget all about using very small pots as often advised, and use as large a pot as you can without making the plant look lost in it. If you err on the large side you will soon find that the plant will make good growth and look more in proportion. Those with long tap roots should have long pots so that the plant can be kept well down in the soil. Now cover the base of the pot with lump charcoal, using pieces just large enough so that they do not fall through the drainage hole. Do not use one-third of the pot drainage, you are wasting valuable space.

If your soil is porous enough, water should drain through it without crocks. Only use the charcoal to prevent the soil from falling through the basal hole. Now sprinkle a little soil over the charcoal and then a pinch of crushed bones; these are very beneficial to the plant and are very lasting. It may be suggested that by frequent repotting the plants are unable to obtain any benefit from

the bones, but when next repotting the roots will be found to have such a firm hold on the bones that they may be repotted without breaking these away. Now steady the plant in the pot and gradually run the soil between the roots. Press in gently with a blunt stick and be careful that the roots are not broken. Do not ram too tightly as the soil will soon tighten up with watering and the swelling of the growing roots. The soil should come up to where the old soil mark shows on the plant. Be careful to see that there is plenty of room left at the top of the pot for watering; this is most essential.

The pots should not require any watering for a few days and the time will depend on the weather and the warmth of the greenhouse. It can easily be ascertained if the plant has been potted correctly by the way the water runs down through the soil and a little practice will soon enable one to achieve success.

I have made several experiments this year and find that it does no harm to a plant to repot it when it is in bud or flower, if one is careful. I repotted a young *Astrophytum myriostigma* in early September this year after it had had three flowers open and there was a small bud showing, which has opened before the end of September. I have repotted many others when in bud and they do not appear to have been retarded in any way.

In conclusion, I would ask that amateurs should try and treat Cacti more as plants and not as fossils, by giving them better growing conditions.

Popularising the Cactus

DURING a recent visit to Copenhagen I was struck with how very much more popular was the cactus than at home. The windows of the fine new blocks of flats in the workman's quarters and those of large houses of the well-to-do, were alike filled with cacti. In fact, the new blocks seemed as though designed for the purpose, so well suited as sun-traps were their corner windows. And upon street barrows cacti, for as low a price as sixpence, were on sale along with apples and plums. In some cases the salesmen had tried to make their goods attractive by "lipsticking" their spines with coloured inks!

This practice I do not advocate. But I had an amusing example the other day of the fact that these prickly objects of our care can

exercise their fascinations on the general public if given a chance.

I left the last meeting carrying with me a *Euphorbia* I had brought to be named and, with it, drifted into a tea shop. To the waitress as she swept up the debris of the last meal, I said:—"Please take care not to hit my plant." "Why, it's a cactus!" she cried. I did not correct her, for when I bought it ten years ago I also was of that opinion.

Off went the waitress and I heard her say: "A lady over there has a most lovely cactus." Soon another waitress came and said: "May I see your cactus?"

And while I was consuming my tea, up came a lady customer, on her way to the pay desk, and said: "May I see your lovely cactus?" And in the background I heard someone murmuring: "They are wonderful, those cactuses. They only flower once in a hundred years." A statement many members would not agree with.

Finally, having finished my meal, I, in my turn, approached the pay desk. But the cashier took no interest in my bill. She said: "May I see your lovely cactus?" and then asked a number of questions as to watering and general care.

Nor did the interest end there. In the 'bus, passengers said: "She has got a cactus." And took care not to bump against it.

I suggest, therefore, that members should take some of their more hardy treasures out to tea and for a few 'bus rides. The public familiarised with the idea of the cactus as a household pet will, I feel sure, in a short time become as cactus-conscious as are the Danes, the Germans, the Dutch and Belgians. And peaceful occupations may replace some of the less desirable recreations now popular.

M. E. DURHAM.

THE CACTUS JOURNAL is published quarterly, in March, June, September and December. It is sent free to Full Members of the Cactus and Succulent Society of Great Britain, the annual subscription for Full Membership being 10/-. Contributions of articles and photographs to the Journal are invited; all communications should be addressed to the Hon. Secretary and Editor, Mrs. V. Higgins, 28, Northampton Road, Croydon.

Kalanchoe Blossfeldiana V. Poellnitz Sp.N.

(*Kalanchoe globulifera* Perr. de la Bâthie
var. *coccinea* Perr. de la Bâthie)

ACCORDING to the rules of botanical nomenclature a variation of a plant species should differ only in a few characteristics from the type itself. Dr. von Poellnitz, a specialist in succulent plants, observed that the well-known *Kalanchoe globulifera* var. *coccinea* differs in nearly all characteristics from the type. After careful comparison of living plants with the description of *Kalanchoe globulifera* and its variety *coccinea* published in *Arch. de Bot.* II. Bull. Mens. 2 (1928) à Caen (pages 25 and 26), it proved necessary to describe this variety *coccinea* as a separate species. The new name *Kalanchoe Blossfeldiana* was given in honour of the distributor of this plant, Mr. Robert Blossfeld, Potsdam.

Here it must be stated that growers of *Kalanchoe Blossfeldiana* in Germany have sold their plants generally just when buds are showing colour. But much better prices might be obtained if the plants were sold when the flowers are fully developed. As flowers of *Kalanchoe Blossfeldiana* keep in full beauty for two months without fading, there is no risk in selling plants with fully opened flowers.

Also the germination of seeds seems to have caused trouble here and there. But this trouble is the consequence of unsuitable treatment or negligence only. If no good germination is obtained the seed pan has been kept either too wet or a bit too dry. It is said that the germination of *Kalanchoe* seeds is a challenge for a gardener, but in my opinion it is only a test for the ability and carefulness of gardeners, as such fine seeds need only some special care until germination is perfected.

This spring I placed some *Kalanchoe* plants, nearly over flowering, in an outdoor succulent group. Probably seeds were produced freely, because they germinated at the base of the plants on ordinary soil like weeds.

Kalanchoe Blossfeldiana does not need big pots, as it has a rather small root system. During past years we have learned that it is not necessary to grow several plants potted up in one pot. If seeds are sown in the first months of the year, single plants will get big enough and will easily make large bushy plants. In spite of its succulent character the plant can be grown in the first summer

months in about the same compost which is used for chrysanthemums. Only the last potting must be done in a really well-drained succulent compost, i.e. without the addition of fertiliser. In this way the plants will grow very large and will not rot in dull winter weather. The leaves also should never get wet in winter and the minimum temperature should be 48° F. Do not think that this plant must be grown hot because it is of Madagascar origin. It grows in Madagascar on high mountains in a rather cool temperature, and the optimum temperature should be around 60° F. during spring and summer. In order to get fine compact pot plants, as much light as possible should be given in winter; otherwise the flower spikes grow too long.

In the current year extensive trials have proved that *Kalanchoe Blossfeldiana* grows extremely well when planted out and cultivated in cold frames during the summer. By this method plants grow much quicker and are better branched than when grown in pots for the summer months. They should be potted up by the end of September in not too large pots, using a compost not containing any fertiliser, just a compost fit for growing succulent plants. But after potting the plants should not be kept in a close and damp atmosphere, good ventilation must be given them at once.

Much is written in the horticultural press about the propagation of *Kalanchoe*. In my experience, and in accordance with the experience of the most successful growers, a propagation by cuttings is not fit for commercial cultivation. For this purpose the plant must be propagated by seed, which method is also much cheaper. Successful propagation by cuttings is greatly retarded as the plants, owing to their enormous floriferousness, will produce suitable cuttings only very late in the summer. Consequently plants from cuttings will never reach the size of plants grown from early sowings.

As a cut flower *Kalanchoe Blossfeldiana* is also of real value, as the flowers are very graceful, have a brilliant scarlet colour and keep for a very long period, outclassing any other cut flower. Flowering branches of *Kalanchoe Blossfeldiana* keep about two months in full beauty.

Never before has a horticultural novelty created such a sensation and been accepted with the same enthusiasm by nurserymen and gardeners in all parts of the world as has this wonderful Crassulacea. The flowering period falls in the first months of the year. The first flowers from January sowings open

in the middle of January of the next year. Later sowings, which can be made until the middle of July, give somewhat smaller plants, which will flower from Easter until Mother Day and even until the end of May. The easy and cheap cultivation, the floriferousness, the brilliant scarlet flowers and the astonishingly long time the flowers last without fading, make this plant one of the most valuable new winter-flowering pot plants in existence. I have worked up since 1930, by careful selection of seed parents, a selected strain which will soon outclass the type. Seeds of this "Selecta" strain have been saved for years from early flowering, vigorous-growing plants, having over fifty flowerstalks and the largest single blooms of the brightest colours.

R. BLOSSFELD.

Conophytum Laxipetalum, N.E.Br.

STEMLESS. Growths cuneately obovate in outline, two-lobed, 1-1½ inches high, 8-10 lines broad at the upper part and 4-5 lines thick, much compressed throughout, the part below the lobes being scarcely thicker than the base of the lobes, which are erect and more or less closed together, 4½-6 lines long and 3½-5 lines broad at the base of the notch, flat on the inner face with sharp edges, sharply keeled on the back, the keel rounded into the apex in side view, but with one lobe often smaller and more acute at the apex than the other; surface smooth, glabrous, glaucous-green, sprinkled all over with somewhat inconspicuous and very small dots of darker green, but which on the sheath of the previous year are large and very evident, the edges and apex of the lobes are dull reddish. Calyx membranous, 5-lobed, with the ovary-part included in the growth; tube 1 line long; lobes 1 line long, oblong, obtuse. Corolla of only flower seen compressed and about 10 lines in its greater diameter, opening only in sunshine; tube 5½-6 lines long, yellow; petals rather lax, in two series, 4-5 lines long, ⅓-½ line broad, linear, acute, bright golden yellow on both sides. Stamens numerous, in several series, the inner arising close to the bottom of the corolla-tube, the anthers all attaining to nearly the same height and just exserted from the mouth of the corolla-tube; filaments and

anthers of a paler yellow than the petals. Glands in a pale green ring. Style arising from the conical green top of the ovary and about 2½ lines long, pale greenish yellow; stigmas 5, filiform, 3 lines long and about equalling the stamens, light yellow.

Little Namaqualand: near Springbok, *Herre* 8415!

The above description is made from a plant that flowered soon after its introduction, so that probably both the growths and the flower will become rather larger under cultivation. In the form of its much compressed growths and the erect and somewhat closed together lobes, it appears to be a very distinct species.

CONOPHYTUM COMPRESSUM, N.E.Br.

Stemless, or nearly so. Growths about 2 inches high, 13 lines broad and 5 lines thick, cuneately oblong in side view, two-lobed at the top, much and about equally compressed throughout, the lobes not being more compressed than the body except just at the apex, where in end view they become shortly acute; lobes 8-10 lines long, suberect, flat on the inner face, with sharp edges, their tips being 3-4 lines apart, keeled on the back and the keel extending for three-quarters of the whole length of the growth as a cartilaginous line or connected row of dots, in side view the keel is rounded into an acute apex, and in dorsal view the lobes are shortly acute, their edges are marked with a line of dots like the keel; surface smooth, glabrous, uniformly whitish green or pale glaucous-green, not dotted, but with a long, narrow, cuneate, darker mark under the notch and the tips of the lobes purplish. Flower (only one seen and perhaps undeveloped) about ¾ inch in diameter, expanding in daytime, not exserted beyond the notch (always?). Calyx 4-lobed, membranous; tube 1 line long; lobes imperfect. Corolla with a tube 5 lines long; petals in two series, 5-6 lines long, ½-¾ line broad, linear, obtuse or acute, yellow, shining. Stamens numerous, all arising from the base to the middle of the tube of the corolla, anthers all exserted; filaments and anthers yellow. Style ¾ line long; stigmas 5, exceeding the stamens and about 7 lines long, filiform, yellow.

Alexander Bay, *Herre* 8460!

This is a very fine and distinct species, that is of about the same size as *C. bilobum*, but much whiter in colour and remarkable for having the body part of the growths much flattened.

N. E. BROWN.

Editorial

WHEN this number of the CACTUS JOURNAL is sent out, preparations for the Christmas season will be in full swing; may we, therefore, take this opportunity of conveying our good wishes to our Sister Societies and to all those who are interested in the growing of Cacti and other succulent plants. May their interest and pleasure in this hobby be still further increased in the New Year.

It is realised that beginners find the Latin names somewhat of a stumbling block, but time and habit may easily cure this. Does the more experienced grower always realise the difficulties which are added to the subject by the multiplicity of names? It is not easy to define what is meant by a species, but a close knowledge of the plants shows that they do tend to fall into fairly well-defined groups. Some species are much more variable than others and, in our opinion, much time and trouble is wasted in trying to find names for each variation. Matters would be considerably simplified if a broader view of "species" were taken.

Consider, for example, the *Sempervivums*; we remember being shown a wonderful collection which included 2,000 different sorts, and the impression left on our mind was that only an expert could possibly cope with these plants. In his excellent monograph on this genus, Dr. Lloyd Praeger has reduced the number to twenty-three true species, all the others being regarded as variations or hybrids. Now, twenty-three species is a number with which any one may hope to familiarise themselves; and when one realises that all the additional names cover an endless series and in some cases that a name may refer to a chance hybrid which has occurred once and may never be repeated, the broader definition of species seems to be justified. If a given plant is *known* to be a cross between two true species, there is no harm in labelling it as such, but when the hybrids have occurred naturally and may themselves be the progeny of hybrid parents, the application of even varietal names seems waste of time. It is better to call it simply a variety of the true species which it most closely resembles.

Similar difficulties arise amongst the *Stapeliads*. The number of varietal names found under *Stapelia variegata* is enormous—and endless; in its native habitat the plant shows marked variation from the type, but as these variations form a series diverging from the type by very slight amounts, they can

hardly be considered as having achieved even varietal rank. When one remembers that the flowers produced on one and the same plant of *S. variegata* may differ quite markedly from each other, it is surely time to consider and call halt and enquire whether it is not better to be content to let the specific name cover the variations that occur, rather than to try and differentiate an incoherent mass into its component parts, giving each a definite name—which has to be recorded and remembered.

Geographical variations in a plant are often given varietal names even when these are so little impressed on the plant body as to become lost under cultivation. Surely it is waste of time, except as an instructional note, to add varietal names in such cases.

In the interests of the many people, not all of them trained botanists, who are interested in the correct naming of plants, we would like to plead for a general reduction in named varieties; and it might be added that botanists are by no means the only or even the chief sinners; the broader view of species and the recognition of polymorphic species is being generally adopted by botanists to-day, while growers, both amateur and professional, are all too ready to "make a new plant" by adding a new name.

Meetings

THE meeting held on September 23rd was devoted to exhibits, when a number of members brought plants of interest. At the October meeting, Dr. Schweickerdt gave an informal talk on "Succulent Plants in the Transvaal," which he illustrated by a number of very fine photographs. This talk has not been reported in the usual way as Dr. Schweickerdt himself has contributed an article on the subject to this number of the Journal embodying the main points of his talk and giving fuller details.

The Meetings in 1935 will be held on the following dates:—

January 8th.	
February 5th.	ANNUAL MEETING.
March 19th.	
April 24th.	
June 4th.	
July 2nd.	} EXHIBITION.
July 3rd.	
September 10th.	
October 22nd.	
November 26th.	

Exchanges

MANY members would like to exchange their surplus plants and the Council has appointed Mr. A. Boarder to act as Exchange Secretary, in order to assist members as far as possible by putting them in touch with each other. The Exchange Secretary will *in no case* handle any plants; members must arrange the actual exchanges themselves.

Any one who wishes to make such an exchange should send in particulars to Mr. Boarder; stating whether they have plants, small seedlings or seeds for exchange and what type of plant they would like in return. In the same way, members who are particularly interested in any genus are invited to inform the Exchange Secretary so that he may put them in touch with other members of similar interests for purposes of correspondence.

It is hoped that as many members as possible will forward particulars of the kind of plants in which they specialise so that a catalogue of members may be compiled with the groups in which they specialise for future use and reference.

As it will obviously take a little time to get such a record in full working order, members who send in lists of plants for exchange are asked not to expect an answer for a week or two; once the scheme is working there will be little delay.

As it is to everyone's advantage to get into touch with others with similar interests it is hoped that most, if not all, the members will help with this scheme by communicating with the Exchange Secretary, even if they have no duplicates to dispose of at the moment. Mr. Boarder's address is:—Marsworth, Meadway, Ruislip, Middlesex.

THE following members would like to make exchanges:—

Dr. A. D. Houghton, The Houghton Gardens, San Fernando, California, is interested in *Ceropegias* and would like to get into communication with other members also interested in this genus with a view to exchange.

Mrs. V. Higgins, 28, Northampton Road, Croydon, is also interested in *Ceropegias*, so that, if any member has duplicates to dispose of, she would be glad to hear from them. Other *Ceropegias* or seedling Cacti could be offered in exchange.

Mr. A. Boarder, Marsworth, Meadway, Ruislip, Middlesex, has the following seeds and seedlings for exchange, and would like other *Mammillarias* in return:—

SEEDS.—*Mammillaria amoena*, *M. aurihamata*, *M. bocasana flavispina*, *M. collina*, *M. centricirrha* var. *Payanni*, *M. c.* var. *Hopferiana*, *M. c.* var. *macracantha*, *M. c.* var. *longispina*, *M. durispina*, *M. dioica*, *M. elongata*, *M. elongata* var. *rufescens*, *M. e.* var. *rufocrocea*, *M. e.* var. *echinata*, *M. Fischeri*, *M. falcata*, *M. gladiata*, *M. grandidens*, *M. Hahniana*, *M. Krameri*, *M. Lesaunieri*, *M. Marshallianus*, *M. Martinlyii*, *M. procera*, *M. pusilla albida*, *M. petrophila*, *M. Runyoni*, *M. rhodantha*, *M. rhodantha* var. *Drogeana*, *M. rh.* var. *fulvispina*, *M. rh.* var. *Pfiefferi*, *M. spinosissima*, *M. Schaefferi*, *M. tricantha*, *M. Waltheri*, *M. Wildiana*, *M. Vaupelii*, *M. sphaerica*, *M. longimamma*.

SEEDLINGS.—*M. sphaerica*, *M. longimamma* major, *M. dioica*, *M. hidalgensis*, *M. dolichocentra*, *M. Kewensis*, *M. rhodantha Drogeana*, *M. rhodantha fulvispina*, *M. spinosissima*, *Cereus grandiflorus Tellii*, *Echinopsis tricolor*, *Echinocactus Ottonis*.

Book Review

“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.

The twenty-first number of this excellent publication includes an illustration of a large clump of *Aloe mitriformis* crowned with many short spikes of bright red flowers, photographed in the Huntingdon Botanic Gardens. *Opuntia subulata* is also figured; in greenhouse cultivation this plant does not readily flower, but in milder climates where it can be grown out of doors it will develop at the ends of the branches its lovely pinkish flowers. The illustration of *Cereus Huntingdonianus* shows one flower on this beautiful *Cereus*, whose native home is unknown but is thought to be the La Plata region. The fourth picture shows *Lemaireocereus euphorbioides* in bloom, the deep red buds open to show the paler petals within and creamy stamens in abundance projecting from the throat; this plant was long known in cultivation and was thought to have come from Brazil but its locality has now been rediscovered in the State of Tamaulipas, Mexico.

A Letter

WE have received from Mr. H. J. Solomon, of Sydney, an interesting description of the work he has been doing on his rockery; unfortunately, space does not permit the inclusion of the photograph he encloses, but the description will be of interest to those members who like to grow their cacti planted out in beds.

"I enclose you a photograph of the cactus rockery I have just reconstructed. In my opinion this is ideal, especially with the material we have in Sydney—sedimentary sandstone laid on the natural beds. When I am away in the bush shooting and fishing, I observe all sorts of rock formations with a view to improving the artistic lay-out of my garden, but, of course, one cannot keep exactly to nature, as there is such a thing as holding the soil up to stop the drift. This bed was taken to pieces, three tons of soil removed, 3 tons of new soil put in, the stones all relaid and the plants put in in one day. I am sure you will agree with me that it is not a bad day's job. I lifted all the plants, my man did the soil and I relaid all the stones and plants.

"At the bottom of the bed I put about 6 inches of broken sandstone, on top of this I put about 1 inch of compost made up of 10 barrow loads of decomposed granite, 10 loads of river sand, 10 loads of rotted plane leaves (I would rather have oak but they are not available), 8 loads of good loam, 4 kerosene tins full of powdered limestone, 2 tins of powdered bone dust, and a bag of about pea size charcoal. I think this compost would grow anything, and the water never lies in it.

"I am sorry I had not enough Cactus to go round the bottom, I have lost so many plants, but I will fill up all the lower edges with the *Stapelia* family. When it settles down I think it will look very attractive.

"For your information, at one time I had over 5,000 pieces of Cactus and a great many show plants collected from Mexico, and I suppose I have not over 1,500 left; the weather here does not suit them at all. Since last January I suppose it has rained more or less every week. We have certainly had 40 inches rainfall this year in Sydney."

THE List of Members will be reprinted in the New Year, and the Hon. Secretary would be glad to be notified of any corrections or changes of address.

Mammillaria Seeds

It has been suggested that it would be interesting and instructive if a number of people grew seeds supplied from the same source and the resulting plantlets were compared at a later date. It has been decided to include in the schedule for the Cactus Exhibition in July a class in which these seedlings may be shown; and Mr. Boarder has kindly offered to supply seed collected from one of his *Mammillarias* for the purpose; about six seeds will be sent to each applicant. It is hoped that a number of members will help in this experiment; the plants to which award is ultimately made will not necessarily be the largest, but strength of spines and general condition of the plant will be taken into account.

Those willing to obtain seeds for trial should send a stamped addressed envelope (no letter is necessary) to Mr. A. Boarder, Marsworth, Meadway, Ruislip, Middlesex. No seeds will be sent out until January.

The International Garden Club

THE attention of members is drawn to the International Garden Club, which has for its object the world-wide exchange of seeds and plants. Rosters are issued every two months; in these are given the list of members together with the plants in which they specialise. This is an excellent method for any one interested in acquiring new and unusual plants to get into contact with others with similar interests. The subscription is 5/- per annum. Entry forms may be obtained from V. Launder Millin, 8, Napier Terrace, Napier, New Zealand. Plant and seed lists from commercial growers of cacti, etc., are desired at the club's headquarters, and should be sent to the above address.

THERE is an interesting note on the damage caused by fungi to *Stapeliads* in the November number of *Desert*; plants attacked show black spots, and wherever possible, the parts affected should be cut away. The use of a lime-sulphur spray once a week is recommended as a preventative to attacks of this fungus, *Triposporium Stapeliae*, which appears to be very wide-spread, heavy losses due to this cause being reported from all over the world.

Antirrhinum Rust: A Plea

Mr. F. J. Chittenden, Technical Adviser to the Royal Horticultural Society, has asked that the following notice may be brought to the attention of as many people as possible.—V.H.

THE first authentic record of the rust disease of *Antirrhinum*s in this country was made in July 1933, and notes on it appeared in our JOURNAL for February last (p. 119). It spread rapidly in south-east England by the autumn of 1933, and since then has spread still further, so that no part of England can be regarded as free from it. The rusted plants wither and look as though they had been scorched, so that many plans for bright beds have been frustrated. Only varieties and hybrids of *Antirrhinum majus* have so far been attacked, and all written here refers to these *Antirrhinum*s only.

So serious is the menace of this disease against this popular plant, and so difficult would it be to replace it by another equally suitable for the purposes for which it is used, that we would urge most strongly that all our Fellows should take the only steps which seem at all likely to prevent its recurrence, and impress upon all their neighbours to do the same.

The importance of the plants in English gardens may be gauged by the fact that over a ton of seed of *Antirrhinum*s is sold in England every year, and when one remembers that an ounce of this seed contains about 180,000, it will be seen that something like seven thousand million seeds of *Antirrhinum* are sown annually in this country.

A brief review of the facts seems desirable.

Until 1933 the disease was unknown outside N. America and Bermuda, where it has wrought havoc and proved difficult or impossible to control.

We do not know how it reached England, and all available evidence shows that infection is not carried on, in, or with the seed. No other plants are known to be attacked (save perhaps species of *Linaria*).

The fungus produces two forms of spore :

- (a) Short-lived spores with a maximum of six weeks' vitality (uredospores).
- (b) Spores capable of living for at least six months (teleutospores).

The *uredospores* are capable of immediate germination, and falling upon *Antirrhinum* foliage rapidly reproduce the disease. Infections have been seen to occur at practically all times in the year when the most favourable temperature (50° to 60° F.) occurs. At a higher temperature (68° and over) they ger-

minate less readily. It therefore seems that high temperatures are not necessary for the propagation of this fungus.

The *teleutospores* germinate after a period and quite freely in winter, at a temperature of 50° to 60°, but less readily in spring. All attempts to reproduce the disease by the teleutospores directly have so far failed, and if it is reproduced indirectly (as in many rust fungi) the steps are not known.

We must therefore suppose that the uredospores are the only means by which the disease is reproduced.

A plant bearing even the most minute patch of uredospores, which might easily pass unnoticed even by a keen eye searching a bed for the disease, is thus a potential centre from which infection may spread. It is a menace to all new plantings.

The one step, therefore, that seems likely, if taken, to prevent future attacks of the disease, is to destroy every plant of *Antirrhinum majus*, whether known to be infected or believed to be perfectly free in all gardens, by fire by the end of November. Preserve no seedlings and no cuttings, but start afresh in 1935 by sowing fresh seed in pots cleansed with boiling water and crocked with similarly cleansed crocks in fresh soil, and prick out into clean boxes in fresh soil.

This method with a plant so easily raised as the *Antirrhinum*, and of which such good stocks of seed are now available, entails no hardship and no sacrifice. Between the end of November and the time for seed sowing at the beginning of March, a sufficient time will elapse to ensure the death of any stray *uredospores*, but if any plants are left alive through this period there is almost certainly that they will carry the disease over to the next year. Will all Fellows do their part and encourage all other gardeners to do the same ? It seems the only way.

So-called immune varieties are at most only partially immune, and if absolute immunity in any plant is discovered it will take many years to ingraft that quality into the many varieties growers use. Spraying has in this country so far not given hope of success in dealing with the disease, and the most favourable reports from America show that only in certain weather conditions (which rarely occur here) does it prove at all successful.

Complete destruction of all *Antirrhinum*s in all gardens everywhere this month will give us the best chance of avoiding the repetition of the disappointment that has come to so many in the present season.

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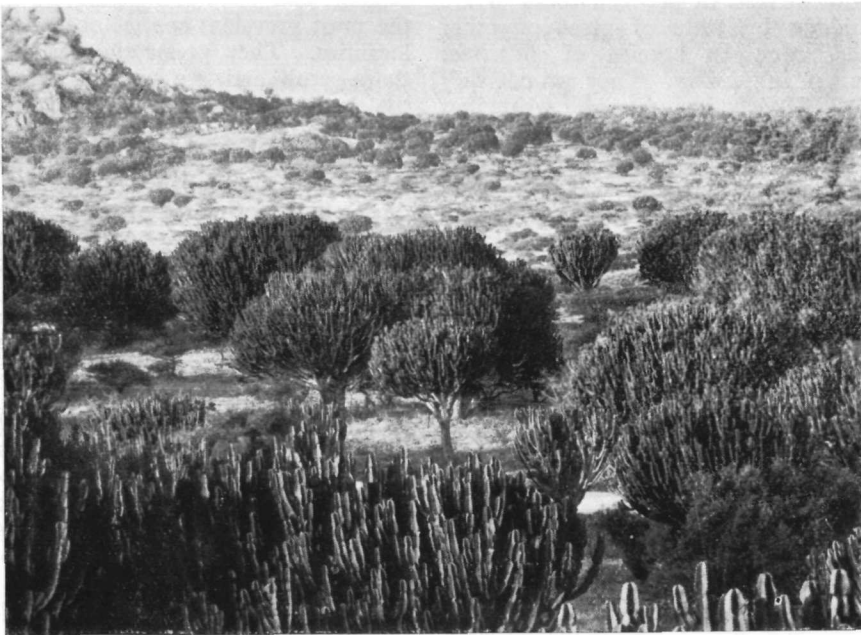


Fig. 1. *Euphorbia ingens*.

A Short Account of the Succulent Flora of the Transvaal

By H. G. Schweickerdt, B.Sc., Ph.D.

(Continued from page 31).

ASCLEPIADACEAE

The *Stapelieae* although only represented by about twenty-five species belonging to various genera, form an integral part of the succulent flora. According to their habitat these plants may be roughly classed into two groups, *a*. those which prefer a rocky substratum and are therefore usually found growing on rocky hill-slopes or among rocky

outcrops, and *b*. those which always grow on fairly level sandy soil and are thus found in the lower altitudes, frequenting sandy plains.

The *Stapelieae* hardly ever grow in exposed positions but much prefer the partial cover and protection of grasses, shrubs or trees. Each of the mountain ranges of the Transvaal appears to have its own endemic species.

Page Forty-one

On the Magaliesbergen and the neighbouring Daspoort Range, the endemic species are *Huernia transvaalensis* Stent and *H. loesneriana* Schltr., *Caralluma lutea* N.E.Br. and *C. melantha* (Schltr.) N.E.Br. are frequently met with on these hills, and although the type locality of *C. carnosa* Stent. is the Magliesbergen its exact locality is no longer known; during the last few years, however, this species has been recorded from the sandy areas to the north of the Zoutpansbergen. The above species prefer the sunny northern slopes of the mountains and are not easily detected, as they often grow wedged in between rocks or are partly hidden by tufts of grass or other succulents, such as species of *Crassula*, *Cotyledon* and *Euphorbia*. They are not very abundant. A party including the writer has spent more than one morning in trying to rediscover *H. transvaalensis* in its type locality, and it was only after what appeared likely to turn out an almost futile search that it was eventually located.

Huernia confusa Phillips is only known to occur on a westerly spur of the Drakensbergen. *Stapelia Leendertziae* N.E.Br. is endemic to the hills surrounding the small village of Heidelberg, whereas its nearest relative *Stapelia Wilmanae* Luckhoff has so far only been recorded from Barberton in the Lowveld of the eastern Transvaal. *Huernia bicampanulata* Verdoorn is only known to occur on rocky slopes of small hills to the south of Pietersburg in the north. *Stapelia clavicorona* Verdoorn and *Huernia Nouhuysii* Verdoorn appear to be endemic to Wylie's Poort in the Zoutpansbergen. The latter two are very uncommon species and both grow on rocky ledges or steep rocky slopes, apparently preferring a sheltered position under cover of such shrubs as *Portulacaria afra* Jacq. Botanically the Zoutpansbergen are as yet little known and this mountain range almost certainly holds many a remarkable find in store for the enthusiastic collector. For instance, the following species have all become known from that area within recent years:—*Caralluma Rogersii* (Bulus) Bruce and Dyer, *C. grandidens* Verdoorn, *C. carnosa* Stent, *Stapelia kwebensis* N.E.Br., *Stultitia Tapscottii* (Verd.) Phillips, and *Ceropegia cimiciodora* Obermeyer, the latter not being a member of the *Stapeliae* but interesting in so far as it is the only succulent member of its genus hitherto recorded from the Transvaal.

The sandy plains to the north of the Magalies-, Water- and Zoutpansbergen harbour a fairly rich succulent flora, but it

is only in the more open type of dwarf-bush country where the succulent Asclepiadaceae are prevalent. The soil in these localities consists of very fine sand, in fact it is almost silty; the grass cover is fairly scanty and the thorny bushes and small trees form clusters allowing ample unprotected spaces between these clusters. *Duvalia polita*, N.E.Br., *D. transvaalensis* Schltr. *Huernia Vogtsii* Phillips, *H. zebrina*, N.E.Br., *Stapelia nobilis*, N.E.Br., *S. kwebensis*, N.E.Br., *S. Gettleffii* Pott, *Caralluma grandidens* Verd., *C. carnosa* Stent, *C. lutea*, N.E.Br., *C. atrosanguinea*, N.E.Br. and *Tavaresia grandiflora* Berger are the most prevalent species occurring in such localities. They prefer the partial shade of thorn-scrub and are usually found to hug the stems of such, as may be seen in the case of *Tavaresia grandiflora* Berger (Fig. 2). They furthermore appear to prefer an eastern aspect; this is probably due to the fact that during the morning the sun is not as penetrating as during the afternoon. Thus when out succulent hunting the writer cultivates the habit of looking on the eastern sides of bush groups and the harvest invariably is a rich one. The prevalence of *Stapeliae* under cover of bushes may furthermore be accounted for by the anemophilous (wind) dispersal of their seeds. These seeds with the apical tufts of long silky hairs are easily carried off by the wind; the majority of seeds strike bushes, become detached from their tuft of hairs and fall into cover where conditions naturally are most favourable towards germination and further development.

The flowering time of the *Stapeliae* is during the late summer, autumn or even the beginning of winter. The odour emitted by the flowers is usually a very unpleasant one. *Stapelia kwebensis*, N.E.Br. has the most offensive and penetrating scent of all Transvaal *Stapeliae*, and yet the author has never observed flies to lay their eggs on the flowers of this species. *Ceropegia cimiciodora* Oberm. bears flowers the odour of which resembles that of a bug (cimex=bug); hence the specific epithet. Another curious fact is that the flowers of *Duvalia polita* and *D. transvaalensis* are apparently odourless; the same applies to some species of *Huernia* viz. *H. zebrina* and *H. Hystrix*.

Of all the Transvaal *Stapeliae*, *Caralluma lutea* N.E.Br. has the widest distribution, since it is found in all dry and arid regions of the province. At least four different forms of this species are known to the author; one with relatively short petals, one with sessile coronas and again a form in which

the corona is distinctly raised and stalked. These differences, however, may warrant varietal distinction, but at the present time not enough is yet known about the taxonomic value of the above-mentioned characters to justify such varietal distinction.

EUPHORBIACEAE

The succulent *Euphorbiaceae* are among the most interesting of all the Transvaal succulents. Only the genera *Euphorbia* and *Monadenium* are of special interest.

Monadenium is a tropical African genus and the species *M. Lugardae*, N.E.Br. appears to be the member occurring farthest south. It is only known to occur in about five localities in the Transvaal, three of which are known to the author. It may thus be considered a rare plant and Kew may be justly proud of the specimens it has in cultivation. The habit of *M. Lugardae* is a variable one; some plants are much branched at the base and the numerous succulent, erect branches may reach a height of $1\frac{1}{2}$ to 2 ft. and a diameter of approximately 1 inch; some plants are again much branched at the base but the stems are almost prostrate and being set with numerous persistent shield-like leaf-bases somewhat resemble a snake. The fleshy obovate leaves are developed apically and there form a loose rosette where also the inflorescences lie hidden. The prostrate stems often root along the surface of contact and this should facilitate the propagation of the species by vegetative methods. *M. Lugardae* never grows in exposed situations but usually in the shelter of bushes or of rocks; it prefers sloping ground and a warm northern aspect. Its abundant latex is supposed to be highly toxic and is said to be used by natives to procure abortion.

The succulent species of *Euphorbia* may be roughly divided into three groups:—

- (a) the arborescent type.
- (b) the shrubby type.
- (c) the acaulescent, pulvinate type.

The following species fall under the first category: *Euphorbia Tirucalli* L., *E. ingens* E. Mey., *E. Cooperi* N.E.Br. and *E. Evansii* Pax. All these species are gregarious and usually form fairly dense groves which impart a strange character to the landscape (Fig 4). Isolated specimens are not commonly met with. They appear to prefer hilly country and often grow in very rocky positions. They flower in late autumn during the months of April and May and only bear relatively small or rudimentary leaves.

Of the above species, three are known to grow on the Zoutpansbergen and the remaining *E. ingens* is found at a distance of twenty-five miles south near Bandolier Kop.

E. Tirucalli L. is said to be indigenous to India, but since the Indian plants rarely flower and are not found wild except in proximity to habitation, whereas they have a wide distribution in Africa and also flower very freely, it may not be incorrect to assume that the species was introduced into India several centuries ago by Portuguese or Dutch seamen. The plants may reach a height of 25 ft., usually have a well developed main



Fig. 2. *Tavaresia grandiflora*.

stem (up to 1 ft. in diameter), unbranched below but much branched above; the ultimate, cylindrical, fairly rigid branchlets (about $\frac{1}{4}$ inch in diameter) are of a drooping habit.

E. ingens E. Mey may reach a height of 30 ft. or more and is a plant of strange habit (Fig. 1). In outline it is generally obconical; the main stem is much branched at a few feet from the base; all branches ascend markedly to form a relatively flat crown. The slightly spiny dark green branches are four to five angled, the flanks very concave and the bright yellow inflorescences are borne along the ridges of these branches. A tree in fruit, having the apical twelve inches

of each angle of each branch studded with numerous capsules, is a remarkable sight. Old residents in the north Transvaal have assured the writer that the serious problem of preserving wood against the attack of termites may be overcome by burying branches of *E. ingens* in places where such timber is being used. The latex is also said to cause temporary blindness and should it come in contact with the skin, gives rise to painful blisters.

E. Cooperi N.E.Br. is a very graceful species, candelabra-like and symmetrical in outline; it may reach a height of 20 ft. The branches arise at regular intervals in whorls from the main stem and radiate at first slightly descending, but ascending towards the apex. The spiny branches are four to five ridged, with markedly concave flanks and are constricted at intervals; each constriction denotes the limit of a year's growth. By counting the number of internodes of a primary branch and the number of the node from which the branch arises (the main stem gives rise to one new node per annum) the age of plants of this species may be readily ascertained. The colour of the branch is a pale yellowish green and a plant in flower therefore is not as conspicuous as *E. ingens*. The natives are said to use branches of *E. Cooperi* for capturing fish; bruised branches are thrown into the water and since the latex has a stupefying effect on the fish, these rise to the surface and are consequently readily netted.

E. Evansii Pax is a species named in honour of Dr. I. B. Pole-Evans, Chief of the Division of Plant Industry, Pretoria, South Africa. It is a much less common plant than any of the foregoing species and does not occur in very great numbers. It is a symmetrical plant with gradually ascending, spiny branches; these arise in whorls at some distance from the base of the main stem. An old plant is not unlike a long-stalked umbrella, the umbrella-part of which has been inverted by a gust of wind. The flanks of the primary four-angled branches are usually only slightly concave and fairly rigidly spiny.

The shrubby types of *Euphorbia* are represented by the following species: *E. Schinzii* Pax, *E. Knuthii* Pax, *E. griseola* Pax and *E. enornis* N.E.Br.

Of all these, *E. Schinzii* is probably the most well-known and widely distributed. It is a much-branched species forming dense, spiny clusters about 6-10 inches high and grows in association with other succulents

(e.g. *Crassula*, *Huernia* to which it offers protection) in a northern aspect on rocky mountain slopes. Occasionally, however, it is met with in level, sandy, loamy soil where it grows under cover of taller shrubs.

E. griseola is only known to occur in the western part of the province adjoining Bechuanaland and then strangely enough again in the Steelpoort Valley near Lydenburg in the north-eastern Transvaal.

E. Knuthii is now and again met with in low, sandy, level soil. It is neither a striking nor particularly interesting species. The writer has not had the opportunity of seeing *E. enornis* in its habitat and very little generally appears to be known about this species. It also appears to have been collected, but only in 1912, by Dr. R. Marloth in the Pietersburg district.

The acaulescent, pulvinate type of *Euphorbia* is represented by three species, namely *E. Bolusii* N.E.Br. and *E. truncata* N.E.Br., both growing in the high veld, and *E. Davy* N.E.Br. from the bush veld. The greater part of their obconic main stem is usually buried in the soil with only the apical part, including the branches, rising slightly above the surface of the soil. They grow in open, flat country (*E. truncata* at Pretoria in association with *Lithops Leslei* N.E.Br.) and are inconspicuous plants easily overlooked. The latex of these species is used by the natives for making bird-lime.

LILIACEAE

The succulents of most frequent and conspicuous occurrence are the various species of *Aloe*. Representatives (about forty species) of this fascinating genus are to be met with in every conceivable locality, practically everywhere in the province.

They frequent dry plains, rocky mountain slopes, steep cliffs and even damp depressions adjoining marshes. Some species grow exclusively in exposed positions, whereas others seek a more sheltered aspect, some even grow in the partial shade of deciduous bush.

The distribution of any one species generally is not a very wide one; certain species are strictly endemic to a very limited area. For instance, *A. petrophila* Pillans is known to occur only on the faces of steep cliffs in the Zoutpansbergen; *A. Peglerae* Schonl. is only found on the summit of the Magaliesbergen and then again on the mountains in the vicinity of Ohrigstad in the north-east; *A. Pretoriensis* Pole Evans is endemic to the hills around Pretoria.

In the Transvaal most species of *Aloe*

flower during the South African winter months from May to August. Several species, however, flower during the summer and autumn months from December to February. Most species are evergreen, but *A. verecunda* Pole Evans, from high elevations in the Drakensbergen, is deciduous and forms new rosettes of leaves at the beginning of each growth period.

The majestic *A. Bainesii* Dyer in the Transvaal is only known to occur in the mountain gorges of the Drakensbergen near Barberton; it may reach a height of 60 ft. and very probably is the tallest of all species of *Aloe*. The main stem is usually unbranched for a distance of at least 10 ft. from the base and may have a girth up to 6 ft. Upwards the stem branches profusely, with the characteristic rosette of leaves terminating each branch. These rosettes give rise to inflorescences composed of a raceme of pinkish-yellow flowers, and a tree in full flower is a grand sight never to be forgotten.

A. Marlothii Berger is most ubiquitous and unusually gregarious; whole hillsides may be literally studded with many thousands of these plants. It is an arborescent, usually unbranched, plant reaching an average height of 10 ft. The much-branched inflorescence makes its appearance towards winter, at a time when most other plants present a dismal and dreary appearance. As the flowers vary in colour from bright crimson (when in bud) to a bright yellow (when in anthesis) this species produces a marvellous show of colour especially if great numbers of plants grow in close proximity. *A. Marlothii* is fairly general on the lower exposed mountain slopes of the Drakensbergen, the Waterbergen and some slopes of the Magaliesbergen.

Another species widely distributed in the Transvaal (and South Africa) is *A. arborescens* Mill. It is usually found perched high up on the edge of rocky ledges, and, unlike other species, apparently prefers a more shady and cooler position, since it mainly grows along cliffs with a southern aspect. It occurs in the Magaliesbergen, the Waterbergen, the eastern mountain region and is very common on the ledges overtopping the mist belt forests on the southern slopes of the Zoutpansbergen. It is a much-branched, shrubby, free-flowering and quick-growing species, readily roots from cuttings and is therefore an old friend frequently met with in cultivation.

Representatives of species generally found frequenting the plains are *A. rubrolutea* Schinz and *A. transvaalensis* Kuntze. The

former is an arborescent, gregarious South-West African species attaining a height of 10 ft.; it is usually unbranched and for the Transvaal has so far only been recorded from the Limpopo Flats to the north of the Zoutpansbergen. *A. transvaalensis* likewise is gregarious, but is acaulescent and is found in many localities in the Transvaal. The plants send out numerous suckers and in this way grow so densely together that they frequently completely cover several square

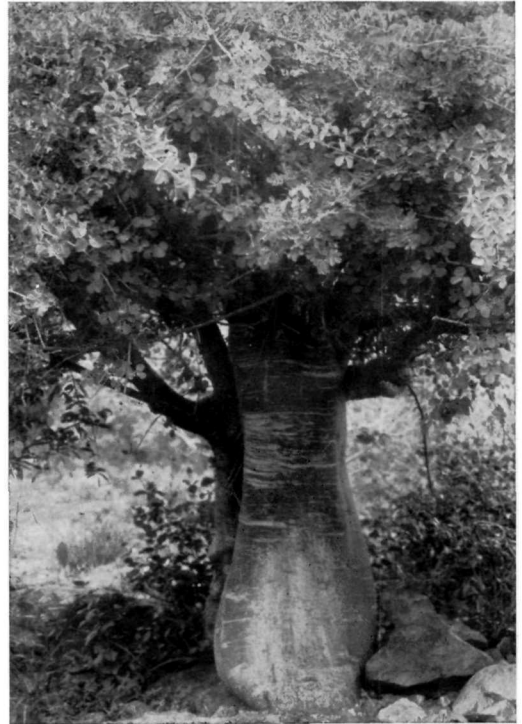


Fig. 3. *Adenia fruticosa*.

yards of soil. Unlike most others it is an early flowering species, the panicles of dull salmon-coloured flowers making their appearance during February and March.

Species which prefer a damp habitat are *A. Kraussii* Bkr., *A. Cooperi* Bkr. and *A. Ecklonis* Bkr. They usually grow in grassland in the vicinity of swampy depressions. They are acaulescent, bear corymbose, much contracted inflorescences and flower during December and January. They commonly occur in the higher lying eastern mountain regions. The leaves are extremely succulent and fragile and for this reason these plants are most difficult to transport without injuring them.

PASSIFLORACEAE

Strange and weird-looking species, *Adenia glauca* Schinz, *A. fruticosa* Burt Davy and *A. spinosa* Burt Davy belong to this family. The flowers of these species are not at all showy, but the habit of the leafless succulent stems so much the more so; these stems may assume various odd shapes and usually bear apical clusters of virgate unarmed or armed leafy branches (Fig. 3). These species mainly grow on rocky slopes with a northern aspect and usually are so tightly wedged in between rocks, that they can be removed intact only with great difficulty. They fruit and seed readily and on account of their peculiar habit deserve to find their way into cultivation. Plants of this genus are notorious for their high toxicity, which for succulent plants is not altogether strange since many South African members of the Euphorbiaceae, Apocynaceae, Crassulaceae and Compositae share this character.



Fig. 4. *Anacampseros Bremekampii*.

COMPOSITAE

Succulent members of this family are not of frequent occurrence in the Transvaal.

Kleinia stapeliiformis (Phillips) Stapf is a curious plant with succulent stems somewhat resembling those of a *Stapelia*. It usually grows under cover of bushes, very much in the same manner as *Stapelias* do; it is never plentiful. The long-stalked, brilliant orange-red flower-heads arise from near the apex of the stem and apparently do not set seed readily; the plant is readily propagated from cuttings. The stems frequently give rise to branches just above the soil level which grow down into the soil, take up a horizontal direction of growth and function as a

rhizome; the rhizome eventually grows upwards, protrudes beyond the surface of the soil to form an erect branch at some distance from the parent plant. *K. stapeliiformis* grows in sandy soil and has been recorded from several localities in the northern Transvaal.

Kleinia longiflora D.C. is a much-branched succulent bush of rigid appearance reaching a height of 2 to 3 ft. The flower-heads are inconspicuous and it is more because of the peculiar habit that this plant is interesting. It is occasionally met with on dry, stony ground and occurs in the dry, arid northern regions of the province.

APOCYNACEAE

A spectacular sight, once seen not easily forgotten, is a specimen of *Adenium multiflorum* Kl. in full flower. This strange plant, belonging to a family closely allied to the Asclepiadaceae, has a succulent, irregularly branched stem, from $\frac{1}{2}$ to 4 ft. high and as much in girth. It bears masses of star-shaped white flowers about $1\frac{1}{2}$ in. in diameter; the margins of the petals are deep crimson. The scantily developed foliage is almost completely obscured by the masses of showy flowers; it flowers during the winter months. This species occurs fairly generally in the plains of the low veld between the Limbombo mountains to the east and the Drakensbergen towards the west.

PORTULACACEAE

Anacampseros filamentosa Sims is commonly met with on the Magaliesbergen and the Zoutpansbergen. The branched stems bear dense clusters of almost spherical leaves and the plant generally prefers a fine sandy soil admixed with humus and coarse quartzite. In its natural habitat it grows among such quartzitic gravel and because of its close resemblance to this is easily overlooked. It is often an associate of *Frithia pulchra* N.E.Br.

Anacampseros Bremekampii v.P. is a dwarf succulent allied to *A. papyracea* but with stems of much smaller dimensions (Fig. 4). It has so far only been recorded from the Matopos in Southern Rhodesia and from the Bandolierkop area in the north Transvaal. There it grows in the extremely narrow fissures of apparently totally barren igneous rocks; it is very inconspicuous little white-flowered plant and is very difficult to remove intact.

BOMBACAEAE

Of this family only one species occurs in

the Transvaal. It is the giant "Cream of Tartar Tree," named *Adansonia digitata* L. (It is doubtful whether the South African species is correctly named as such!) The giant copper-red succulent bole may attain a diameter of 30 ft. and seldom exceeds a height of 20 to 30 ft.; it tapers very rapidly upwards and the branches are relatively short (Fig. 5). It is a deciduous plant flowering in spring just as the leaves appear; the large, white, showy flowers emit a penetrating nauseous odour. The many-seeded oblong or globose fruits contain a white pulpy mass of an agreeable acid flavour. The pulp mixed with water or milk is said to be a very pleasant and wholesome beverage.



Fig. 5. *Adansonia digitata* (?)

Owing to the soft nature of the wood, the stems are not infrequently hollowed out by natives or farmers and are used as store rooms for implements or vehicles. The species occurs in most parts of the low veld and is particularly abundant on the northern slopes of the Zoutpansbergen, where many thousands of specimens cover the hillsides.

VITACEAE

Only *Cissus quadrangularis* L. and *C. succulentus* (Galp.) Burt Davy deserve mention. Both species are succulent climbers with four-angled, winged stems, usually growing in the shade of bushes or trees. Closely appressed to the stem of their support they may climb to the top of trees where they exhibit their inconspicuous and not showy inflorescences.

PEDALIACEAE

Sesamothamnus Lugardii N.E.Br. is a most strange-looking succulent shrub which may reach a height of 15 ft. It has a very short main stem, irregular in outline and is much branched just above the base. The armed stiffly ascending or arching, rigid-looking branches are in fact very succulent and bear fascicles of small grey leaves. This species frequents deep sandy soil and is found in but a few localities in the Transvaal.

Several families, e.g. Sterculiaceae, Burseraceae, etc., succulent representatives of which occur in the Transvaal were not enumerated. In the opinion of the writer these are neither of frequent enough occurrence nor of conspicuous enough habit to be of special interest.

The photographs illustrating this article were taken by Dr. Herbert Lang, with whom the author has collaborated during the past six years.

MEMBERS have received notice that it is proposed to publish an English Edition of *Die Sukkulente*, by H. Jacobsen; the publishers, Messrs. Williams & Norgate, Ltd., have now completed arrangements with the Author and the German Publishers, and the work of translation is proceeding. It is hoped to have the English edition available by July, when the price will be 25/-; the publishers have offered, for a limited time, an opportunity for advance subscribers to obtain copies for 21/-. Herr Jacobsen has added a considerable amount of new matter, so that in the English edition 151 genera, including 1,087 species, will be described; there will also be 58 new photographs, showing 103 species, making 277 illustrations altogether.

Annual Meeting

THE third Annual Meeting was held on February 5th, 1935, at the Royal Horticultural Society's New Hall, with the Chairman, Mr. R. S. Farden presiding. The Report of the Council (see below) and the Balance Sheet were presented and adopted. The election of Officers for 1935 then took place. Lord Scone, M.P., was re-elected to the Presidency, and Mrs. Vera Higgins and Mr. J. Haddon were re-appointed Hon. Secretary and Hon. Treasurer respectively, while Mr. W. F. Athawes was elected Auditor for 1935. The three members of Council who had served longest—Mr. Denton, Dr. Marrable and Mr. Pullen—retired, but were re-eligible; since no further nominations had been received, these gentlemen were automatically re-elected.

Report of the Council for 1934

The Council are glad to be able to report that interest in the Society is well maintained. Forty-one new members have been elected during the year; four members have died, seventeen have resigned, whilst the names of fourteen members have been removed for non-payment of subscriptions. The total membership at the end of December was 367, of whom 345 are Full Members and 22 Associates. This does not greatly exceed the number on the lists at this time last year, but the attendance at meetings and the correspondence from members at a distance certainly indicates that great interest is taken in the Society's activities, and, while they hope that members will lose no opportunities of inducing others to join, the Council feel that the present state of the Society is a very healthy one.

The year began with the loss of our first President, Sir William Lawrence, Bt., and the following months only served to show how much the Society was indebted to him for his kindly help and guidance. Towards the close of the year, another good friend to the Society died, Dr. N. E. Brown, whose extensive work on succulent plants is so well known; Dr. Brown joined the Society in the early days and, despite his advanced

age, was always ready to give encouragement and assistance; the original descriptions of *Mesembryanthemums* which he sent for publication in the JOURNAL will be much missed.

Lord Scone, M.P., kindly consented to become President of the Society.

The JOURNAL continues to appear quarterly and has received favourable comments from members here and abroad.

The Monthly Meetings have been held in London, and the Council would like to thank all those who have kindly assisted. The following is a list of the subjects dealt with:—

February	Exhibition of Paintings and Photographs.
March	Discussion on Soils.
April	Mr. C. D. O'Donoghue on Deserts, Dews and Spines.
May	Discussion on Winter Losses and their Causes.
June	Mr. G. W. Bartingale on What I see in Cacti.
September	Exhibition of Plants, etc.
October	Dr. H. G. Schweickerdt on Succulents of the Transvaal.
November	Mr. W. F. Higgins on Plants of interest in his Collection.
December	Discussion on Methods of Heating.

In July the second Cactus Exhibition was held in the R.H.S. Old Hall, the number of entries and of visitors being well up to the previous standard.

The Library is well used, books being sent to members at a distance, when available; the Journals of kindred Societies are regularly received, and books have been added by gift and purchase. So far, it has not been found necessary to impose a time limit on borrowing but as the number of books available is necessarily limited, the Council would be glad if members would return books as soon as possible.

The appointment of an Exchange Secretary has opened up possibilities and it is hoped that when this scheme is in full working order, members will find that the exchange of plants is considerably facilitated.

The Council would like to take this opportunity of thanking the authorities of the Royal Horticultural Society for assistance received during the year, and also the Press for their kindness in publishing notices of the Society's Meetings and other matters of interest to Cactus enthusiasts.

The Heating of Greenhouses

AT the meeting held on December 8th, there was a discussion on methods of heating greenhouses; Mr. Collings, Mr. Boarder and Mr. Higgins spoke on the use of coke stoves, oil lamps and electricity and several other members contributed to the discussion. Instead of a verbatim report, it seems best to summarise the details of each method separately. It is hardly possible to say that one method is better than another; it depends entirely on the circumstances, the size and position of the greenhouse, the facilities for stoking and the amount the owner is prepared to spend on heating.

COKE STOVE

The most usual method of greenhouse heating is by means of hot water pipes connected to a stove placed outside the greenhouse. The usual size of water pipe is 4 inch diameter; if a smaller size is used, the water will cool quickly, should the fire go out. This method is very satisfactory as it gives a reasonable heat without unduly drying the air; also, as the heating is done from outside the house, there is no danger from fumes. If the house is small and the amount of piping consequently short, there is a risk of the water boiling and pouring steam into the house if the fire burns too fiercely; undoubtedly this system works best when a good length of pipe can be used, but even for small houses it can be quite satisfactory.

Coke is the most usual fuel, and if the stove is small it is best to use "nuts," as this size packs better and burns more evenly. Anthracite may be used and certainly has advantages if the fire-space is limited; also it is cleaner to use and the cost is very little greater than coke, if any. As a rule, stoking need only be done twice in the twenty-four hours and such a stove should, after a little experience, be kept burning for several months, provided the clinker is carefully removed each day. Should the fire go out, the reserve of heat in the pipes will prevent a sudden drop in the temperature of the house.

Mr. Collings heats a house approximately 20 ft. by 7 ft., having 90 ft. of heater pipe, at a cost of about 3/- per week, the minimum temperature aimed at being about 40-45° F. Later speakers thought the estimate of cost was on the low side.

It is possible to heat a system of water pipes by means of gas; the advantage of this method is that no stoking is required and the temperature can be kept more even, especially

if a thermostat be added. If a high temperature is not required, the cost is not unreasonable; to keep a house at about 45° F. the cost would be of the order of 3/- per week (assuming the price of gas to be about 10d. per therm), but if a temperature of 50° F. is required the cost would be more than double.

OIL LAMPS

Though the heating of a greenhouse by means of hot water pipes connected to a stove outside the house is probably the most generally satisfactory method, good results can be obtained in a small house by the use of an oil lamp. The lamp is best connected to waterpipes which help to radiate the heat more evenly, though it is possible to use an ordinary Beatrice Stove, such as is used to heat rooms; this can be made more efficient if a pyramid of pots is built up on it to help spread the heat.

The advantage of this method is that there is no great expense incurred for the initial installation, and further, a lamp is quick and easy to light, whereas it may take an hour or more to get the water pipes warm by means of a coke stove, so that the lamp has distinct advantages if heat is required for short periods only and not continuously.

The disadvantage of this method is the danger from fumes; it is possible so to arrange things that the products of combustion are carried outside the house; this means loss of heat and consequent extra expense to maintain the required temperature. A properly cleaned lamp should not smoke and, if adjusted carefully, this calamity can be avoided, though probably most lamp users have had the lamp smoke at least once. The damage to the plants when this does happen is not, as a rule, fatal but it leaves them very dirty, and plants covered with white hairs are unlikely to look really white again until new hair has grown.

For a lamp with a double burner heating a small house, Mr. Boarder reckons that the cost of oil per week would be about 1/4; this will not maintain a temperature of 50° F. but will safely keep out frost in a house about 12 ft. by 8 ft. He does not recommend the type of lamp burning with a blue flame; this is hotter but the fumes are apt to make the eyes smart, so that damage to the plants may occur.

A lamp can usually be kept alight for twenty-four hours, the size of the reservoir being augmented by a siphon arrangement, if necessary. When an oil lamp is used, it

is important to see that a ventilator is open always, as the burning of the lamp uses up the oxygen in the air.

ELECTRIC HEATING

Where electricity is cheap, that is to say $\frac{1}{2}$ d.- $\frac{3}{4}$ d. per unit, an electrical installation forms a very simple method of heating. It is hardly a practical proposition if high temperatures are required but for a minimum temperature of 45° or 50° F. it works admirably and requires no attention at all.

One type of heater is the so-called "Unity" heater, consisting of heating elements enclosed in steel tubes about 2 in. in diameter. It is important that the rating of these heaters should be low; when fully on it should be just possible to touch them with the hand, otherwise the air will get too dry. The heaters can be connected to a suitably placed thermostat, which is set at the temperature it is desired to maintain; when the temperature in the house rises above the temperature at which the thermostat is set the current is automatically cut off, and when it falls below it is switched on again.

In a greenhouse 15 ft. by 9 ft. Mr. Higgins suggested that two banks of three heaters each, running the length of the house was a suitable arrangement; each bank has its own thermostat, thus saving current should only a slight rise in temperature be required. With current at about $\frac{3}{4}$ d. a unit, it costs about 5/- per week to maintain a minimum temperature of 45° F.; since this system was installed three years ago, it has not been touched in any way, and despite a difference in temperature on occasions of more than 20° between the outside and the inside of the house, has so far always proved adequate.

Simpler methods of heating by electricity can be devised; and if these are not arranged with a thermostat, but require adjustment from time to time, it is easy to fix up a warning bell in the circuit to indicate when the temperature is too high or too low.

Exhibition

THE Cactus Exhibition will be held this year on July 2nd and 3rd; we are becoming more ambitious and proposing to keep the Show open for two days. The Royal Horticultural Society's Flower Show in the New Hall will be open on both days and as notices may appear in the Press on the evening of the first day, it is hoped that this arrangement will encourage an even greater number of visitors.

To be worthy of these visitors, the Exhibition must reach an even higher standard than

before. This is the third year and most people will now have had an opportunity of seeing what other people can do, so that no one should be deterred by shyness from entering in at least one class.

The Schedule has been altered and it is hoped that the new arrangement will also encourage more entries; the large groups have been dropped as it was obviously difficult for many members to bring up the number of plants required. In consequence, the Lawrence Cup and the Evelyn Theobald Cup are being offered for the highest number of points in certain classes; it is felt that this is a fairer arrangement, as the Challenge Cups are awarded rather for general merit than for a specialised class and more members will have a chance to compete. In some classes it will be seen that a limit is put to the size of pot used; the object here is to encourage people whose plants are not yet perhaps very large and who may hesitate to compete against some of the large specimens that are sometimes exhibited. Another point is that it may make it easier for people who have limited facilities for transport to bring an exhibit which stands an excellent chance of winning an award.

Naturally, everyone who exhibits would like his plants to receive a prize but we hope the members are sufficiently public spirited to bring their plants with the idea of helping to make a really representative show; it is hardly fair to the prize-winners to feel that, though they have gained the award, there has been very little opposition and every exhibitor is a potential prize-winner. If every member will do as much as possible we are assured of a successful Exhibition in 1935.

Mammillaria Seeds

WITH reference to the offer of seeds in the December issue of the Journal, I had twenty-six applications for seeds. I sent the majority of the seeds out to reach applicants by January 1st, and planted a few myself to assist in the experiment. I sowed the seed in a small pot on January 1st and several were up on January 8th. All the remaining seeds were up by the 14th, and I hope that most members had as good luck. One member had some up on January 7th, but another had none up after three weeks, although his sowing conditions appeared ideal. I shall be interested to hear how the seedlings are progressing from time to time.

A. BOARDER.

Dr. N. E. Brown

By the death on November 25th, 1934, of Dr. N. E. Brown, the Botanical world has lost one of its most distinguished workers. Nicholas Edward Brown was born at Redhill in 1849 and educated at Reigate Grammar School; on leaving school, he obtained the post of Curator of Mr. Wilson Saunder's Museum of Natural History at Reigate, being already much interested in natural science. In the first number of the CACTUS JOURNAL Dr. Brown told how his interest was directed towards succulent plants by seeing the collection at Reigate, then in the charge of Mr. Thomas Cooper, whose daughter Dr. Brown subsequently married.



In 1873 Dr. Brown joined the staff of the Herbarium at Kew, where he remained until his retirement in 1914, and even after this date, he was for many years still working in conjunction with Kew. In 1879 he was made an Associate of the Linnean Society and in 1921 was awarded the Captain Scott Memorial Medal by the South African Botanical Society; in 1932 the University of Witwatersrand conferred on him the Honorary Degree of Doctor of Science, the presentation being made by Sir Arthur Hill in the presence of the Kew staff.

Dr. Brown's work covered a wide range

and was largely concerned with the flora of South Africa; the families most closely associated with his name are the Asclepiadaceae, Ericaceae, Euphorbiaceae, Iridaceae and especially that enormous group, the Mesembryanthema, though there are many other genera and species which bear the familiar letters "N.E.Br." Of late years, Dr. Brown had chiefly been working on the Mesembryanthemums; he divided this heterogeneous genus into a large number of new genera; much of his work, unfortunately, is not yet published, but descriptions with illustrations have appeared over a number of years in the *Gardener's Chronicle* and, since the inauguration of the CACTUS JOURNAL, Dr. Brown has contributed to each issue; the Society is deeply indebted to him for his help and encouragement.

Besides being a most painstaking botanist, whose wide experience made his work additionally valuable, Dr. Brown was a very competent botanical artist and has faithfully recorded, sometimes in colour, many of the species he described. He has added materially to the sum of botanical knowledge and his wonderful record of work accomplished will be long remembered.

The accompanying photograph is reproduced from the *Gardener's Chronicle*, and we should like to thank the Editor for his kindness in loaning the block.

Euphorbias

AMONGST the various types of succulent plant found in collections, Euphorbias are particularly popular at the present time. The genus is vast, including as it does all types from annual herbs to large trees, but the number of succulent species alone is considerable and the great variety of form encountered makes the plants especially interesting to the collector. It is not surprising, therefore, that enthusiasts in America should have formed the International Euphorbia Society, the Secretary being Mrs. J. M. Warner, 3744 Seneca Avenue, Los Angeles, California. The subscription is \$2.00 (\$2.50 abroad), and a quarterly Journal under the Editorship of Mr. G. A. Frick is being issued. The first number has just reached us; in general get-up it resembles the Journal of the Cactus and Succulent Society of America and contains articles on *E. handiensis* and *E. inermis*, Hints on Growing Euphorbia and other matters.

Succulents

Other than Cactaceae and Mesembryanthemae

By R. S. Farden

(Continued from page 29.)

Section F. ALBICANTES

- H. albicans*. Stem short; rosette 5-6 in. wide; leaves about 30, wide at base, tapering, $2\frac{1}{2}$ -3 in. long, rather recurved, whitish green, quite smooth both sides, rigid, keeled towards the apex; margin smooth, whitish and horny.
- H. albicans* var. *virescens*. Leaves darker green with a few white tubercles on back along the keel.
- H. sordida*. Stem short; rosette about 4 in. diameter; leaves 10-12, ascending, triangular, acutely tapering, 3-4 in. long, $1-1\frac{1}{4}$ in. broad; face concave, back rounded; dull green, slightly rough, especially on back.
- H. scabra*. Stem very short; rosette about 2 in. in diameter; leaves about 10, wider at the base, ascending, $1\frac{1}{2}$ -2 in. long, $\frac{3}{4}$ -1 in. broad, dull green; face flat or slightly concave, back rounded and with a slanting keel towards the tip, rough all over with small, crowded tubercles, the colour of the plant.

Section G. VENOSAE.

- H. tessellata*. Rosette of leaves stemless, 3-4 in. in diameter; leave 12-15, triangular recurved, $1\frac{1}{4}$ - $1\frac{1}{2}$ in. long, $\frac{3}{4}$ -1 in. broad, $\frac{1}{4}$ in. thick, firm, face flattened, marked with 3-5 pale green, vertical lines on a darker shining, green ground; back rounded, dull green and rough all over with small, raised, tough tubercles, tips pointed; margins with minute, recurved teeth.
- H. tessellata* var. *parva*. Leaves shorter, $1-1\frac{1}{4}$ in. long and the same broad; rosette 2 in. in diameter; leaves with 5-7 pale green lines.
- H. tessellata* var. *inflexa*. Rosette 2 in. in diameter; leaves dull purplish green, with a concave face; margins turned up and inwards.
- H. recurva*. Stem very short; rosette 2-3 in. in diameter; leaves 12-15, triangular very recurved, rigid, $1\frac{1}{4}$ - $1\frac{1}{2}$ in. long, $\frac{3}{4}$ in. broad, nearly flat on face, pale green with vertical lines of deeper green; back rounded, keeled upwards, dark green; rough with small crowded pimples same colour as the plant.
- H. venosa*. Rosette of leaves $1\frac{1}{2}$ in. long,

$3\frac{1}{2}$ - $4\frac{1}{2}$ in. diameter; leaves triangular, 12-15, tapering, rather recurved, rigid, pale green, with purplish tinge; face flat with 5 pale green vertical lines; back rounded and keeled, rough on the upper half; tip pointed; margin with minute teeth.

Section H. RETUSAE.

- H. mirabilis*. Stem short, rosette 2 in. in diameter; leaves 20, triangular, very recurved, $1-1\frac{1}{4}$ in. long, $\frac{3}{4}$ in. broad, firm, flat on the much recurved face; back rounded and rough with tubercles, keeled towards apex, turning red-brown when old; toothed on margin and keel.
- H. asperula*. Stem short; rosette 2-3 in. in diameter; leaves 10-15, triangular, very recurved, pale green on both sides, rough on face with minute pimples, same colour as plant and marked on the upper half with 7-9 vertical pale green lines; back rounded and smooth and keeled on the upper half.
- H. asperula* var. *mutica*. New variety.
- H. turgida*. Stem very short; rosette makes offshoots, $2-2\frac{1}{2}$ in. in diameter, leaves 20-30 in a dense rosette, oblong, tapering, much recurved, smooth, pale green, $\frac{3}{4}$ -1 in. long, $\frac{1}{4}$ - $\frac{1}{2}$ in. broad at the middle. Marked down the upper half of the face with 5-7 vertical lines of pale green; back rounded and keeled in the upper half.
- H. retusa*. Stem short; rosette 2-3 in. in diameter; leaves 10-15, triangular, very recurved, $1-1\frac{1}{2}$ in. long, $\frac{3}{4}$ in. broad, $\frac{1}{2}$ in. thick in centre, pale green, smooth on both sides, face marked on upper half with pale green vertical lines; tip pointed, back rounded and keeled in the upper half.

Section J. OBTUSATAE.

- H. cymbiformis*. Stem short; rosette 3-4 in. in diameter, leaves 20-25, wedge-shaped and pointed, $1-1\frac{1}{2}$ in. long, $\frac{3}{4}$ in. broad, pale green on face, slightly concave, back rounded, keeled upwards with an indistinct, soft spike at the tip, pale glaucous green, especially marked in the upper half with indistinct vertical veins of darker green.
- H. cymbiformis* var. *obtusa*. Smaller, with leaves only 1 in. long, darker in colour and more distinctly striped.

H. cymbiformis var. *pallida*. Leaves rather thicker, flat face.

Section K. MUTICAE.

H. reticulata. Stem short, basal offshoots; rosette 2-2½ in. in diameter; leaves 30-40 in a dense rosette, oblong tapering, pale glaucous green on both sides, face flattish. Minutely rough on the margin, back rounded and keeled, lined, especially on the upper half of back in darker green, with indistinct soft spike at tip.

Section L. SUBREGULARIS.

H. subregularis. Rosette of leaves 1 in. long, 2½-3 in. diameter; leaves 20-30, thick at base, tapering, glaucous green, face flat, lined in the upper half with a few small, whitish tubercles; back rounded and distinctly keeled; margin toothed.

Section M. LAETEVIRENTES.

H. altilinea. Stem short, with basal offsets; rosette 3-4 in. in diameter; leaves about 30, ascending, oblong, thickest at the middle, acute with a distinct soft spike at the tip, 1½-2 in. long; face flat, back rounded and keeled in the upper half, pale green, smooth on both sides, semi-transparent in the upper half, with 5-7 vertical green lines.

H. laetevirens. Rosette about 1 in. long, 2-3 in. in diameter; leaves 20-30, dense, ascending and widest in the middle, 1-1½ in. long, ¾ in. broad, ⅛ in. thick, pale green, turning reddish when old; face flat, with 3-5 indistinct lines towards the apex; back rounded and keeled with a distinct transparent, soft spike at the tip; toothed on the margin and keel.

H. denticulata. Stem short; rosettes 3-4 in. in diameter; leaves 20-30, dense, oblong, widening and then tapering to the point, pale green, colourless towards the tip, with 5-7 green vertical lines with a soft spike at the tip; back rounded and keeled towards the apex; margins minutely toothed.

Section N. LIMPIDAE.

H. translucens. Stem short; rosette 2½-3 in. in diameter; leaves 30-40, dense, ascending, widest in the middle, 1½-2 in. long, ½ in. broad, very pointed, pale glaucous green, often tinged with purple; face swollen, back rounded and keeled upwards, semi-transparent on the upper third, with 5-7 green, vertical lines; tipped with a soft, transparent spike; margined with triangular pointed teeth.

H. sessiliflora. Rosette with no stem, 2½-3 in. in diameter; leaves about 20,

wider at the base, much recurved, ¼ in. thick in the middle, bright green, semi-transparent in the upper third and with 7 green vertical lines; tipped with a short, soft spike; margins and keel closely toothed with pale, recurved teeth.

H. cuspidata. Stem very short; rosette 2-2½ in. in diameter; leaves 20-30, dense, thickening to the tip, much recurved, about 1 in. long and ¾ in. broad, pale green, smooth, colourless at the tip, with green, vertical ribs with a distinct soft spike at the tip; back rounded, keeled in the upper half.

H. bilineata. Rosette of leaves about 1½ in. tall, 3 in. in diameter; leaves about 15, oblong, tapering, dull green, face flat, semi-transparent in the upper third with 1 or 2 short, green vertical lines, no spike at the tip; back rounded, keeled upwards, margin and keel toothed.

H. affinis. Rosette about 1 in. long, 2-2½ in. in diameter; leaves about 20, oblong tapering, acute, 1 in. long and ½ in. broad, dull green, face flat, rather turned up, semi-transparent towards the tip with 1-2 short, green, vertical lines, no soft spike; back rounded and keeled upwards; margins toothed.

H. pilifera. Rosette of leaves 1 in. tall, 2 in. in diameter; leaves 20-30, widest in the middle, 1 in. long, ½ in. broad, pale green, semi-transparent and lined with green vertical lines in the upper third, with a large soft spike at the tip; back rounded; margins ciliated with transparent, triangular pointed teeth.

H. columnaris. Stem short; rosette of leaves 3 in. in diameter; leaves about 30, wedge-shaped, ascending not recurved, minutely pointed at the tip, dull green, semi-transparent towards the tip for ¼ in. and with greenish-brown, vertical lines. Margins with minute teeth, widest in the centre.

H. Cooperi. Rosette 1½ in. tall, 2½-3 in. in diameter; leaves 30-40, dense, oblong, widest in the middle, pale green, semi-transparent in the upper half with green, vertical lines, face flat, back convex and keeled upwards; tipped with a long, soft spike; margins and keel with triangular semi-transparent teeth.

H. vittata. Stem short; rosette 3-3½ in. in diameter; leaves 20-30, dense, oblong, widest in the middle and tapering to a fine point, 1½-1¾ in. long, ⅔-⅝ in. broad at the middle, pale green; face nearly flat, soft towards the apex, marked on

both sides with about 5 short, vertical stripes; the tip has a long, transparent, soft spike; back rounded and keeled towards the apex; margins toothed, but not the keel.

H. Dielsiana. n.sp.

H. Blackbeardiana. n.sp.

H. chlorocantha. Stem short; rosette about 2 in. in diameter; leaves 20-30, broad at the base, widest in the middle, ascending, a uniform dead green on both sides, firm, face flat, back rounded and keeled in the upper half; margin with minute recurved teeth.

H. angustifolia. Stem short; rosette 3 in. in diameter, leaves about 20, ascending, widest in the middle, tapering, moderately firm, uniform pale green, without lines; face flat, back convex with 1-3 faint keels upwards; minutely hairy on the margin.

Section P. SETATAE.

H. atrovirens. Rosettes with copious basal offsets; stem 1 in. long, rosette 2 in. diameter, leaves 30-40, dense, oblong, widest in the middle, dull green, reddish-brown when old, firm, face swollen, semi-transparent at the tip with 3-5 vertical green lines; back rounded and keeled and rough with tubercles; toothed on margin and keel.

H. pallida. Rosette 1 in. tall; 2-3 in. in diameter, ascending, widest in the middle, pale green, face swollen, the upper third with vertical lines of darker green, tipped with a long, soft spike; back rounded and double keeled towards the apex; margins with triangular, transparent teeth.

H. arachnioides. Stem $1\frac{1}{2}$ in. long; rosette 3-4 in. in diameter; leaves 30-40, dense, oblong, widest in the middle, pale green; glaucous, the upper third transparent and lined on both sides; face flat, back rounded and keeled upwards, tipped with a long, soft spike; margins and keel toothed, teeth transparent.

H. xiphiophylla. Leaves 50 or more, in a dense, stemless rosette, widest in the middle, 2 in. long, $\frac{1}{3}$ in. broad, pale green, without lines; face flat, back acutely keeled, tapering to a transparent, soft spike; margin with copious transparent prickles which extend to the upper part of the keel.

H. setata. Stem short; rosette $2\frac{1}{2}$ -3 in. in diameter; leaves 30-40, dense, ascending, oblong, widest in the middle, pale glaucous green; face swollen, not transparent at the tip; back rounded and tipped with a long, soft, transparent spike; margin with

spreading teeth, $\frac{1}{12}$ in. long, not so numerous as in *arachnioides* or *Bolusii*.

H. setata var. *nigricans*. Leaves darker green; teeth more slender and more numerous.

H. setata var. *media*. Pale green.

H. setata var. *major*.

Section Q. ALANCEAE.

H. minima. Stem very short; rosette with plenty of basal offshoots; rosettes $1\frac{1}{4}$ - $1\frac{1}{2}$ in. in diameter; leaves 40-50, oblong, widest in the middle, pale glaucous green, face swollen, not transparent nor lined; back rounded and keeled upwards, tipped with a long soft, transparent spike; margins and keel with teeth.

H. Bolusii. Stem $1\frac{1}{2}$ in. tall; rosettes $2\frac{1}{2}$ -3 in. in diameter; leaves 30-40, dense, oblong, widest in the centre, pale glaucous green; transparent and lined on both sides in the upper third; face flat, back rounded and keeled in the upper half, tipped with a large, soft, transparent spike; margins and keel with spreading teeth $\frac{1}{8}$ - $\frac{1}{6}$ in. long.

H. Schmidtii. Stem short; rosette $1\frac{1}{2}$ -2 in. in diameter; leaves pointing three ways, very recurved, 1 - $1\frac{1}{4}$ in. long, $\frac{1}{2}$ in. wide, tapering to a narrow point, very concave, marked with raised whitish blotches, and on the back also; broad continuous bands on the margins in the same colour.

H. gracilis. Stemless; rosette $2\frac{1}{2}$ -3 in. in diameter; leaves longish, wide at the base, tapering towards the tip, marked with oblong spots, ascending; face flat, back with one keel in the middle and one on either side; margins and keels with short, close-set teeth.

H. limifolia. n.sp. Stemless; rosette $2\frac{1}{2}$ -3 in. in diameter; leaves 20-25, young ones ascending, older almost horizontal, marked with fine, raised, transverse lines almost continuous, dull white; plant dull grey-green.

H. Haageana. n.sp. Stemless; rosette 2 in. in diameter; leaves ascending and incurved; lanceolate, with a short, soft spike at the apex; face flat, back rounded, marked with faint vertical lines of green; plant bright yellow-green.

Since Alwin Berger's list was published, there have been some 30-40 new species discovered, which include the following:—

H. pygmaea, 1929.

H. Herrei, 1929.

H. Bijliana, 1929.

H. decipiens, 1929.

H. gracilis, 1929.

H. *Fergusonii*, 1929.
 H. *pseudotessellata*, 1929.
 H. *Dielsiana*, 1929.
 H. *variegata*, 1929.
 H. *Schmidtii*, 1930.
 H. *Haageana*, 1930.
 H. *inverculata*, 1931.
 H. *truncata*, 1931.
 H. *Albertensis*, 1931.
 H. *Pearsonii*, 1931.
 H. *granulata*, 1931.
 H. *limifolia*, 1931.
 H. *Engleri*, 1931.
 H. *fallax*, 1932.
 H. *Maughanii*, 1932.
 H. *Blackbeardiana*, 1932.
 H. *gracilidelinata*, 1932.
 H. *inermis*, 1932.
 H. *incurvata*, 1932.
 H. *ferox*, 1932.
 H. *confusa*, 1932.
 H. *gigas*, 1932.
 H. *Starkiana*, 1932.
 H. *tuberculata*, 1932.
 H. *tenera*, 1932.
 H. *pellucens*.

Karl von Poellnitz publishes these new species in a German horticultural periodical.

Apicras

The name comes from the Greek and means "not bitter" in distinction to the Aloes, which are bitter. The Apicras are very closely related to the Haworthias; Haworth took them out of the Aloes and made them into a separate genus; there are only 10-12 known species at present.

The distinction between Apicras and Haworthias is in the flowers; those of both are very similar and on similar long stems, but the Apicra flower has 6 petals, white with a green line in the centre, and the flower is a little star or rosette, whereas in the Haworthia the 6 petals are placed differently, 3 of them being turned up and 3 of them downwards; also the petals are longer.

A. *aspera*. Stem 4-6 in. tall, 1 in. wide with the leaves; leaves triangular, $\frac{4}{8}$ - $\frac{5}{8}$ in. long and the same wide; face smooth and flat; back rounded, rough with tubercles the colour of the plant; margin crenulated.

A. *pentagona*. Stem $\frac{1}{2}$ -1 ft. tall, 2 $\frac{1}{2}$ -3 in. wide with the leaves; leaves triangular in five regular rows, bright green; face flat, back rounded, rough on the margins

and with two obscure keels and a few scattered white tubercles on the back; lower leaves spreading, upper ones ascending.

A. *pentagona* var. *spirelia*. Leaves smaller, more triangular, 1 in. long, irregularly quinquefarious.

A. *pentagona* var. *Bullata*. Leaves irregularly quinquefarious, with more numerous tubercles on the face.

A. *pentagona* var. *Willdenowii*. More robust; leaves about 2 in. long, arranged in 5 spirally twisted rows.

A. *Skinneri*. Stem 6-8 in. tall, 3 $\frac{1}{2}$ -4 in. wide with the leaves; leaves large, scattered, cream tubercles and on the back also; one or two keels, with smaller tubercles, almost touching.

A. *bicarinata*. Stem $\frac{1}{2}$ -1 ft. high, 1 $\frac{1}{2}$ -1 $\frac{3}{4}$ in. wide with the leaves; leaves in many rows, longish-triangular, dull green; face smooth, concave, rough with large tubercles, with whitish tips, arranged in indistinct vertical and transverse rows and furnished with 2 indistinct keels towards the apex at the back.

A. *spiralis*. Stem $\frac{1}{2}$ -1 ft. tall, 1 $\frac{1}{2}$ -1 $\frac{3}{4}$ in. wide with the leaves; leaves in many rows, longish-triangular, bright, shining green; face flat and smooth; back rounded, obscurely crenulated on the margin; all, except the lowest, ascending.

A. *congesta*. Stem $\frac{1}{2}$ -1 ft. high, 3 in. in diameter with the leaves; leaves in many rows, longish-triangular; face flat, back rounded, irregularly keeled, rough on the margin with spots and tubercles.

A. *deltoidea*. Stem $\frac{1}{2}$ -1 ft. tall, 2 in. in diameter with the leaves; leaves in five regular rows, all except the uppermost spreading, triangular, bright shining green, slightly concave on the surface; back rounded and distinctly keeled towards the apex with very small saw-like teeth on the margins and keel; no spots or tubercles.

A. *turgida*. Stem 6-9 in. tall, 2-2 $\frac{1}{2}$ in. wide with the leaves; leaves arranged in five spirally twisted rows, triangular, 1 in. long, $\frac{3}{4}$ in. wide; face smooth, rough on the margins, quite free from spots or tubercles; lower leaves spreading, dull green, back rounded. The upper leaves pale green, with several indistinct vertical ribs of darker green.

A. *turgida* var. *intermedia*.

A. *foliosa*. Stem $\frac{1}{2}$ -1 ft. tall, 1-1 $\frac{1}{4}$ in. in diameter with the leaves, which are crowded, in many rows, triangular, rough

on the margins, dull green; face flat, rough, obliquely keeled on back; no spots or tubercles.

- A. *rubiflora*. n.sp. Plant erect, smooth, rigid, densely leafy, up to 18 in. tall; leaves spreading in 4 series, ovate, triangular, tapering sharply, glaucous grey green; without teeth, spots or lines. Flowers red, the only species where they are not white.

New species discovered since Alwin Berger's list are :—

- A. *egregia*.
A. *Neliana*.
A. *humilis*.
A. *Thunbergii*.
A. *Pillansii*.
A. *Huttonii*.

Book Review

“ZIMMERKULTUR DER KAKTEEN,” by Fritz Thomas, 9th edition by Hugo Socnik; published by J. Neumann, Neudamm, 1935. Price 2 R.M.

This little book on the cultivation of Cacti in dwelling rooms is the ninth edition of a work originally written by Fritz Thomas, and this last edition has been brought up to date by Hugo Socnik, the author himself having died in 1931. The eighth edition appeared in 1928 and since that time the interest in Cacti in Germany has increased so much that a thorough revision became necessary. The text has been much enlarged and the illustrations improved and increased in number.

Zimmerkultur der Kakteen is a most useful book for beginners. It gives a short calendar of work for each month, useful information on forming and caring for a collection, on methods of propagation and also a key to the species. The book concludes with a short chapter on other succulent plants. There are a large number of excellent illustrations; the cover bears a beautiful colour photograph of *Rebutia minuscula* in flower; there are 73 photographs of plants, 50 black and white drawings and 5 plates showing the types of the various genera.

Herr Socnik has accomplished the work of revision and amplification in a very satisfactory manner and the publishers are to be congratulated on the very attractive way in which the work has been produced.

Page Fifty-six

A Letter from a Member

MR. WRIGHT M. PIERCE, of Claremont, California, sends the following letter :—

“May I offer a little friendly criticism on *Cactus in Canada* (CACTUS JOURNAL, Vol. III, p. 32). I am well familiar with *Opuntia*, so-called *ursina*, which we call *erinacea* here, having travelled through its native habitat many times. This species is not a native of the islands but occurs locally in many places on the Mohave Desert. Possibly by ‘islands’ the author means isolated localities. Again these locations are well over a hundred miles north of the southern border of California. This plant is also found considerably further to the northward than these southerly locations mentioned. It is a plant of a rather high altitude, I would say at least above 3,000 feet where the weather at times gets bitterly cold, oftentimes freezing and below. I am not so sure about the other *Opuntia* mentioned, for our plants seem so mixed up that no one apparently knows just what to say about them.

“*Coryphantha Alversoni* grows also in the Mohave and Colorado deserts, more commonly in the latter; this seems to be only a yellow-flowering form of *Coryphantha deserti*, normally pink, but there has been considerable discussion about this, some seeming to think that the yellow blossoming form should be called *Coryphantha chlorantha*. Suffice to say they (*deserti* and *Alversoni*) seem to be the same—plant, flower and seed—except for the colour of the blossoms. In the *Opuntias* I have found blossoms of distinctly different colours on the same plant! This plant is quite common locally in Eastern Southern California, on dry desert hills and barren sandy washes and flats where rainfall is rather meagre. With me it has always been a rather difficult plant to handle. Nearly all plants are infected with a beetle larva and very many dead plants are seen in their native haunts killed by these pests.”

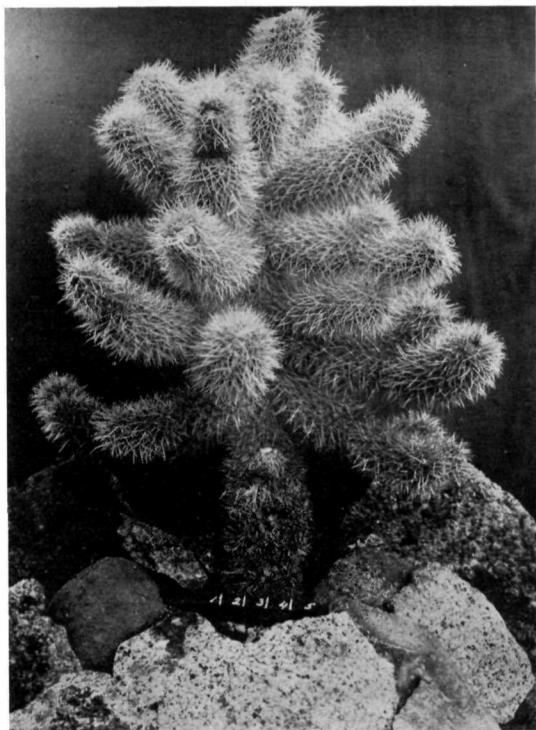
OWING to a change in the arrangements of the Royal Horticultural Society, the date of the October Meeting of the Cactus Society will be changed to October 15th, instead of October 22nd.

THE Hon. Treasurer would be glad to hear as soon as possible from those members whose subscriptions fall due on January 1st, and who have not yet paid for 1935.

Cactus in Canada

By C. W. Armstrong

LAST month I received this fine specimen of *Opuntia Bigelovi*, the packing of which must have been a problem; it arrived packed alone in its case with crumpled newspapers, losing only five small joints in transit. On arrival I lifted it out of its case by looping a rope around its roots and hung it upside down on a nail in a beam in the basement. I left it there until a friend interested in Cacti came in, then I got two ropes and made a



Opuntia Bigelovi.

running noose around the upper part, threw the ends over the beam, got him to hold the other ends while I eased it off the nail and we righted it and left it suspended for a couple of days. In the meantime I procured a five-gallon oak keg, bored a couple of one inch holes in one end and sawed four inches off the other; in the bottom of this I made a drainage eight inches deep of stones and broken bricks, filled in the upper spaces with smaller pieces, putting a screen of moss over that, liberally sprinkled with broken charcoal; next I made up a mixture of loam,

sand and gravel with a handful of mortar rubble and waited until another friend came along to hold the ropes and lower the plant into the keg, while I packed the compost around the roots and put four half-bricks around the stem to steady it. The plant is now twenty-seven inches high and weighs twenty pounds. I put two screwhooks in the keg on each side and, with the help of a couple of iron bars, we carried it out to the rockery, placed it in a hollow, piled some rocks around it and took the photograph which you see here.

Cactus Growing in Belgium

LAST September the Brussels section of the "Cercle des Cactéophiles Belges" arranged an exhibition at the Botanical Gardens in Brussels, which exhibition was patronised by the Minister of Agriculture in Belgium. The main object of the show was propaganda with a view to getting the public interested in the study and collecting of cacti.

The various exhibits were happily arranged in the form of cactus gardens and were certainly very attractive. One group of outstanding interest, which appealed greatly to the Belgian people, was a series of plants from the late King Albert's private collection of cacti, which is at present housed in the conservatories of the summer residence of the Royal Family in Laeken, near Brussels.

The exhibition lasted for one week and was a complete success. For the three first days the attendance reached 2,500 paying visitors. In addition, schoolboys and schoolgirls were invited and it was interesting to watch them sketching and making notes of the plants and of small glasshouses for baby plants.

The activities of the Society are bearing fruit. The Brussels section of the Cactus Society was founded about two years ago and to-day the membership has reached 500. The other section of the Cactus Society in Ghent also has a large number of members and the Société des Cactéophiles Liégeois in Liège numbers about 150. Considering that the population of Belgium is not greater than that of the Metropolitan area, the organisers must be complimented on their good work. The Society publishes every two months a revue "Cactus," and also some interesting studies are occasionally published by members.

G. MOSTART.

Editorial

FOR the eleventh time the CACTUS JOURNAL makes its appearance and, as the growing season is now about to begin, we should like to wish all our members and friends good luck with their plants this year. Good luck depends to a certain extent on outside influences but is probably considerably more under our control than many people realise.

Though much has and will be written on the subject of potting, yet the majority of beginners still seem to find this one of the main stumbling blocks and even experienced growers are so far from attaining finality that they are often tempted to experiment. It is generally realised that the chief purposes of the soil are to provide food and water to the roots but the fact that air is also needed is apt to be overlooked. Some plants, such as those which live in bogs, are so adapted that their roots are capable of functioning in soil which is almost completely devoid of oxygen, but the majority of flowering plants need to absorb oxygen through the roots as well as through the leaves. Desert plants which, in many cases, have much reduced leaves or none at all, are more dependent than ever on the absorption by the roots of a good proportion of the necessary oxygen. If this were more generally realised and the potting soil so made up that there are plenty of air spaces between the particles, half the difficulty experienced in growing succulent plants would vanish.

Alpine gardeners have already discovered this, for it is customary now to put all "miffy" plants and difficult subjects into a scree. In nature, a scree is the result of the continual breaking up of rocks under the influence of the weather; on the sloping hillsides the broken pieces tend to roll so that at the base screes are formed. These, at all events when young, contain no soil and yet some of the greatest treasures are found growing in these loose accumulations of broken rocks. The drainage is perfect; water cannot "stand" and yet each fragment of rock will hold a film of moisture, from which the roots may take their supply when required; and since there is no fine soil present to clog the interstices air circulates freely. In a pot filled with fine, closely packed garden soil, broken-down loam, leaf mould, etc., the small amount of air contained will very easily become stagnant as there is nothing to move it except the rise and fall of barometric

pressure, which can have little or no effect on the centre. But, if the pot is filled with coarse material so that there are considerable air spaces, the contained air will be changed much more frequently to the great benefit of the plant.

It is probable that much of the benefit derived from the use of burnt clay is due to the fact that the air supply to the roots is so much better than that provided in a close soil. On the other hand, many growers consider that the plants so grown, though healthy, are starved. There is no reason why a richer soil should not be provided without necessarily clogging the spaces between the burnt clay, if the more nourishing elements, such as loam, are also added in large pieces and not as fine dust. It is a question well worth keeping in mind if the potting soil in use does not seem entirely satisfactory.

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Opuntias

TO many people not very familiar with these plants, the name Cactus is almost synonymous with Opuntia; if one mentions Cacti, such people will immediately think of those large, prickly plants along the Mediterranean, or of the plague in Australia. And yet the Opuntia is the type of Cactus least in favour with Cactus growers, and probably the reason is the same in both cases. For the common types of Opuntia are very free growing; where they have been introduced into congenial surroundings they increase rapidly and, unless severely controlled, will soon become a feature of the landscape. In the same way, a small cutting of Prickly Pear will grow so rapidly in a greenhouse that it soon outgrows its welcome; if the owner puts it out of doors during the summer, it will make such strides that re-housing it for the winter becomes a serious problem. Moreover, unless these plants do reach a fair size, they are unlikely to flower, so that part of their attraction is lost. In consequence, Cactus growers are a little apt to dismiss Opuntias as a class as of little interest. This is a pity, because this large genus contains a variety of forms, some of which are quite easy to grow in a small space.

The Cactus and Succulent Society of America has just completed the issue in their Journal of the first volume of Britton and Rose's Monograph, "The Cactaceae"; this deals exclusively with the Opuntias and their near allies. This Society is now about to issue the second volume on the Cerei in the same way, but as it will be nearly two years before the whole volume appears, Cactus growers might well concentrate their attention on Volume I and learn more of a genus which includes the almost too familiar Prickly Pear as well as the too little known *glomerata* types.

In the Monograph, Britton and Rose have divided the Opuntias into three main groups:

1. *Cylindropuntia*.
2. *Tephrocactus*.
3. *Platyopuntia*.

The *Cylindropuntias* include those species which form more or less shrubby plants with many joints, none of which are flattened. They are further subdivided into 13 Series containing 54 species. Amongst the *Cylindropuntias* which are found both in North and South America, are such plants as *O. leptocaulis*, with slender stems and long spines, *O. Bigelowii*, a very spiny type illustrated elsewhere in this issue, and *O. cylindrica*, often found in collections.

The *Tephrocacti* are found only in South America, usually at a considerable altitude, and are divided into four Series containing 21 species, whose number is already being increased as this area becomes better known. All these plants are low growing, the joints being oval or globular; one of the most beautiful of these is *O. floccosa*, which is covered closely with long white hairs; it grows in large patches high up in the Andes, where it may even be mistaken at a distance for patches of snow. Another type which is somewhat variable is *O. glomerata*; here the joints are nearly as broad as long and the spines are flattened and parchment-like. The *Tephrocacti* are well worth growing; they are not particularly easy—which adds to their attraction for many people, but if kept cool and dry in winter and given a reasonable amount of water in the summer they should do well; under cultivation the new joints formed seldom attain the size of those produced in the native habitat, but are larger if the plant is grafted; exposure to the fullest sunlight possible also helps to increase the size of the joints produced.

The largest group is *Platyopuntia*, where the species all have flattened joints; they are divided into 29 Series, containing 164 species, and occur in both North and South America. Many of these types grow into large straggly bushes and are used for hedges; these are the types that are disliked by cactus growers on account of their rampant growth, but some of them are more restrained and worth house room. *O. basilaris* is a low-growing type usually forming clumps, the pads being often beautifully coloured, and *O. microdasys* is always a favourite. The series *Brasiliensis* was considered as a separate group by Schumann, who classed them as *Brasilopuntia*, and Britton and Rose suggest that perhaps they should be ranked as a separate genus; *O. brasiliensis* is remarkable in that the trunk is cylindrical and continues to grow in this form, whilst the side shoots are flattened pads, so that it seems to unite the characteristics of the *Cylindropuntias* and the *Platyopuntias*.

One characteristic persists all through the Opuntias; whatever form the plant body may take, the areoles always contain glochids, those little, barbed bristles which become detached so easily; everyone who has ever handled an Opuntia knows how irritating the glochids can be, and in consequence, even if not much loved, Opuntias will always be treated with due respect.

Meetings

Two of the Meetings held this quarter have been devoted to descriptions by members of their collections. Mr. W. F. Higgins gave an account of the plants he and Mrs. Higgins have got together during the last six years; beginning with the intention of collecting Cacti only, they have, like so many other people, been led on to include other succulent plants as well, till now these latter are perhaps the chief interest. The object aimed at throughout has been to collect representative species of as many genera as possible, rather than to specialise in any one genus, so that at the moment there are about 490 species of Cacti representing 103 genera (Br. and R.) and 360 species of other succulents, representing 78 genera.

Mr. R. S. Farden, who gave an account of his plants at the January meeting, has been collecting for thirty-five years and has some fine specimens, many of which he has had for a number of years. He specialises in Cacti, arranging them in the greenhouse in their botanical sequence as far as their cultural requirements permit. He, also, felt the lure of other succulent plants but has been strong-minded and finds that his accommodation will not permit him to grow everything he would like to, so he has decided to give up Mesembryanthemums and is concentrating on Haworthias—and a few other genera of special interest.

It is felt that it would be helpful to beginners and seasoned collectors alike to know what other people are doing, so it is hoped that other members will feel inclined to come and tell the members what plants they grow.

Catalogues

To all keen collectors the receipt of a catalogue provides much interest, particularly in the winter evenings, when active work among the plants is not possible. Opportunity can then be taken of studying the lists of plants and of laying plans for the extension of the collection. Possibly many of the plans so made are changed later, but their making will have provided entertainment and will have contributed inevitably to a wider knowledge of the subject. Our thanks are due to the dealers for the care and trouble taken in making up their lists, which so frequently contain excellent illustrations and much valuable information as to the origin, characteristics and methods of growing the plants. Needless to say, the method by which our appreciation

can best be expressed is by placing our orders for the coming season.

We have recently received the following lists:—

C. Armstrong, 3830 19th Avenue W., Vancouver, B.C., sends a list of some 50 cactus plants, including many *Opuntias* regarding which he has from time to time contributed articles to the Journal.

Curt Backeberg, Im Sorenfelde 15, Volksdorf, Bez. Hamburg, Germany, has forwarded his spring list of seeds and plants of both Cacti and other succulents. This list is particularly complete in respect of the South American Cacti, including *Rebutias* and *Lobivias*, many of which were first collected by Herr Backeberg during his South American trips. Members will remember the interesting accounts of his travels which he has given before the Society.

Mrs. D. van der Bijl, The Glen Rockeries, Great Brak River, C.P., South Africa, sends a list of seeds of South African succulents which she is able to supply; many uncommon *Crassulas*, *Haworthias* and *Mesembryanthemums* will be found in this list.

Robert Blossfeld, Potsdam, Germany, includes a number of the most attractive Cacti in his general list No. 348. This list, issued primarily for nurserymen, includes many, good garden and greenhouse plants.

Howard E. Gates, 119 South Illinois Street, Anaheim, California, has forwarded a descriptive price list of Cacti. In addition to many well-known species, the list deals with the interesting plants of Lower California, a district in which Mr. Gates has made many collecting expeditions. From time to time we have had the pleasure of printing accounts of these trips by Mr. Gates.

R. Graessner, Perleberg, Germany, sends his 1935 seed list of Cacti and succulents. Many rarities will be found, particularly among the succulents.

Hurling and Neil, The Highlands Nurseries, Bonnievale, C.P., South Africa, have forwarded a catalogue of seeds and plants of South African succulents; collectors of these plants will find many items of interest listed.

W. T. and H. E. Neale, Meeching Rise Nurseries, Newhaven, Sussex, send their monthly circular to all members of the Society. Our enthusiastic and energetic fellow-member, Mr. Neale, always finds interesting items of news to add to the lists of plants with which he so constantly tempts our pockets.

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CACTI AND SUCCULENTS

AT THE

ROYAL HORTICULTURAL SOCIETY'S OLD HALL

Vincent Square · London · S.W.1

1935

TUESDAY, JULY 2nd. 1 p.m. - 7.30 p.m.

WEDNESDAY, JULY 3rd. 10 a.m. - 5 p.m.

ADMISSION :—To members of the Cactus and Succulent Society and Fellows of the Royal Horticultural Society, on presentation of Membership Tickets.

Charge to Non-Members, 1st day, before 5 p.m.	..	2s. 6d.
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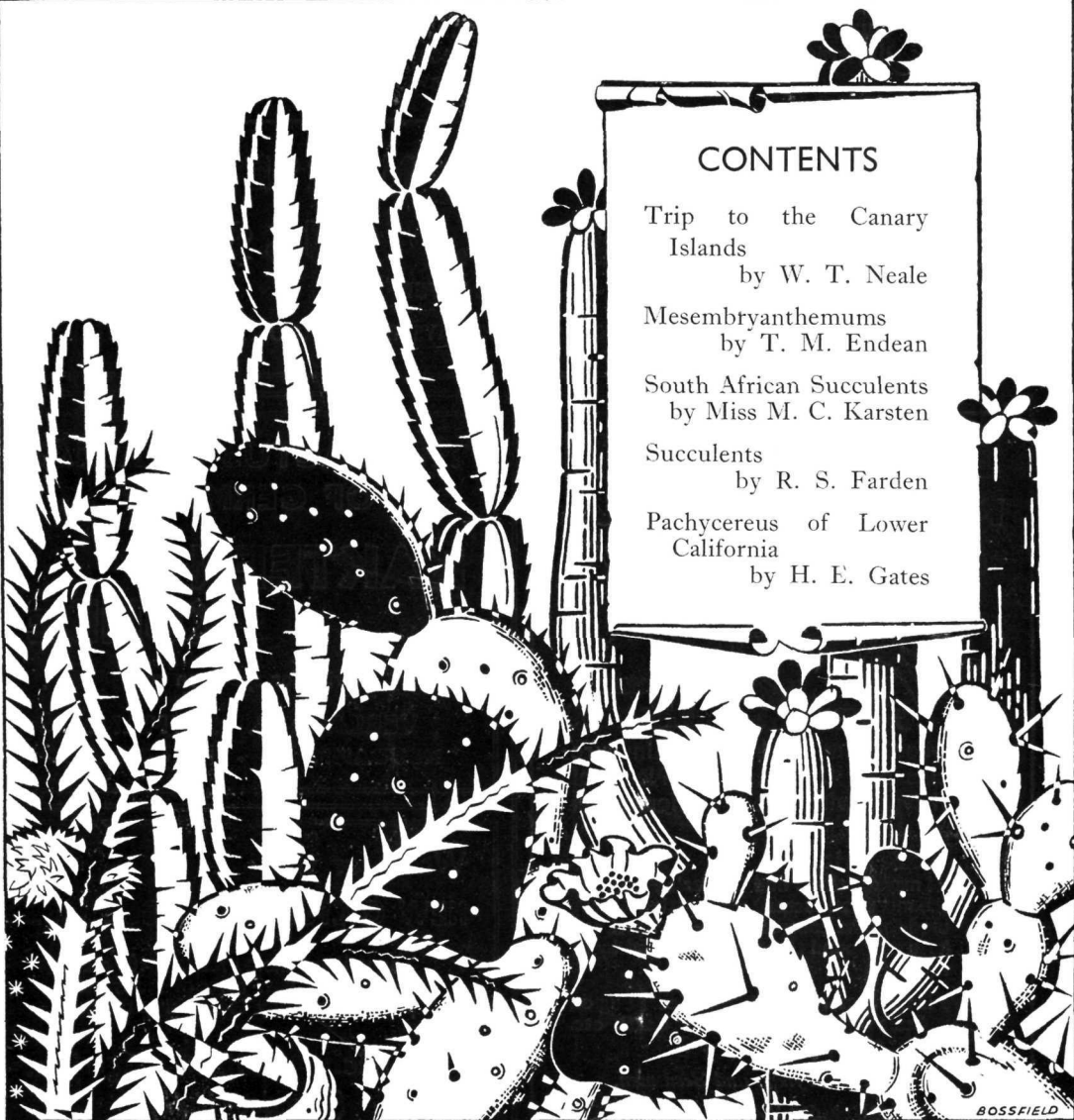
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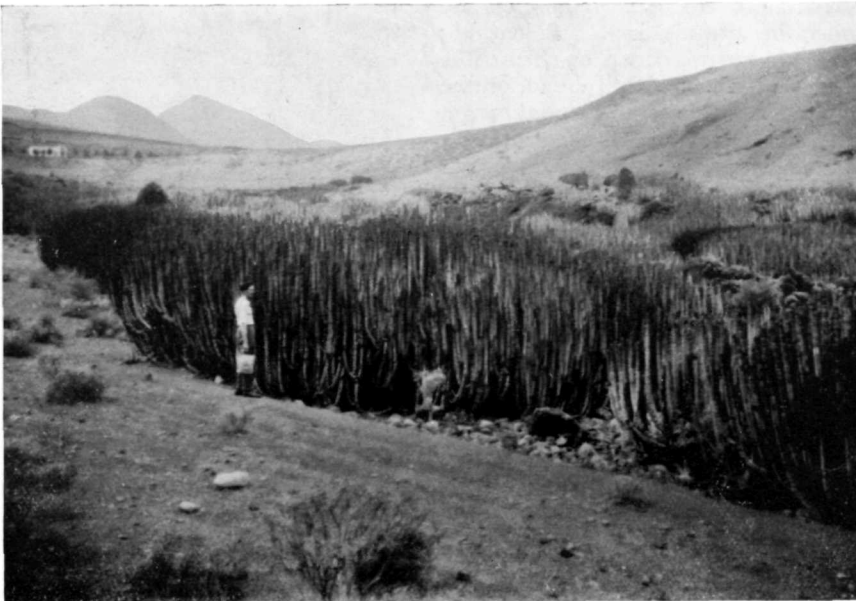
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Euphorbia canariensis in its natural habitat.

A Trip to the Canary Islands

By W. T. Neale

(Résumé of a Talk given on March 19th, 1935)

MR. NEALE began his talk by saying that the chief plants in the Canary Islands of interest to collectors of succulents are Aeoniums and allied species, such as Aichryson, Monanthes, etc., and Euphorbias; *E. canariensis* is the only cactus-like species, but *E. atropurpurea*, *balsamifera*, *obtusipetala* and *Regis-Jubae* also occur. *Kleinia neriifolia* is found there, too, and the interesting *Ceropegias*, *C. fusca* and *dichotoma*.

The general appearance of the Islands is rather as if a giant had made a series of ash

heaps, and the vegetation is very sparse. In places lava flows are found, on some of which nothing grows at all, but the older flows have been colonised by *Euphorbia canariensis* and the *Kleinia*; many seedlings were growing in the lava cracks with no soil at all, and the plants could easily be removed without damaging the roots. The mountains appeared in places to consist of ashes, and from one this was apparently being dug for fuel.

The natives seemed to think collectors of succulents were very odd people, their idea

of "plants" being Crotons, Poinsettias, and Bougainvilleas, which grow in the open in their parks and gardens, for the lower coastal belt is very fertile, if irrigated. There is no water supply on the islands in the form of rivers, etc., and the rain has to be collected, and is then led down the hillsides to the towns in cement gutters; in this way plantations of bananas and other fruits for export can be maintained. Opuntias, though not native, grow everywhere on the islands, having been introduced for the cochineal industry; on Gran Canaria, *O. Dillenii* (*O. horrida*) was covered with red fruits, and below a certain altitude is very plentiful; it does not appear to occur on Teneriffe. *Agave americana* is also plentiful and, on the whole, *Opuntia* is pleasanter to climb through, as when a steep hillside has been closely colonised with *Agave* it makes a ferocious barrier.

The Canary Islands are noted for the very large number of endemic species found, and on each island the flora varies; for instance, though *Euphorbia canariensis* grows on all, *Aeonium nobile* occurs only on Palma, *Ae. Saundersii* and *Ae. gomerense* on Gomera. The most interesting island botanically—and the only one with a still active volcano—is Fuerteventura, which, unfortunately, is more difficult to visit owing to the time required and the fact that one has to take one's own supplies. *Euphorbia handiensis* occurs on this island only; it is a low-growing plant, like *E. mamillaris*, but with stouter stems, and to collect it a camel ride of considerable distance from the port must be undertaken. *Caralluma Burchardii* is also found on Fuerteventura. Mr. Neale was fortunate in seeing many of the rare species growing in the garden of Dr. Oscar Burchard, a botanist who has been long resident in Teneriffe and has in cultivation all the indigenous plants of the islands.

Heavy storms are rare and the greater part of the rain falls in the form of a fine drizzle; it condenses on the hillside, but the ground never gets really soaked as most of the water is collected into channels. Apart from the irrigated areas, most of the country is very dry, and there is a strong tendency to succulence amongst many of the ordinary plants, though on the shady sides of the hills these will be found growing naturally.

Probably *Euphorbia canariensis* is the plant most often associated with the islands and its distribution there is very wide; specimens are sometimes found in collections which differ from the normal in having more than

the usual number of ribs or the ribs spiralled; these are not different species nor even varietal forms, for Mr. Neale found them growing together with the usual form on the same plant, as shown in the illustration.

The *Aeoniums* are found chiefly near the tops of the mountains, and the species are rather local; Mr. Neale, during his short stay, found nine species and one species of



Euphorbia canariensis, showing spiral stems.

Greenovia. *Monanthes* is also found at high altitudes; *Monanthes pallens*, *M. laxiflora* and *M. anagensis* were found growing abundantly at one of the highest points in Teneriffe, the latter is much like a shrubby *Sedum*. *Aeonium canariensis*, *A. ciliatum* and *A. lindleyi* were also plentiful in that district, the *A. canariensis* being a much larger form than that found on Gran Canaria.

A plant which Mr. Neale had considerable difficulty in finding was *Zygophyllum fontanesii*; this grows in the arid southern coastal districts on sand hills, with long, thin roots apparently drawing moisture from the rocks beneath the sand. The growth is very succulent and it has proved exceedingly difficult to establish, the only plant so far showing signs of revival being one that was kept soaked after being potted. Considering the absence of moisture in the

place where it was found this appears rather remarkable, but the same tendency to die out unless thoroughly soaked immediately has been observed among newly imported *Stapelias*, etc., which also live naturally where they seldom have rain.

Mr. Neale found his trip most interesting and useful and much regretted that he had not had time to explore further.

Conophytum

By Dr. A. Tischer

Conophytum albifissum, Tisch. spec. nov.

Corpuscula ad 8 mm. alta, 4–5 mm. lata, obconica, supra leviter convexa, pallide griseo-viridia, ore 1 mm. longo, supra paucis punctis et linea rosea ad marginum notata. Sepala 4, ad 1 mm. longa; petala ad 2.5 mm. longa, alba; stamina exserta, antheris aureis; stigma $\frac{1}{2}$ mm. longa, stylum O.

Stemless; growths up to 8 mm. high, –5 mm. wide and –4 mm. thick, obconical, upper surface somewhat elliptical to almost circular, nearly flat or slightly convex (Type E of Brown's Key), pale grey-green, sides slightly tinged with red, upper surface appearing slightly hairy; fissure scarcely depressed, about 1.5–2 mm. long, low rhomboidal, with whitish hairs, bordered with darker lines; a reddish line runs along the edge of the upper surface on which are scattered also a few indistinct dots.

Ovaries included; calyx tube about 3 mm. long, pale green, with 4 lobes about 1 mm. long; corolla tube white, hardly longer than the calyx tube; petals 16, almost 2.5 mm. long, very narrow, acute, translucent white; stamens projecting somewhat from the corolla tube, the inner ones rather shorter, few, small, yellow anthers, white filaments; stigmas 4, about $\frac{1}{2}$ mm. long, white, with no style. Flowers opening at night. Discoverer and exact locality unknown.

I received this plant several years ago from Mr. I. T. Bates without closer details. The plant belongs to the section § Picta, Schwant. and is distinguished from all other species by its pale grey-green colouring and the peculiar reddish marking at the edge.

Conophytum nanum, Tisch. spec. nov.

Corpuscula ad 1 cm. alta, 5–7 mm. lata, supra semiglobosa vel leviter convexa, nanoviridia, puberula, paucis punctis notata, ore 1.5 mm. longo. Flores ignotae.

Stemless; growths up to 1 cm. high, 5–7 mm. wide, seen from above almost circular in outline, upper surface very convex, sometimes almost hemispherical (Type C of Brown's Key), dark grey-green to blue-green, smooth, slightly velvety to the touch; fissure scarcely depressed, up to 1.5 mm. long, hairy, bordered by a few green, usually very indistinct dots; a few dark green scattered dots also occasionally on the upper surface. Flowers and fruit unknown. South Africa. Discoverer and exact locality unknown.

This plant, too, I received from Mr. I. T. Bates some years ago without closer details under the number C 77. Unfortunately, up to now it has not flowered. It is, however, readily distinguished by its markedly convex upper surface and the dark blue-green colouring as well as by its pubescence. Possibly it belongs to Section § Velutina, Schwant.

Conophytum piluliforme N.E.Br.

The plant described as *Conophytum Etaylorii* Schwant. is identical and should therefore be considered as a synonym. The salmon-red colour of the flower mentioned by Schwantes as peculiar is characteristic of *Con. piluliforme* N.E.Br.

Conophytum praeparvum N.E.Br.

I give below, in order to complete the description, the details of the flower of this species, previously unknown:—

Flowers opening at night, slightly scented. Calyx tube about 3 mm. long, greenish, with 5, about 1 mm. long reddish lobes. Corolla tube somewhat longer than the calyx tube, narrowed at the point of insertion of the petals, white. Petals about 25, in 2–3 series, narrow, acute, 3–3.5 mm. long, inner ones distinct, rather narrower and shorter, pale yellow to ivory coloured, tips tinged with red; stamens hardly longer than the corolla tube, small, with yellow anthers and white filaments; stigmas 5, very fine, 1–1.5 mm. long, whitish.

Meetings

For the benefit of members who have joined the Society during the year the dates of Meetings are repeated:—

June 4th.	} EXHIBITION.
July 2nd	
July 3rd	
September 10th.	
October 22nd.	
November 26th.	

Editorial

THE third volume of the CACTUS JOURNAL is completed with the present issue, and we should like to thank all those who have made its continuance possible by sending contributions. We hope that they will continue to send and be joined by others; as time goes on we have had opportunities of learning what sort of collections many of our members possess, and we feel that a large number of them would be able to give information on various points of interest that they have met with during their dealings with the plants; the best way of learning is by one's own experience, the next best way by hearing of the experiences of others.

At the meetings points arise from time to time which are discussed by those present; but a number of interesting points might be taken up and discussed in the Journal if members, wherever they live, would add their contributions. For instance, there is the question of the best time to sow seeds. The seeds of Cacti and of many other succulent plants germinate freely as a rule, at whatever time of year they are sown, provided, of course, that heat is available during the winter months; the difficult part often comes a few weeks later when the young plants show a tendency to fade away, generally for no very obvious reason, and then the grower asks himself, has he pricked out too soon or delayed too long. Naturally everyone wants to get things going early at the turn of the year and there is a feeling that one *must* gain something by sowing in January or February rather than waiting till April. We have generally sown in January and had fair success, but for the last two years sowing has been delayed till the end of March, the first time owing to pressure of other work, the second time intentionally; in both these cases germination has been excellent and the seedlings have continued to grow on in a most satisfactory manner; there has been no standing still during several dull, cold weeks, so that the result is that an embarrassingly large crop of adults threatens in some cases. We are therefore coming definitely to the conclusion that the later sowing is an advantage as far as the proportion of plants reared is concerned, and that the size of the later-sown plants compares very favourably—if it does not exceed—that of seeds started at the beginning of the year. We hear that other members are also preferring March or April sowing, but possibly the climate and conditions generally may have their effect also. It would be most interesting

and helpful if members living in various parts of the country or abroad would give their experiences. We are all anxious and willing to help beginners and many people who have grown Cacti for years feel they are still learning, but a pooling of information should be of benefit to everybody.

We hope that all those who had Mam-millaria seed from Mr. Boarder will try to bring the result to the Exhibition; this is the first attempt at a co-operative experiment, and the result should be very instructive.

Coryphanthas

The descriptions of *Coryphantha elephantidens* and *bumamma* in Britton and Rose do not seem to be quite adequate.

Of *C. elephantidens* they say the tubercles are very large, 4 to 5 cm. long (they surely mean wide?), 8 radial spines, somewhat unequal, brownish when young with black points and yellow bases; flower large, rose coloured, 11 cm. in diameter, but in the key (Vol. iv, p. 24) it says that the flower is purplish or rose.

I have a single plant of this species, 4 in. in diameter, the young spines being ivory tipped with black, and they remain so. There are persistently 7 spines, 5 of which are thick and the two at the top of the areole are the same length as the others, but only half as thick. Its flowers are rose pink.

Of *C. bumamma* Britton and Rose say the spines are 5-8, grayish brown; flower large, 5-6 cm. in diameter, yellow. I have a single specimen 5½ in. in diameter; the young spines on their faces are dull purple lightening to the base; the backs of them are much lighter except just at the top. There are 9 spines, 7 thick, ivory when old, black above, and 2 at the top of the areole as long as the others but only one third of their thickness; it only arrived this year and has not flowered yet.

R. S. FARDEN.

At the Royal Horticultural Society's Spring Show at Chelsea this year there were three exhibits of Cacti and Succulent Plants. Mr. W. G. Theobald (Gardener, R. Baker) received a Silver-Gilt Medal for a fine exhibit of his beautiful *Echeveria* and *Cotyledon* hybrids; Mr. T. M. Endean was awarded a Silver Flora Medal for Cacti and *Cotyledons*, and Mr. W. T. Neale's exhibit of Cacti and interesting Succulents gained a Silver Banksian Medal.

Mesembryanthemums

By T. M. Endean

(Résumé of a Talk given on April 24th, 1935)

IN considering Mesembryanthemums it is important to remember the difference between England and Africa. Africa has thirteen hours sunshine every day except during the very short rainy season, when the amount of rain is excessive, though for the rest of the time conditions are very dry; but there are heavy dews formed by condensation of the moist air during the cold nights which compensate for the lack of moisture at the roots. These conditions under which the plants live should be remembered. In England, however, things are very different; what can one give the plants to make up for the sunshine to which they are accustomed in Africa? Nothing. Artificial methods are only a substitute; it is necessary, therefore, to treat them intelligently and, instead of using the watering can regularly at the roots, to give moisture overhead. With the exception of Lithops, all the Mesembryanthemums may be sprayed, though care should be taken not to spray Conophytums too frequently. In dull weather during the winter no water should be given, but only on bright days during this season.

Most people either take a house which already has a greenhouse attached or else have one built, but few people build a Mesembryanthemum house, which is not at all the same thing as a Cactus house; a greenhouse specially suitable for Mesembryanthemums would have a glass roof and sides perforated with ventilators, wire netting, for instance, would be very suitable, for a stagnant atmosphere is the greatest enemy of these plants. They need especially good ventilation; Mr. Endean leaves the ventilators open day and night during the summer and opens them whenever possible during the winter; he does not approve of top ventilators which let in so much dust and dirt, but prefers them in the ends of the house (if of the span-roof type) and below as well. Mesembryanthemums come from Africa where the climate is hot, but the temperature may drop to freezing point during the night; in this country a low temperature is safer for the plants; even 34° F. during the winter is preferable to 84° F. achieved by artificial heat. In fact, it is advisable to keep the plants as cool as possible whilst shielding them from frost. Sunshine is the best friend of Mesembryanthemums; when this is not available they should have

as much light as possible but not too much artificial heat as this produces weak growth. A minimum of 40° F. is a good temperature at which to aim. All the sunshine available should be allowed to reach the plants; it will do no harm provided there is plenty of ventilation.

The best method of watering is by soaking the pots periodically; Mr. Endean takes each pot, wipes it carefully, especially round the drainage hole, with a paraffiny rag and then puts it into water up to the rim; after draining it is put back on the bench. This method means a lot of work but is worth it; the continual giving of dribbles is not good for the plants.

As the best potting compost Mr. Endean recommends burnt clay with, for Mesembryanthemums, the addition of sand and lime or preferably old mortar rubble which contains both sand and lime; the proportion should be about 10 parts of soil to 1 part of mortar rubble. Lately he has been using up the fine dust which occurs in the burnt clay and which, if left in, tends to clog, by mixing it with lime and sand and making a sort of cement which, after it has hardened, can be broken up into nodules and used.

The plants may be re-potted at any time of year, but it is not advisable to do this when they are flowering.

It is important to remember that the plants require a period of rest and, if they do not get it they will suffer, just as human beings do. In England the growing period varies by as much as three weeks between the south and the north, that is, over a distance of 400 miles; for instance, no one would plant potatoes in Scotland as early as in the south of England. The difference between the growing periods in South Africa and South West Africa, separated by thousands of miles, is as much as three and a half months, so that all the Mesembryanthemums do not want to be rested at the same time. Thus Lithops should be watered from May to Christmas-time and then given a rest until April; the old plant dries up alarmingly and should become a thin skin, whilst the fibrous roots die during the resting period; if watering is continued through this period the fibrous roots persist and the old plant receives the benefit instead of the new growth, whereas, if the roots are kept dry the new plant absorbs nourishment

from the old plant, which consequently dries up.

With the Conophyta the fibrous roots die in the same way ; their resting period is from May 1st to the middle of August, when they start flowering. Mr. Endean keeps the pots in trays into which a very little water is poured so that a slight vapour rises in the cool of the night ; for a tray 14 ft. by 10 in., a pint of water is sufficient.

In Conophyta the dead fibrous roots form hard bunches, so that the plants should be re-potted every two to three years, when the old roots should be removed without damaging the stouter main roots ; it is useful to do this with Lithops also, but not so essential as the roots do not in this case make such hard, impenetrable bunches. Some people have good clumps which have not been re-potted for as much as seven or eight years without apparently deteriorating, but there is always the danger of patches drying out and it is better to attend to them more frequently.

Faucarias, Pleiospilos and other stemless varieties are apt to get elongated so that they hang over the pot ; they may be replanted with the bare stem buried, but it is much better to cut them off just below the leaves and re-root them ; the old stem does not long remain sound when buried. June is the best time to perform the operation and the plant should be kept in a bright place while re-rooting so as not to grow soft.

Shrubby Mesembryanthemums are easy to grow if put out during the summer, but the difficulty comes when they have to be housed in the winter ; they become weak and anaemic in a greenhouse and are apt to die. They would be better suited in the sort of house suggested earlier, that is, a glass roof and wire netting sides, but heating would have to be supplied to keep out the frost and the netting covered during bad weather. These are the hardest section of the Mesembryanthemums to winter successfully under glass.

Some people regard Mesembryanthemums as hardy plants ; Mr. Endean has travelled considerably and seen many collections ; the best was at the Marine Laboratory, Plymouth, where the plants had been successfully brought through several winters without heat, but when a severe winter came most of the plants succumbed. They are not really hardy but may survive our milder winters, though *M. edule* has become naturalised along the coast, where it is now quite wild in some places, but none of the others are as hardy as this.

Page Sixty-six

In answer to a question, Mr. Endean said that cuttings of *Mesembryanthemums* might be taken at any time with the exception of Conophyta, which should never be cut in December, as then the plant only consists of two connate leaves, and the new bud at the base has hardly begun to form.

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Members are reminded that the Amateurs' Flower Show, organised by the Royal Horticultural Society, will be held on June 25th, 1935. There are classes for Cacti and Succulent Plants ; schedules can be obtained on application to the Secretary of the R.H.S., Vincent Square, London, S.W.1.

South African Succulents in their Habitat

By Miss M. C. Karsten

1. *Lithops Lesliei*, N.E.Br.

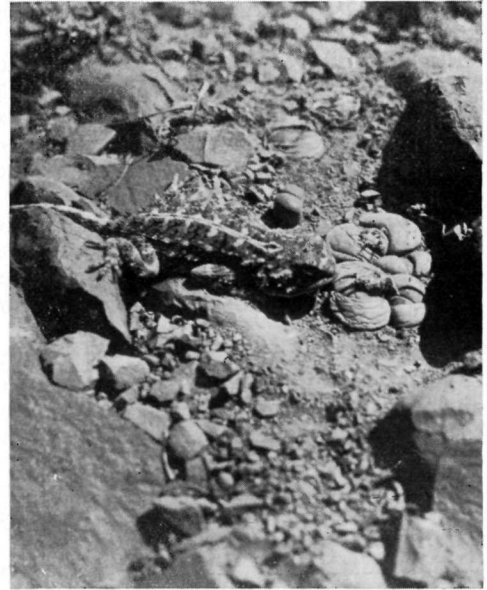
This stone-shaped *Mesembryanthemum*, which is rather common in our collections, was originally discovered on August 9th, 1908, on a Dwyka Conglomerate* outcrop on the banks of the Vaal River at Vereeniging in the Transvaal, by the youngest son of Mr. T. N. Leslie, after whom the plant was named. Later several other localities in the Transvaal, the Highveld, Griqualand West, were reported. But it is not generally known this species also occurs in the close vicinity of Pretoria, South Africa's administrative capital.

When I visited that town in the last days of August, 1933, a botanist belonging to the staff of the new Transvaal Museum, Miss Emmy Obermeyer, took me out one morning on a small excursion just outside the town, in order to see this species of *Lithops* in a wild state. After a short drive our car stopped at the border of a small stony flat covered with fragments of shale, and there it was we had to search for the plant above mentioned. So we got out and started our investigation of the veld, occasionally stooping and kneeling in order to examine the stones and crevices of the rock. It ought to be mentioned, there were no blooms to call attention to where the plants were growing; the dry winter season having not yet given way to the rainy period, the plants were still in a state of rest.

After searching for awhile, my companion exclaimed she had come across a specimen of the coveted plant and hurrying to the spot where the little thing was growing, she had to touch it with her finger since I failed to see anything that looked like a living plant! The small growths (leaf-pairs fused together into a single body) buried to their flat apex in the soil, were partly enveloped by the brownish remnants of the old leaves. Moreover, the leaf-tips with their close pattern of rust-coloured markings (on a dark olive green ground, which was practically invisible) and the dried-up skins exhibited a striking resemblance in colour to the soil and the surrounding shale-formation. The plants appeared to occur only among vertical outcrops of a reddish or rusty shale and beyond

those spots not a single specimen could be found, although the colour of the fragments of shale was exactly the same.

Having got acquainted with the mode of occurrence of the plant, I found some specimens myself, but not without difficulty, they were too well hidden. Once I nearly put my hand on a small clump consisting of three or four growths, without noticing it! But



Lithops Lesliei N.E.Br. in the Veld near Pretoria.

[Photo : M. C. Karsten.]

in the flowering period, when bright yellow blooms with spreading petals appear from the narrow fissure between the leaves, the plants must be rather showy.

Some common names given to *Lithops Lesliei* may be of interest to the readers of our Journal. In the Transvaal the plant is called "toontje" (S. African for little toe) and eaten by the children, while in Griqualand West it is named "paardeklauw," because of its outline which resembles the spoor of a horse. Proceeding to the natives, the Bechuanas have given the plant the name "sebululana," but we cannot even guess the meaning of it!

The late Dr. R. Marloth was right by ranging this stone-shaped plant among the most striking examples of *mimicry*. As a matter of fact, the genus *Lithops* includes many more good examples of this curious adaptation, e.g. the species with grey or brownish-grey

* Dwyka Conglomerate : a very compact, non-aminated clay formation, originating from the glacial period, with quartzitic and other rock inclusions, extending from the Cape, through the Transvaal and Rhodesia up to Nyasaland and towards the Cameroons.
M. K.

tops, which have their home in the arid regions of South West Africa, and are exclusively found among the quartz, granite, limestone or half buried in yellowish sand.

On the other hand there are many Mesembryanthemums mentioned in this respect that are not good "mimicries" at all. Some continental dealers and collectors are in the habit of applying the name "mimicry" to all species of *Gibbaeum*, *Rimaria*, *Pleiospilos*, *Lithops*, *Conophytum*, and other dwarf genera, but we cannot subscribe to this generalisation. In some catalogues one may find these plants offered under the heading "Flowering Stones."

Although in several cases the plants imitate their surroundings in form or colour, or both, to a large extent, we must be careful not to overrate the protection the plants have by means of their inconspicuousness. If experienced collectors have the greatest difficulty in finding these little wonders of plant life, even pass them by unnoticed, that does not mean that they will also escape the keen eyes of hungry animals which eat the juicy growths eagerly.

On the other hand, we cannot agree with the antagonists of mimicry among plants who claim that this curious adaptation to the surroundings is merely accidental. The hypothesis that this adaptation has been caused by environment is a much more plausible one. But what is the real use of it to the plant? Can we really speak of a *protective* adaptation? It is a problem that has not been solved thus far, and shall we ever know? There are many mysteries in Nature.

L. Leslie possesses, like all other species of the genus, windowed leaves; the subterranean portions of the plant, to which the green colouring matter is restricted, receive the light through the truncate apex which is deprived of chlorophyll, except for a small strip on either side of the mouth of the fissure. The transparency of the windowed top was not quite distinct in the specimens found in the Pretoria commonage, thanks to its dense pattern of rusty markings.

A photograph taken of *Lithops Lesliei* N.E.Br. in its Pretoria habitat is reproduced herewith. The mode of occurrence of the plant, e.g. the shale formation, is distinctly shown in the picture. One will notice a small clump consisting of four growths (two of them with fruit-pods) partly enveloped by the wrinkled remains of the old leaves and just above the four-headed specimen, in the upper part of the picture, two single plants, also

with their tops level with the surface of the ground, but they are far less conspicuous!

A sleepy lizard which was sunning itself on the shales did not mind being moved to the spot where the plant was growing and having its portrait taken. We found the little creature merely by accident. By its dull brown colour with characteristic markings on back and tail, and its rough, scaly surface it was more or less camouflaged with respect to its surroundings. But had we found



Aloe ferox Mill. growing wild in the Little Karroo.

[Photo : M. C. Karsten.]

instead of this lizard a specimen of the indigenous "verkleurmannelje," a kind of chameleon, the illusion would have been more perfect! In that case two striking examples of mimicry, a botanical and zoological one, would have been united in one picture.

A two-headed specimen of the plant, picked in its habitat and brought to Holland, was rather a slow grower; it took the plant nearly seventeen months to develop its new growths; only last winter the new formation showed itself between the old leaf-pairs. The colour of the new growths exactly matches that of the fragments of shale collected on the spot.

It is to be feared some new town planning will wipe out the Pretoria locality of this species of *Lithops* as time goes on. How many rare and interesting South African plants have not already been sacrificed to the expansion of the white population?

2. *Aloe ferox* Mill.

Some flowering specimens of *Aloe ferox* Mill. in their habitat at Hottomskloof in the Little Karroo are represented in the other picture. The thick flowering spikes are of a flaming red colour and make the plants very showy. This species of *Aloe* is rather frequent in the Little Karroo and appears to stand long periods of drought quite well. The shrubby vegetation which is seen in the picture is partly formed by the so-called Guarri bush, *Euclea undulata* Thunb., an evergreen shrub with small leaves with undulated margins, which is also a very common feature in the Little Karroo.

I was staying at a small farmhouse at Hottomskloof, which lies in the Oudtshoorn district (C.P.). From the back of the house one had a wonderful view of the Great Swartberg Range. At sunset, when the colour of the mountains changes to violet, the scenery is exceptionally beautiful.

A CORRECTION

"THE Karroo Garden at Whitehill near Matjesfontein." In the above-mentioned article which appeared in the December issue, No. 2, Vol. 3, the name *Cotyledon fascicularis* Ait. (the "Boterboom") as given on p. 22, should be replaced by *Cotyledon paniculata* L. fil., the latter name having the priority.

We have been misinformed on the common name of *Crassula perfossa* Lam. (vide p. 23). The name "shaving-brush flower" is not applied to that species but to *Crassula congesta* N.E.Br.

Terborg.

M. C. KARSTEN.

Articles on subjects of interest to readers of the Journal are welcomed, as well as photographs suitable for reproduction. The Journal appears quarterly on the first of March, June, September and December, and matter to be included should be received, if possible, at least a month before the issue in which it is to appear. All communications should be addressed to the Editor: Mrs. Vera Higgins, M.A., 28, Northampton Road, Croydon, Surrey.

New Succulent House at Kew

The following letter from Sir Arthur Hill to *The Times* will be of interest to members of this Society:—

Royal Botanic Gardens,
Kew, Surrey.

4th May, 1935.

SIR,

It has long been desired to have a greenhouse at Kew where our remarkably fine collection of South African succulent plants could be exhibited to our many visitors. At present the collection of Mesembryanthemums, etc., numbering some 2,000–3,000 plants, is being cultivated in a private part of the Gardens and can be seen only by special permission. I was greatly pleased, therefore, when I received an offer from an English gentleman to provide half the funds for a house suitable for the purpose. He desires to do this to celebrate the Jubilee of His Majesty the King, and also as a thankoffering for all the help he has received from Kew from time to time.

The proposed house would be a low structure of 67 ft. long by 13 ft. broad, running east and west and so getting the full benefit of the sun from the south, and it would be built parallel to and to the south of the Sherman Hoyt Cactus House. The estimated cost of the house is about £1,300.

I venture to address this letter to lovers of Kew and more particularly to those interested in the unique succulent plants of the Union of South Africa, in the hope that there may be others who would like to celebrate the Jubilee by providing the rest of the funds (£650) needed to supplement the generous gift which has already been offered.

The object is, I submit, a particularly suitable one at this memorable time, since it would enable us to exhibit to the British public in a convincing manner some of the wonders of the vegetation of one of the most interesting portions of the Empire. May I ask that any who would like to be associated with this proposal should communicate with me in the first instance.

I am,

Sir,

Your obedient Servant,

[Sd.] ARTHUR W. HILL,
Director.

The Cactus Journal

WE hear from Mr. W. C. G. Ludford, who has recently joined the Society, that he has some parts available of the CACTUS JOURNAL published in 1898 and 1899. When the publication of this Journal was discontinued, Mr. Ludford took over all the remaining parts; particulars of the numbers available are given below.

There are no complete copies of Volume I, and the only part available is:—

Part 5, June 1898 .. 21 copies.

Of Volume II there are four copies; these are very scarce and, of course, out of print, and Mr. Ludford offers them at £1 1s. od. each. Details of the number of Monthly Parts available are as follows:—

Volume II

Part 13, February 1899 ..	57 copies.
„ 14, March „ ..	12 „
„ 15, April „ ..	1 only.
„ 17, June „ ..	1 „
„ 19, August „ ..	11 „
„ 20, September „ ..	5 „
„ 21, October „ ..	37 „
„ 22, November „ ..	5 „
„ 23, December „ ..	3 „
„ 24, January, 1900 ..	16 „

The Monthly Parts are offered at 2/6 each and, together with the complete volumes, can be obtained from Mr. C. G. Ludford, Fern Lea, Four Oaks, Sutton Coldfield, near Birmingham.

Mr. Walton's *Amateur's Guide and Price List*, published about the same time (Mr. Walton was Editor of the CACTUS JOURNAL), contains 170 illustrations and the names and prices of 3,350 Cacti and other succulent plants. If any member would like the opportunity of acquiring one of these lists, which are of historical interest, Mr. Ludford is willing to supply copies at 1/3, post free.

A Letter

The following letter has been received from Mr. H. J. Solomon of Sydney:—

“In the work *Mesembrianthemum* I think Dr. Tischer mentioned something about the ‘Sciara’ fly, small and very active. I have trouble with a small fly in and on my seedlings and jolly hard to catch without knocking a number of pots over; for your friend’s

information, if not already used, I place about my pots sections of sticky fly paper, some sheets, some rolls, and it is very efficacious and I have had no further trouble from this pest.

“I have had to take a pull on the *Mesembrianthemum* section as I have accumulated thousands of plants and have terrible congestion, which is bad for one’s peace of mind, as they take a lot of care and watching. I am at present concentrating on Euphorbias, Haworthias and Gasterias and they are worth collecting, especially the Haworthias, of which I have over 100 sorts. As a side line I have 100 latest hybrid Cymbidiums arriving shortly; they are, in my opinion, really wonderful plants; I had over 2,000 flowers last season.

“I have a hunch to go in for Cacti again. I used to have over 5,000 plants, but they have dwindled down to 1,000–1,500. If I do start these again, I shall only collect show plants to keep under cover, and the best sorts from South America which appeal to me especially.

“I am glad to say the Sydney Botanical Gardens are building a new succulent garden that will be very beautiful and are also building a special greenhouse with rockery beds to house a collection of about 2,000 plants I am giving them; that is why I have collected so much from time to time, as this was their intention some time ago, but it was put off on account of the hard times we went through.”

Euphorbias

At the Conversazione of the Royal Society held at Burlington House, on May 3rd, the Director of the Royal Botanic Gardens, Kew, showed Cactoid Euphorbias from South Africa. The plants were all succulent types resembling in their form the Cacti of America; amongst the species represented were: *Euphorbia aphylla*, *E. cereiformis*, *E. Evansii*, *E. heptagona*, *E. horrida*, *E. Krinithii*, *E. pseudocactus*, *E. stellaespina* and *E. virosa*.

Catalogue Received

Robert Gulzow, Hohenzollerndamm 11, Berlin, W.15, Germany. The catalogue, which contains beautiful photographs, includes plants and seeds of cacti and other succulents.

Succulents

Other than Cactaceae and Mesembryanthemae

By R. S. Farden

(Continued from page 56.)

GASTERIAS

The name is from the Greek *Gaster*, referring to the swollen base of the flowers, which, like the flowers of Aloes, are of a straight funnel shape. The *Gasterias* are closely allied to the Aloes and like them, their flowering season is in our winter; there are some 70 species or more, all natives of the Cape of Good Hope. There seem to have been very few *Gasterias* discovered during the last forty years.

Alwin Berger divides the *Gasterias* into fifteen sections, viz:—

- | | |
|-------------------|------------------|
| A. Verrucosae. | I. Nigricantes. |
| B. Subverrucosae. | J. Caulescentes. |
| C. Brevifoliae. | K. Carinatae. |
| D. Dictae. | L. Parvifoliae. |
| E. Mollis. | M. Trigonae. |
| F. Augustifoliae. | N. Magnae. |
| G. Conspurcatae. | O. Grandiflorae. |
| H. Angulatae. | |

Section A. VERRUCOSAE.

- G. verrucosae*. King William's Town. Leaves 10–12, distichous, that is spreading out right and left, close, sword-like, outer ones turned out, inner ones ascending, 6–9 in. long; face concave, both sides heavily spotted with prominently raised, white dots.
- G. verrucosae* var. *latifolia*. More robust, with leaves a foot long.
- G. verrucosae* var. *intermedia*. Leaves more sword-like, 6–9 in. long, tubercles not so white. Syn. *G. lingua*.
- G. verrucosae* var. *scaberrima*. Leaves more strap-like, incurved, with most of the tubercles greenish white, almost the colour of the leaves.
- G. repens*. Leafy stem about 1 in. long; leaves 8–10, distichous, spreading, tongue-like, $2\frac{1}{2}$ –3 in. long; 8–9 lines wide, rounded with pointed apex; spots whitish, small, rather raised, aggregated into irregular transverse bands.
- G. margaritifera*.
- G. Holtzii*.
- G. Kewensis*.
- G. lanceri*.

Section B. SUBVERRUCOSAE.

- G. verrucosa*. Algoa Bay. Stem $1\frac{1}{2}$ –2 in. long; leaves 8–10, strap-like, to right and

left, 6 in. long, $1-1\frac{1}{4}$ in. wide, not so thick as in *verrucosa*; tip rounded with a hairy point; edges beaded with raised tubercles, spots on face and back small.

- G. verrucosa* var. *parvipunctata*. Leaves longer, spots smaller.

- G. verrucosa* var. *marginata*. Pale, hairy; margins of leaf continued all the way down.

- G. radulosa*. Stem $1-1\frac{1}{2}$ in. long, leaves about 6, distichous, strap-like, 6–8 in. long, flexible, face flat, dull green; rounded tip with a point; erect teeth on the edge; spots on face crowded, small, whitish.

Section C. BREVIFOLIAE.

- G. brevifolia*. Cape. Stem $1-1\frac{1}{2}$ in. long; leaves about 10, densely crowded, tongue-like, 3–4 in. long, 2 in. wide, very thick, rather glossy, rounded tip with a point; spots small, white, indented.

Section D. DICTAE.

- G. dicta*. Stem 2 in. long; leaves 12–14 in a slightly spiralled rosette, strap-like, 4–5 in. long, $1\frac{1}{2}$ in. wide, firm, very smooth, dull green, with one side often duplicated; spots on face small, whitish, indented.

Section E. MOLLIS.

- G. mollis*. Stem $1-1\frac{1}{2}$ ft., leaves 6–8, to right and left, crowded, strap-like, 3–4 in. long, $1\frac{1}{2}$ in. wide, dull green with small spots, borders tubercled.

Section F. AUGUSTIFOLIAE.

- G. augustifolia*. Cape.

Section G. CONSPURCATAE.

- G. conspurcata*. Cape. Leaves distichous.

Section H. ANGULATAE.

- G. sulcata*. Stem 1–2 in. long; leaves 10–12, distichous, or in a slightly twisted rosette, strap-like, 6–8 in. long, $1\frac{1}{2}$ in. wide, round at the top with a point; borders usually duplicated, tubercular, dull pale green; copious minute, scattered, indented spots.

- G. obtusifolia*. Stem $1\frac{1}{2}$ –2 in. long, leaves 12–16, right and left, tongue-like, 4–6 in. long, $2-2\frac{1}{2}$ in. wide, broadly rounded top with minute point; quite smooth on the

surface, copious small, indented, whitish spots.

G. lingua.

G. angulata.

Section I. NIGRICANTES.

G. nigricans. Stem 4-5 in. long, leaves 10-20, distichous, crowded, tongue-like, 4-8 in. long, rounded top with a point, not tubercled, dark green and glossy on the surface; copious scattered, indented spots; backs rounded.

G. nigricans var. *crassifolia*. Leaves narrower and thicker with the margin slightly tubercled.

G. nigricans var. *marmorata*. Leaves shorter and narrower than the type, marbled with white and reddish spots.

G. nigricans var. *fasciata*. Very smooth with spots aggregated in indistinct transverse bands. T. Cooper says this is entirely different from *nigricans*, the leaves being spirally arranged.

G. nigricans var. *subnigricans*. Strongly tubercled on margins, rough on the surface since the tubercles are slightly raised.

G. rufescens.

Section J. CAULESCENTES.

G. Zeyheri. S. Africa. Stem 6 in. long, leaves 16-20, laxly disposed in twisted, right and left, rosettes, turning outwards, strap-like, 8-9 in. long, 1 in. wide, smooth, firm, flat, top with a point, tubercled, spots obscure and indented.

G. maculata. Short stemmed, leaves 12-20, in a spirally twisted rosette, strap-shaped, erect, firm, 4-6 in. long, 1 in. wide, smooth, tinted purple; copious spots, large, white and coalescing; no tubercles on the edge.

G. colubrina. Stem 4-6 in. long, leaves 8-10, spirally disposed, rosette-like, 9-14 in. long, thick, smooth, bright green or purple, face concave; spots small, whitish, indented, one border often duplicated.

G. spiralis. Stem 4-6 in. long, leaves 16-28, in a spirally twisted rosette, glossy, dull green, 4-6 in. long, back rounded, both sides with copious, whitish, indented spots.

G. picta. Stem short, leaves 16-20, in a spiral rosette; 6-12 in. long, glossy, dark green, with copious indented, white spots, one border duplicated.

G. pulchra. Stem 6 in. long, leaves 12-20, in a spiral rosette, standing out, 1-1½ ft. long, 1 in. wide, narrower at the top, smooth, often tinted purple, with copious large, indented, white spots, coalescing; one border duplicated, edge not tubercled.

G. retata.

G. planifolia.

Section K. CARINATAE.

G. cheilophylla. Stem 2 in. long, leaves 14-18, in much twisted rosette, sword-like, 9-12 in. long, broad, low down narrow, top with a point, sometimes with duplicated edge one side, dark green, with copious, coalescing slightly raised, white spots; tip with an entire white, horny margin; spots on the edge more raised than those of the face.

G. porphyrophylla. Stem 1½-2 in. long, leaves 8-10, crowded, standing out, strap-like, 7-8 in. long, 1 in. wide, dull purple, very smooth, duplicated border on one edge; copious indented, white, coalescing spots; apex with a point, with a toothed, horny border; edges tubercled below.

G. variolosa. Stem 1½-2 in. long, leaves 15-18, in a spiral rosette; 8-9 in. long, 1½ in. wide, narrowing to a pointed tip, smooth, dull green, firm, concave; copious indented spots, large, whitish and coalescing.

G. pallescens. Stem 2 in. long, leaves 8-10, crowded, outers spreading, inners standing out, 6 in. long, 1 in. wide, apex with a toothed, horny border; edge not tubercled, surfaces covered with greenish white, indented, coalescing spots.

G. excavata. Stem 1½-2 in. long, leaves 12-16, in an irregular, right to left, rosette; 4-6 in. long, pale, dull green with small immersed, indistinctly whitish spots; borders tubercled, one or both duplicated.

Section L. PARVIFOLIAE.

G. parvifolia. Leaves 10-12, arranged in a dense rosette, lance-like, 2-2½ in. long, dull green changing to purple when old; face very concave, back obliquely keeled; copious spots on the face, small, whitish, immersed, forming irregular bands; border and keel tubercled.

G. decipiens. Stem 1-1½ in. long; leaves 12-20, in a dense rosette, 2-3 in. long, narrowed to a point, concave on face, obliquely keeled on the back, dull dark green and rough with copious, concolorous, raised spots.

G. gracilis. Leaves 9-10, in a dense rosette, 3-4 in. long, 1 in. wide, narrowed to a continuously horny tip, back obliquely keeled; copious spots on face, small and immersed, those on edges and keel raised.

Section M. TRIGONAE.

G. carinata. Stem 1-1½ in. long, leaves 12-20, in a dense rosette, 5-6 in. long, 2 in.

wide, narrowing to the deltoid, denticulate, horny tip, concave on face; obliquely keeled on back; dull green, rough with copious, round, white, scattered, raised spots, the margins and keel prominently furnished with raised spots.

G. carinata var. *strigata*. More robust, leaves 8-10 in. long, less rough; tubercles sometimes coalescing.

G. carinata var. *parva*. A small, very proliferous form with but few tubercles.

G. carinata var. *falcata*.

G. lactipunctata. Stem $1\frac{1}{2}$ -2 in. long, leaves 15-20, in a dense rosette, lance-like, 4-6 in. long, narrowing, concave, keeled down the back, bright green or tinged with purple, smooth, with many small, pure white, immersed spots and tubercled edge.

G. glabra. Stem $1\frac{1}{2}$ -2 in. long, leaves 15-18, in a dense rosette, 6-9 in. long, 2-3 in. wide, face concave, keeled, smooth, dark green with many small, immersed spots and tubercled edges.

G. obtusa. Stem $1\frac{1}{2}$ -2 in. long, leaves 12-18, in a dense rosette, 6 in. long, $1\frac{1}{2}$ in. wide, concave, keeled dull green; many scattered, immersed, small, whitish spots; margins tubercled.

G. subcarinata.

G. metallica.

Section N. MAGNAE.

G. fuscipunctata. Stem 2-3 in. long, leaves 12-20, in a dense rosette, stiff, lance-like, 6-12 in. long, 2-3 in. wide, face slightly concave, keeled, dull green, reddish brown when old, with a few whitish, immersed and many brown star-like, often coalescing spots; margins smooth.

Section O. GRANDIFLORAE.

G. acinacifolia. Stem $1\frac{1}{2}$ -2 in. long, in a dense rosette, stiff, standing out, 12 in. long, 1-2 in. wide, narrowing, unequally keeled on back, smooth, shiny, dull green, with copious, small, immersed, greenish white spots; margins rather rough.

G. acinacifolia var. *ensifolia*. Leaves short, less tapering.

G. acinacifolia var. *venusta*. Leaves narrower, more glossy, with whiter spots running into obscure bands.

G. acinacifolia var. *nitens*. Leaves longer, $1\frac{1}{2}$ ft. long, very smooth, light green, with copious coalescing spots.

G. candicans. Stem $1\frac{1}{2}$ -2 in. long, leaves 12-20, in a dense rosette, 6-15 in. long, face concave, keeled, bright green, smooth,

with copious immersed, minute, whitish spots; margins and keel not tubercled.

G. Croucheri. Stem $1\frac{1}{2}$ -2 in. long; leaves 12-18, in a dense rosette, 12-15 in. long, 3-3 $\frac{1}{2}$ in. wide, narrowing to a pointed tip, face concave, keeled, smooth; dark green, with copious small, immersed, greenish white spots; edges smooth or obscurely papillose.

EUPHORBIAE

The name *Euphorbia* was given by Dioscorides, a Greek physician living about A.D. 100-200, after Euphorbus, physician to Juba, King of Mauritania. Walton says in the *CACTUS JOURNAL*, 1900, "that they abound in equinoctial America; in the U.S.A. they are much less numerous and only a few reach Canada." (I take it he is speaking of non-succulent *Euphorbias*, of which there are many.) Again he says Africa produces much fewer; a good number of them inhabit Cape Province and most of these are succulent. India produces a smaller number still; in Great Britain there are 16 species, none truly succulent.

A large proportion of the *Euphorbias* are poisonous; that does not mean that to touch one would poison you; it is getting the sap of them into a cut or sore that would be poisonous. If *E. canariensis* is touched and then the eyes rubbed, that will produce an inflammation lasting some days. Some species are used in medicine; Castor oil is a *Euphorbia* product. Some are narcotic. India-rubber is produced from various poisonous species, but the poisonous principle is very volatile and the application of heat dissipates it. *E. balsamifera*, on the contrary, is cooked and eaten; the sap of *E. heptagona*, *E. virosa* and *E. cereiformis* is used by the S. African bushmen to poison their arrows.

The flowers, unlike those of other genera, are unisexual in all species, that is, they have both male and female flowers and when the flowers occur together on the same plant there are usually 3-5 male flowers and only one female flower and this latter turns outwards. In the *Meleuphorbia* section the plants bear all male or all female flowers and again there are those, such as *E. enopla* and *E. cereiformis*, that bear flowers that are undeveloped and which turn into permanent thorns.

Euphorbia cuttings are somewhat difficult to root; the cut surface should be thoroughly dried, then the cutting is tied to a stick,

sufficient length being left below the plant to enable it to keep it upright; this is put into soil so that the cutting itself just touches; the soil should consist of fine peat, sand and powdered charcoal. They require all the sun and air possible and a temperature of 50-55 deg. F. in winter, though some prefer more heat in winter.

Soil. Euphorbias require a fairly rich soil generally, such as sandy loam with some leaf mould, with rubble or burnt clay to maintain complete porosity; they need but very little water in winter and not too much in summer.

In *Flora Capensis*, Vol. V, Section 2, 1925, they are listed and described very fully by N. E. Brown, J. Hutchinson and D. Prain in 290 pages. These are the succulent types; there are very many more which are not succulent.

A. Berger in *Sukkulente Euphorbien*, 1907, describes about 100 selected species. (I notice the classifications of these two books are totally different.) Berger divides the species into twelve sections:—

- | | |
|-------------------|-----------------------|
| 1. Tithymalus. | 7. Meleuphorbia. |
| 2. Arthrothamnus. | 8. Dactylanthus. |
| 3. Tirucalli. | 9. Medusae. |
| 4. Pteroneuræ. | 10. Pseudoeuphorbium. |
| 5. Diacanthium. | 11. Pseudomedusae. |
| 6. Anthacantha. | 12. Treisia. |

Section 1. TITHYMALUS.

- | | |
|------------------|-----------------------|
| E. punicea. | West Indies and Cuba. |
| E. mellifera. | Madeira. |
| E. balsamifera. | Canaries. |
| E. atropurpurea. | Canaries. |
| E. piscatoria. | Madeira. |
| E. Regis Jubae. | Canaries. |
| E. dendroides. | Mediterranean. |

Section 2. ARTHROTHAMNUS.

- E. pendula. Cape Province. Numerous long, pendent, jointed branches, nearly $\frac{1}{2}$ in. thick; joints 2-3 in. long, dull green with fine white dots; leaves small, scale-like, soon dropping. Most of the plants in cultivation under this name are *Sarcostemma viminale*.

Section 3. TIRUCALLI.

- E. Tirucalli. E. Africa and E. Indies. When old, forms a tree; branches forked or in whorls, jointed; joints 3-4 in. long, round, about $\frac{1}{2}$ in. thick, pale green with lighter longitudinal stripes; young shoots with leaves $\frac{1}{4}$ - $\frac{1}{2}$ in. long, soon falling. Very poisonous.
- A. aphylla. Canaries. A shrub, branching freely; branches jointed, cylindrical, forked or in whorls, grey green.

- E. Laro. Madagascar. Shrub with round branches in whorls; branches $\frac{1}{2}$ in. thick, curved, spreading, dark green, grooved longitudinally with lighter coloured dots and stripes in the grooves.

- E. xylophylloides. S. Africa. Stem erect, 20 in. high, often shorter; branches from below the soil and irregularly above; stem erect, branches two-angled, very flat, pale green, jointed, about 6 in. long and $\frac{1}{2}$ in. wide.

- | | |
|-----------------|-------------|
| E. Intisy. | Madagascar. |
| E. obtusifolia. | Teneriffe. |
| E. Schimperii. | S. Arabia. |
| E. Dreageana. | Cape. |
| E. arbuscula. | Socotra. |
| E. mauritanica. | Cape. |

Section 4. PTERONEURAE.

- | | |
|----------------|---------|
| E. Sipolisii. | Brazil. |
| E. pteroneura. | Mexico. |

Section 5. DIACANTHIUM.

This section is divided into six sub-sections.

1. Splendentes.

- E. splendens, Madagascar. Shrub 6 ft. or more high; stem with spreading branches, almost angled, slightly furrowed, with long black spines; leaves chiefly at the ends of the young shoots, oval with pointed tip, 2-2 $\frac{1}{2}$ in. long, $\frac{3}{4}$ in. wide, smooth, leathery, pale green. Flowers in repeatedly forked inflorescences on long, sticky stems, small, with two round, fiery red bracts. Flowers nearly all the year round but chiefly in spring.
- E. Bojeri, Madagascar. Similar to splendens but more elegant and forming a looser bush; leaves smaller and rounder, with small spiny tips. Flowers rather darker in colour.

2. Grandifoliae.

- E. neriifolia. India. Tree-like when old; stems weakly 5-angled, later round. Branches more or less in whorls, slightly spiralled, pale green with short black spines; leaves 2 $\frac{3}{4}$ to 5 in. long, wide at the tip, pointed, fleshy, pale green, dropping off in autumn.
- E. drupifera. Guinea.
- E. nivulia. India. Similar to neriifolia, but smaller; stem and branches rounder.

3. Scolopendriae.

- E. uncinata (Syn. scolopendria (Don.), stellata (D.C.)). Cape Province. Stems small, cone shaped, truncate, grey, with thick turnip-

like root, with radiating, prostrate, curved, flattened, two-angled branches from the crown; these branches are up to 6 in. long, convex above, concave below, the angles undulate, notched, with small greyish brown thorns in pairs.

- E. Gilbertii*. S. Africa. Stem short, cone-shaped, with a thick turnip-like root, not projecting far above the soil, crowned with radiating, angled, prostrate branches, $2\frac{1}{2}$ –5 in. long, green edges broken, sides flat; thorns in pairs, thin, greyish brown.

4. *Compressae*.

- E. alpicornis*. Madagascar. A tree when old; stem short, 5-angled, nearly 3 in., skin green, later grey, with dark thorns; often branched from the base; branches cylindrical below, then 3-angled above; flat or 2-angled, in 2 or 3 ranks, toothed, dark green.

- E. Nyikae*. Tropical E. Africa.

5. *Trigonae*.

- E. antiquorum*. India.
E. tortilis. India.
E. tenuirama. S. Arabia.
E. macroglypha. Madagascar.
E. cactus. S. Arabia.
E. Bussei. S.W. Africa.
E. trigona. India. A tree when old; branches 3-angled, angles compressed, deeply undulated, pale green; leaf cushions tooth-like, prominent; thorns 2 to 4, about $\frac{3}{4}$ in. long.
E. lactea. India. A tree when old; stems and branches 3-angled; sides almost flat, dark green, with a whitish line in the centre with similar coloured curved markings running to the indentations; edges broken, thorns thick, brown.
E. Hermentiana. Gaboon River. W. Africa. A tree when old; branches erect, 3–4 angled, 2–3 in. diameter, divided into joints from 6–9 in. long, winged, compressed, with short undulations; dark green, marbled irregularly with white; thorns reddish brown, leaves 1–1½ in. long, spoon-shaped, with short tips, persisting a long time.
E. grandidens. S. Africa. A tree when old, 30 ft. high; stem obscurely 6-angled, the branches in whorls, up to 6 in. long, erect, later more pendent; thorns in pairs, brownish.
E. grandicornis. Almost tree-like; stems and branches 3-angled; branches erect, angles winged, in more or less long joints, angles undulate with a horny edge; thorns very stout, in pairs, light brown, later grey.

6. *Polygonae*.

- E. triangularis*. S. Africa. A tree when old; stem at first 6-angled, later round; branches at long intervals in whorls, spreading, 3–5 angled, green, jointed, branching repeatedly; angles winged, compressed; thorns in pairs, 1–2 in. apart.
E. tetragona. S. Africa. A tree when old; stem 6–7 angled, up to 6 in. diameter, constricted into short joints; branches in whorls, usually 4-angled, flat-sided, dark green, thorns in pairs, about $\frac{3}{4}$ in. apart, thin, brown.
E. Cattimandoo. India.
E. Stapfii. E. Africa.
E. heterochroma. S.W. Africa.
E. Erlangeri. Tropical Africa.
E. confertiflora. E. Africa.
E. Thi. Nubia.
E. polyacantha. Abyssinia.
E. quinquecostata. E. Africa.
E. impervia. E. Africa.
E. Royleana. India.
E. parviramulosa. S. Arabia.
E. Frankiana.
E. Beaumieriana. Morocco.
E. Phillipsiae. Somaliland.
E. fruticosa. S. Arabia.
E. canariensis. Canary Islands. Large shrub, branched from the base; up to 40 ft. high, usually 5- rarely 4-angled, bright green, sides flat, angles sharp with small undulations; thorns in pairs about $\frac{3}{4}$ in. apart.
E. similis. Like *Abysinnica*; angles thinner, winged, weakly undulate.
E. Ammak. S. Arabia. Grows to 30 ft. high with a short trunk; branches spreading, up to 6 in. wide, usually 4–5 angled, dark green with slightly raised stripes; edges with teeth about $\frac{1}{2}$ in. apart, thorns on prominent shields, spreading horizontally.
E. resinifera. Morocco. Shrub; in cultivation hardly more than 20 in. high, very irregularly branched from the base; branches pale green, 4-angled, thorns in pairs $\frac{1}{2}$ in. apart.
E. pseudocactus. Stem erect, usually 3-angled at the base, 4–5 angled above, jointed; branches coarsely toothed with a horny band; thorns stout, brown, later grey. Sides flat, green marbled with yellow green.
E. Ledenii. Cape Province. Shrubby, up to 6 ft. high, branches spreading, 5-angled, grey green, thorns up to 6 in. apart, $\frac{1}{2}$ in. long, brown, later grey on horny shield which more or less coalesce to form a horny strip.

- E. Abyssinica. Abyssinia. Tree-like, up to 30 ft. high; branches in whorls, 5-8 angled, pale or dark green, angled, the angles winged and compressed, sides much depressed with marked double veins; leaves small, soon falling off.
- E. neutra. Like Abyssinica; stems and branches 5-6 angled.
- E. virosa. Cape Province. Almost tree-like; stem 4-5 angled, numerous branches in whorls, spreading, 3-angled at the base, 4-5 angled above, grey green, edge horny.
- E. Dinteri. S.W. Africa. Shrubby, branched from the base; stem and branches 6-8 angled, angles and stem spirally twisted, sometimes straight, grooves between the angles marked with dark, sinuous lines, the edge horny.
- E. Echinus. S. Morocco. Shrub about 18 in. high; freely branched; stem $1\frac{1}{2}$ -2 in. in diameter, branches ascending, 6-7 angled; thorns in pairs $\frac{1}{2}$ in. apart, reddish, later pale grey.
- E. officinarum. Morocco. Up to 40 in. high, a few branches in whorls, 9-13 angled, sharply but not deeply grooved between; angles, almost straight, edges whitish grey, horny; thorns in pairs, whitish grey, often pointing downwards.

(To be continued.)

Cacti in 1768

THE name of Phillip Miller, for many years in charge of the Chelsea Physic Garden, is well known; he was responsible for the introduction of a large number of plants of great importance in our gardens to-day and received contributions of plants and seeds from correspondents all over the world. As well as several smaller works, he published the *Gardener's Dictionary*, an enormous volume which contains much useful information. The first editions were arranged on the older system of classification, but in the eighth edition, which appeared in 1768, Miller adopted the bi-nomial system of Linnaeus. It is interesting to refer to this important work and see what the author has to say about Cacti; he gives only six species under this generic name, twelve under *Cereus* and nine under *Opuntia*; the genus *Mammillaria*, so largely grown to-day, is not recognised, though possibly two of the species given under *Cactus* actually were *Mammillarias*.

Under *Cereus*, Miller says:—"Dr. Linnaeus has joined the plants of this genus and also those of *Opuntia* to the *Cactus*, making

them only species of the same genus; but as the flowers of these plants differ greatly in their form from those of *Cactus*, they should be separated; and by preserving the title to this genus, by which it has been long known, it will prevent confusion; and by increasing the number of genera, the specific differences may be better ascertained."

Despite his hopes of preventing confusion, Miller does not seem to have been very clear about the relationships of some of the spherical types: "There have been about four of the large kinds brought to England, some of which have been crowned with a prickly brown cap, in form of one of those fur caps which are worn by the Turks; and others, which have been destitute of these caps, although the plants were full as large as those which had them; therefore some persons have supposed them to be distinct species, especially since these have been many years preserved in gardens, and no appearance of any caps as yet have been produced; but as these have been rarely propagated by seeds, it is difficult to determine if they are essentially different. Those which have these caps, produce their fruit in circles round the upper part of the cap; whereas, the smaller sorts produce their fruit from between the tubercles, round the middle of the plant: and in some figures of the larger sorts of these plants, the fruit is represented as coming out near the crown of the plant; so that if a skilful botanist was to examine these plants in the places of their growth, there would probably be found a much greater variety of them than is at present known"—a prophecy which has been amply fulfilled!

Cacti had been in cultivation in this country for many years at the time Miller was writing; *Opuntias* and some of the *Cerei* were fairly well established in greenhouses though they were generally grown in much higher temperatures than are thought reasonable nowadays, and often they were plunged in beds of fermenting tanner's bark. The difficulties of importing must have been great in the days of sailing ships, even apart from "the unskilfulness of those persons who had care of them in the voyage; for, by giving them water, they generally caused them to rot before they were taken out of the ships."

Any one who is historically minded will find much interesting reading in Miller's *Gardener's Dictionary* where, besides the sections devoted to Cacti, are others on *Euphorbias* and *Mesembryanthemums*, thirty-two and forty-six species being described respectively.

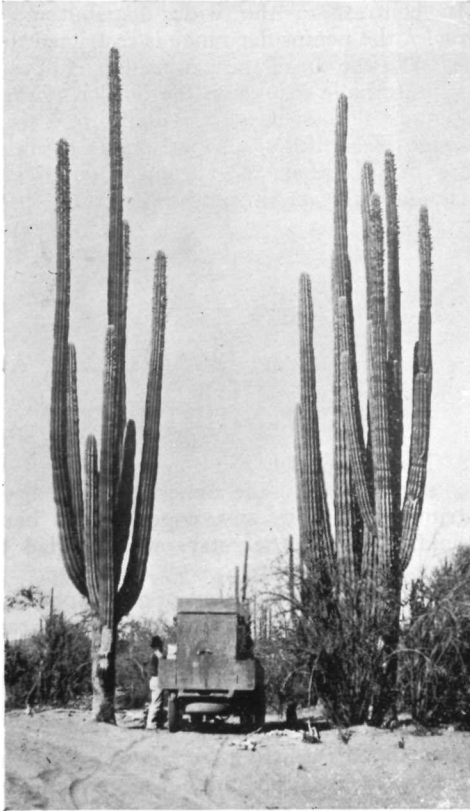
Pachycereus of Lower California

By Howard E. Gates

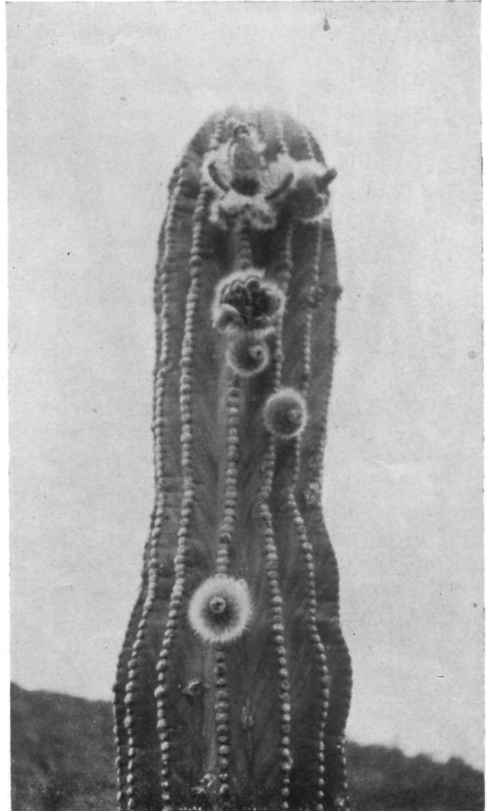
THROUGHOUT the major portion of Lower California, Mexico, the giant *Pachycereus* dominate the landscape. They are not at all particular as to soil or the location. Often a single plant will top a small hill like a sentry on out-post duty. On fertile bottom lands they form veritable forests and many are found on small islets that are hardly more than great rocks in the

Usually they are vertical but they may spiral in either direction around the branches. Often the stout spines drop, leaving the ribs protected only by large felted areoles. For this reason they are called the Cardon Pelon or Bald Headed Cardon.

The flowers are borne over a large area, from the top of the plant downwards, mostly on the sunny side of the plants. When one is



Pachycereus Pringlei near Mulege.



Pachycereus Pringlei in fruit.

Gulf of California. The most magnificent specimens are found in the bottoms of protected canyons. In exposed places and near the sea coast the plants are much smaller and the branches bear many constrictions dividing them up into small joints.

The larger species, *Pachycereus Pringlei*, is most abundant, being found nearly everywhere from the Thirtieth Parallel to below the Twenty Third Parallel. The large branches usually take off in a group at a point from six to ten feet above ground. The fluted ribs number eleven to seventeen.

lost in a forest of these he should look for evidences of bloom rather than for the mossy north sides in order to orientate himself. The flowers are not as large as might be expected for such huge plants, being only about 3 in. across. They are widely trumpet shaped, white petaled, with closely matted, fine, brown spines on the outer perianth scales. The fruit is round, covered with fine spines, giving it the appearance of a large chestnut burr with the dried floral remains protruding from the outer end. When ripe, the fruit splits open from the blossom end,

exposing shining, black seeds imbedded amongst fleshy, white to purplish-red filaments. This is feast time for birds and small animals, but the seeds are too large and numerous to make the fruit palatable for humans.

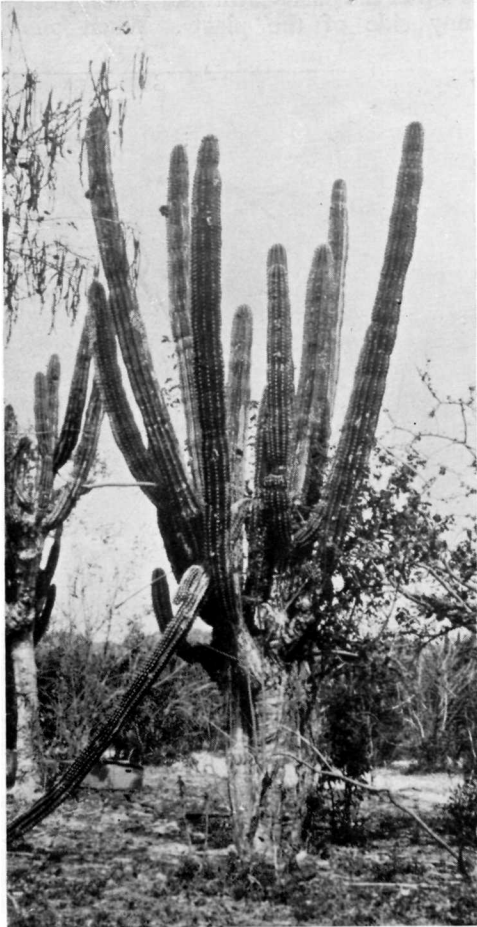
The natives will not sleep under a Cardon, for they say the plant knows they are there and will fall on them. The truth probably is

feed and the seeds are gathered for chicken feed.

Pachycereus pecten-aboriginum, so named because it is said the Indians used pieces of the spiny fruit hulls as hair combs, is much smaller than *Pringlei*.

The more numerous branches bear fewer ribs and more spines. In fact, it is called Cardon Barbon or Bearded Cardon because of the very spiny upper portions of the branches where the flowers are borne. The flower is similar to that of *Pringlei* but smaller, while the fruit is larger and spinier.

In contrast to the wide distribution of *Pringlei*, the peninsular range is restricted to a portion of the tip of the peninsula. They do not intermingle except on the border of their habitats. Both species grow easily from seed, forming beautifully proportioned columns more quickly than most giant Cacti. The *Pecten-arboriginum* must be carefully protected from frost.



Pachycereus pecten-aboriginum near Todos Santos.

that the plants are shallow rooted and are easily blown over in time of storm. In any event the sight of these huge plants towering upwards to as much as 50 ft. is enough to demand awesome respect. Their great weight is borne by a circle of small, woody rods imbedded beneath the ribs. These rods are stripped out and used in house and fence building, as there is no timber where they grow. The fallen flowers are valuable cattle

The Exhibition

THE Third Cactus Exhibition will be held on July 2nd and 3rd; the Schedules have been distributed but if any copies have been mislaid, the Hon. Secretary will be glad to send again on request.

Judging by the experience of other specialist Societies, it is felt that it will be a great advantage to have the show open for two days, as it gives more people an opportunity of visiting it and real enthusiasts can come twice.

It is hoped that the re-arrangement of the classes will make it possible for more members to enter; it is very encouraging when members will enter for a number of classes but, even if any members find it possible to enter for one class only, it is hoped that they will do so. No one knows who owns the prize-winning plant.

The success of an Exhibition depends on the co-operation of all the members; the attendance at the two previous exhibitions shows that many people appreciate the opportunity of seeing the many different species on view; but visitors should remember that there would be nothing to see unless someone had taken the necessary trouble and interest to bring plants and should make an effort to be exhibitors as well as visitors.

Cactus in Canada

By C. W. Armstrong

ONE of the most intriguing Cacti for its persistent flowering habit is *Escobaria tuberculosa*; with me it blooms for nearly two months on the desert rockery in my garden; the flowers are of a delicate pink, nearly 1 in. across, appearing on the apex of the plant, opening in the afternoon and closing at night for several days continuously, followed by others prolonging the period. These are



Escobaria tuberculosa.

succeeded by red fruits that are persistent until the following year. The plant usually grows in clusters of cylindric stems, 3-6 in. tall, covered with white spines on spiralled tubercles and is a native of South-west Texas and adjacent Mexico.

A Reply

MR. C. W. ARMSTRONG writes: "May I add a note in reply to Mr. Wright M. Pierce on page 56 in the March number in regard to *Opuntia erinacea ursina*. My remark regarding "Islands" applies to *Opuntia pycnantha* and *Opuntia erinacea ursina* which is found in the interior as Mr. Pierce says; it has proved hardy with me during our winters outside. I appreciate the criticism and this fall hope to have something to say in regard to the group of *Coryphantha* to which *C. Alversoni* belongs."

Book Reviews

"CACTUS GROWING FOR BEGINNERS," by Vera Higgins, M.A., and H.T. Marrable, M.A., M.D., published by Blandford Press Ltd. Price 2/6.

It has given me great pleasure to review this recent publication and I feel sure that it will prove itself of great value to all beginners. I suppose it is hard to define a beginner, as, personally, although I had my first Cactus thirty years ago and have kept some ever since, I feel I am only just beginning to learn how to flower some species. It was so difficult years ago to obtain any literature relating to Cacti and so the beginner had to plough a lone furrow and learn by the slow course of experience and, in many cases, lose many plants by trying to find the best method of culture.

This book will make it easy for any one starting a collection to acquire the necessary knowledge to keep the plants healthy and growing. It is written chiefly for those who have little or no experience, although all growers will find the book of interest. There is nothing contentious about the methods of cultivation and, although I do not carry out the proposed methods strictly myself, I realise that those described are far safer for beginners than the methods I use, and sometimes recommend, in the Journal.

The introductory chapter gives a clear definition of Cacti and their history and the one on cultivation is very concise and helpful. Soils and potting, sun and ventilation, and heating and watering are dealt with in three more chapters, and I feel sure that if any one carries out the instructions therein, the results will be most satisfactory. Seed raising, that most fascinating pastime, has a chapter to itself and, if the directions as given do not produce the best results, then there must be something wrong with the seed. Cuttings and grafts are also dealt with and a chapter advises the methods of dealing with insect pests. The chapter on types of Cacti will be of great value to beginners as it is well illustrated with photographs of plants which show clearly the difference between different tribes. Many of the kinds usually cultivated are described, and the possession of those plants which have been described will form the basis of a good collection.

Succulents other than Cacti have not been neglected and there is even an article on the making and maintenance of miniature gardens. The last chapter gives a summary of operations

for the different times of the year and this will prove of great value.

The whole book has struck me as being just the thing required by beginners, as technical names and descriptions have been avoided as much as possible. At its modest price, the book should be in the possession of all growers and I suggest that the gift of the book to any one faintly interested in Cacti will cause an increased interest which will ultimately bring a new member to the Society and make an enthusiastic collector.

I congratulate the joint authors on the result of their endeavours and I predict a large and continued sale of *Cactus Growing for Beginners*."

A. BOARDER.

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

The twenty-second part of this illustrated publication on Cacti and other Succulent Plants contains beautiful colour photographs of two Succulents and two Cacti. The illustration of *Huernia zebrina* N.E.Br. was provided by Herr Schlombach, the plant having flowered freely during the summer of 1934; the flower has a dark, very shiny, raised ring and the corolla lobes are strongly marked in stripes of brown and yellow; it strongly resembles *H. Blackbeardae* R. A. Dyer and, by some writers, the names are considered to be synonymous. The photograph of *Conophytum truncatellum* N.E.Br. was taken in the Botanic Garden at Dahlem; it shows a large clump bearing straw-coloured flowers; this species was first introduced into England by Masson in 1795. *Lobivia densispina* Werdermann, comes from the Argentina-Bolivia boundary and is of recent introduction; the plant body is barrel-shaped and closely covered with spines whilst the flowers are very large, golden yellow with a satiny sheen. *Cleistocactus areolatus* Riccobono, was photographed in the Huntingdon Botanic Gardens and shows a number of the slender, cylindrical stems with golden spines bearing tubular, red flowers which hardly open.

The twenty-third part of *Bluehende Kakteen* contains a beautiful illustration of *Echinocereus Viereckii* Werdermann; the plant was sent from Mexico to the Botanic Gardens,

Berlin, in 1933, and flowered freely the following year, when this photograph was taken; this species was originally introduced under the name *Echinocereus Scheerii*; it is named after its discoverer, H. W. Viereck. *Mammillaria Nunezii* Boedeker was also photographed in the Berlin Botanic Gardens, the plant having been imported in 1931; the species is rare in collections and the carmine flowers are here described for the first time. This plant also is named after its discoverer, Prof. C. Nuñez of Mexico, and is closely related to *M. rhodantha* Lk. et Otto. *Stapelia Schinzii* Berger and Schlechter from German South Africa was discovered in 1886, but it is still uncommon in collections; the flower is about 10 in. across with long, slender points to the corolla, which has many fine red-brown cross-markings on a lighter ground. *Conophytum vescum* N.E.Br. was photographed from a specimen sent fourteen years ago by Dr. Marloth to Berlin, where it flowered for the first time in 1934, this being the first description of the flowers, which are pale violet in bud and golden brown when open.

This series of colour photographs accompanied by descriptions and historical details by Dr. Werdermann makes a very fine collection, and much valuable information is thus made available; the publishers are also to be complimented on the production.

"CACTI AND OTHER SUCCULENTS," by W. T. Neale. Price 2/-, paper cover; also obtainable in cloth cover.

We have had an opportunity, as we go to press, of seeing an advance copy of Mr. Neale's catalogue which he is publishing in book form. The main part consists of a list of species, with prices; the cacti are arranged in accordance with Britton and Rose's classification but in such a way that those who prefer to use Schumann's names are also catered for; and, in fact, those growers to whom all names are anathema can refer to the plants by number only. Each species has a very brief description which should help in identification. Mesembryanthemums, Euphorbias, Aloes, Cotyledons, Crassulas, Stapelias and in fact all the succulent genera commonly grown, are included. General cultural notes are given, and at the end of the book are 116 illustrations of Cacti and 44 of other Succulents.



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