

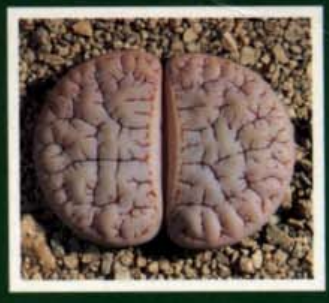











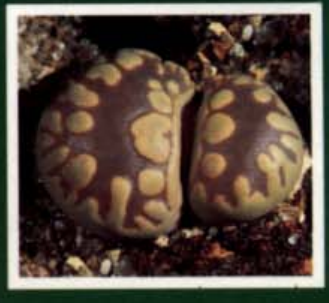
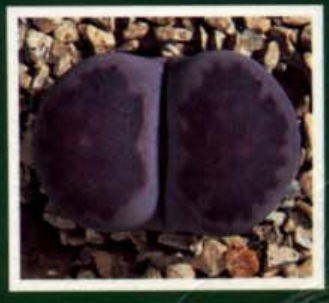

LITHOPS

TREASURES OF THE VELD

(Observations on the genus *Lithops* N.E.Br.)

Steven A. Hammer

photographs by
Christopher Barnhill

BRITISH CACTUS AND SUCCULENT SOCIETY

LITHOPS - TREASURES OF THE VELD

by Steven A. Hammer

To the average member of the public who comes to our shows and plant sales, 'Living Stones' — *Lithops* must be one of the most readily recognisable plants in the succulent world; it is however not one of the easiest to keep in cultivation.

In this the latest B.C.S.S. book, Steven Hammer with his usual mind stretching vocabulary and graphic writing style, unfolds the history of these little treasures; shows us the plants in habitat, a necessary step if we are to be able to understand their requirements in cultivation; illustrates their distribution; introduces us to their powers of self-hiding and enlightens us about the precipitation they receive in the wild.

He takes us in the greenhouse and advises how to best cultivate lithops, from pollinating the plants to seed-raising, from light requirements to resting the plants.

With the excellent photography of Chris Barnhill the reader is then treated to a profusion of lithops mugshots. The photographs are mostly taken without flowers — to have included them would have hidden the plant in many cases — but a separate section shows many of these "stones" richly in flower. Accompanying the photographs are descriptions, distributions and other notes for each species, including observations on any cultivars for that species.

ISBN: 0 902 099 64 7

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photographs by

Christopher Barnhill

Drawings by Gerhard Marx,
additional photographs by Gerhard Marx and John Trager,
and incorporating a key by Jonathan Clark

Dedicated with affectionate esteem to

Hermias Kennedy

British Cactus and Succulent Society
1999

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A hand-coloured illustration of '*Mesembryanthemum truncatellum*' [*Lithops hookeri*] from Curtis's Botanical Magazine Vol.100 t.6077, 1874, sent by N.E.Brown of Kew to J.T.Bates
(Courtesy of the Rowley archive)

Foreword

I first met Steven A. Hammer in August 1982. Passing through England en route from South Africa, he visited our collection, then in Brighton, with his old friend Betty Athy. I remember his extremely rapid speech; he remembers a fantastically orange *Lithops gracilidelineata* subsp. *brandbergensis* and a glossy chocolate cake. Little did I realise the effect this meeting and his influence would have during the next two decades!

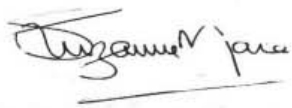
Two years ago I first put forward the suggestion that the British Cactus & Succulent Society ought to produce a further publication on the subject of lithops, as the previous one written by Brian Fearn, was almost sold out. I was sure that the subject would be popular, and felt that Steven Hammer, an expert grower, should to be invited to author the book. When I approached him, he was initially concerned that there was not very much that was "new" to be written about lithops, Prof. Desmond Cole having written the definitive work in 1988, after some thirty years of studying the plants in the wild and in cultivation. Unfortunately Cole's book has been out of print for years, and used copies are rare. Steven decided that if he approached the subject primarily from the horticultural viewpoint, he could offer some fresh ideas. In the process he has reacquainted us with the rarest taxa, introduced us to the more recent cultivars, offered new solutions to the problems of cultivation, opened complacent eyes to the delightful diversity within each species, and given life to old metaphors.

Steven, to use his own words, is a completely incompetent photographer. Fortunately his friend Chris Barnhill is the reverse and has complemented Steven's words with his beautiful illustrations, taken over a year-long cycle. This book is further enhanced by the lively drawings of another superb lithops-grower, Gerhard Marx, and by Jonathan Clark's revised key to the genus, the original version of which was published in *Bradleya* **14**: 1–9 (1996).

I am constantly amazed by the quantity and quality of Steven's writings. I imagine that having an excellent visual memory is a considerable help, as is the stimulus of the thousands of unusual plants which surround him, not to mention the experience accrued on his trips to the southern African veld and the support of his many friends around the world.

Steven did not train as a botanist but rather as a gifted pianist. As early as 1962, when he was merely eleven years old, his love for Bach had a rival, a love for mesembs which started, not surprisingly, with lithops and conophytums. Soon it embraced the shrubbier mesembs and many other succulent families; eventually plants became his life.

Since 1986, Steven has infected and injected the *Mesemb Study Group Bulletin* with his enthusiastic encouragement, copious musings, sharp observations and joie de vivre, enabling the publication and the group to flourish. He also writes for the *Cactus and Succulent Journal*, *Aloe*, *Bradleya*, *Haworthiad*, and several other journals. In 1993 his much-read *Conograph*, a unique and influential book, was published. I hope that through this new book readers will become further afflicted with the wonderful disease of plant love.



Suzanne Mace
Editor, *Mesemb Study Group Bulletin*

Introduction

What more is there to write about the genus *Lithops*? A fair amount, to judge from the length of this tome. When I was approached about its authorship, I had no doubt that I could spill sufficient ink. But I had no wish merely to rephrase or condense Desmond Cole, whose well-chosen words and novel, long-considered concepts need no further aping. Though his book *Lithops*: Flowering Stones (1988) is out-of-print and not as widely accessible as one might wish, it will remain the standard for years to come. There are, however, some points Cole did not touch, among them the individual merits of various populations, the erratic behaviours of certain species in cultivation, especially under northern hemispheric conditions, and the recreation of cultivars.

Apart from Cole's writings, there is a lot of prose, and even some poetry, regarding these strange and lovely plants. Much of it seems outdated and quaint, but much is still perfectly sound, and it is inevitable that I echo some of it. Nel's *Lithops* (1946) is patchy as an old quilt, but it is nonetheless full of insight, and its superbly caught watercolours, the work of Evelyn Kraemer, hold up beautifully. The text includes a tribute by James Lückhoff so appropriate that I quote it here, in full:

"For me there is something very attractive in *Lithops*. Its adaptation is very peculiar and where it grows is so attractive, that a search for *Lithops* is always enveloped in an atmosphere of adventure — a search as it were for treasures, which require experience and a spirit of enterprise. Treasures of loveliness. Then, the many species are wonderful, since the difference between them is and cannot be great."

Schwantes' substantial and characteristically enthusiastic account on the genus (in Flowering Stones, 1957) is still eminently readable and useful. What other botanical work fuses wisps of Goethean teleology with shrewd biological speculations? Schwantes' work is all the more impressive when one considers that he assessed the genus largely on the basis of plants growing in northern Germany.

Many field and laboratory observations have been made since 1957, and I will mention a few of these as well. The technical literature on *Lithops* is much larger than many collectors realize, and not all of it is arcane. In the 1960's Dr. Hindrik W. de Boer's rational passion for lithops resulted in a spate of papers. Most of them concerned new taxa, but de Boer also discussed such things as variability in the genus and analytical keys. It is unfortunate that two major theses, Brian Fearn's and Rob Wallace's, remain unpublished, but I have had access to both. My own contributions to the literature are minor, non-technical, and have been based mostly on my horticultural experience, which dates back to 1962. Since then I have repeated or re-invented every major mistake in lithops-raising. I have, however, successfully reared some 500,000 lithops from seed, and it is on that basis that I offer so much advice. Though people love to make their own heartfelt mistakes, I may be able to spare some grief and save some plant lives; certainly I can share enthusiasm and experience.

Acknowledgements

Over the years, many friends have encouraged my interest in lithops. Several of these stalwarts should receive particular acknowledgement for their help with my lithops explorations, on paper, on foot, or both. I wish to thank Naureen and Desmond Cole (SA), for twenty years of letters, hospitality, stimulating discussions, and seeds; Gordon Rowley (UK) for permission to explore repeatedly his wonderful library and archives — it was Gordon who provided the evidence for *L. halenbergensis*; Jonathan Clark (UK) for permission to reprint his masterful key to the genus from Bradleya; Jossie Brandt (SA), for trips around Griekwastad and Prieksa and for the sustained empathy without which plant interest is barren; Ronnie Uijs (SA), for extensive information and companionship in the field; Kotie and Arda Retief (SA), for delightful company on many an odd trip to Namaqualand, and for the wild ride

that led to *L. coleorum*; Mias Kennedy (SA), for the pleasures of living history and for providing an horticultural model; Tattie Visser (SA), for an introduction to the lithops of Upington; Bruce Bayer (SA), for many trips and discussions, and for access to the Karoo Garden collection; Johan du Toit (SA), for trips around Springbokvlakte and the Richtersveld; Buys Wiese (SA), for information and for access to several farms and farmers; Peter Bruyns (SA), for information, trenchant scepticism, and an introduction to *L. divergens* var. *amethystina* and *L. viridis*; Emile Heunis (SA), for seeds of exquisite forms, and a trip to visit *L. helmutii*; Suzanne and Tony Mace (UK), for enthusiasm and for their electronic life-supporting forum; Eddie Harris (UK), for *L. ×steineckeana*; Ralph Hewitt (UK), for its first mate; Peter Prager (USA), for valuable computer assistance and endless editing; Graham and Françoise Williamson (SA), for introductions to *L. herrei*, *L. geyeri*, *L. meyeri* and many other beauties of the Richtersveld; Steve Brack (USA), for his long commitment to a Cole collection; Niko Sauer (SA), for trips around Kakamas and the lower Richtersveld; Gerhard Marx (SA), for his eyes and imagination, and for the drawings which adorn this text; Dorothy Byer (USA), for help with my annual harvest; Carl Volkers and Jim Kampwirth (USA), for a wide green niche; John Trager (USA), for a thousand pointed lights; Sigrid "Erepsia" Liede (Germany), for companionship on a gravelly trip through Bushmanland; Myron Kimnach (USA), for literature, data, and good advice; Nick Lear, for protean, clairvoyant work with the layout of this book; Eli Fallaux (Netherlands) for a Dutch view of *Lithops*; Chris Barnhill (USA), for the most interesting trip of my life, not to mention a year of photographic work; Jane Evans and Gene Joseph (USA), for 'Valley Girl' seed and genial rivalry; and Norm Dennis (USA), who has the most wonderful address for a lithops-lover: he lives on Shamrock Drive!

Mammon and Enthusiasm, Entwined; A Little History

Since Burchell discovered the first lithops in 1811, there has been a considerable European interest in this amazing genus, but it wanes and waxes periodically, fuelled by fashion, by the exploration of new habitats, and by the dedication of a few major collectors. In the 19th century the plants were hardly known in cultivation; their introduction to pot-life dates from the very end of that century. Only a few common species were cultivated at first. *L. pseudotruncatella* was available in the form of seeds from 1897 onwards, followed by *L. lesliei*. In the 1920's N.E. Brown sold a few seedlings of *L. hookeri*, *L. lesliei* and other species, thus supplementing the meagre income he obtained from botanical writing. In the same period the general interest in succulent plants burgeoned, and many collectors awakened to the singular beauty of lithops; naturally they craved living plants.

A great deal of very raw material was exported from (German) South West Africa into Europe, especially on behalf of Graessner's and de Laet's nurseries, where plants endured a terminal exile. Kurt Dinter collected thousands of plants for export; his writings casually mention this or that "modest" collection of 300. He also collected a great deal of seed. But there is something touchingly keen and intelligent about Dinter's accounts, and to accuse him of over-collecting is to apply the inconsistent standards of our own day. In the 1920's fences were few and ecological concerns were fewer, though far-sighted observers like John Muir and Rudolph Marloth were already alarmed. Wilhelm Triebner followed literally in Dinter's footsteps and was at least as liberal in his diggings, as a look at his wholesale lists will confirm. Triebner's material has had an impact on American horticulture which can still be seen, unto the twentieth generation, in the wholesale unlabelled lithops market.

After Triebner's death in 1957, other sources emerged, most of them non-commercial. Novel material was sent out by Harry Hall, Hans Herre, Roy Littlewood, Victor Pringle, Hermias Kennedy, Herkie Horn, and A.A. Roux, much of it going to Hindrik de Boer (1885–1970), who amassed the finest pre-Cole collection in his modest greenhouse near Gröningen, Holland. Of de Boer's magnificent collection, very little 3-D evidence remains — a great pity, as he spent many years engaged in the beautiful work of reproducing his own "true-breeding", pattern-stabilized, concepts (see *L. julii*, p.76). The colour photographs in Fearn's thesis are

Figure 1. *L. karasmontana* subsp. *karasmontana* var. *aiaisensis*, near Ai-Ais

Photo: John Trager

Figure 2. *L. pseudotruncatella* subsp. *dendritica*, Cole 73

Figure 3. *L. verruculosa*, Cole 159

Figure 4. *L. bromfieldii* 'Sulphurea'

Figure 5. *L. verruculosa* 'Rose of Texas'

Photo: John Trager

Figure 6. *L. helmutii*

Figure 7. *L. gracilidelineata*, Cole 309

Figure 8. *L. divergens*, Bitterfontein

probably the best documentation of de Boer's plants, but many of the plants were later propagated by Fearn, who also continued some of his experiments in hybridization and in the "synthesizing" of certain taxa presumed to be mongrel (see Fearn's Lithops, 1981).

Coles to Newcastle, and Other Colonialists

Overwhelmingly, the material currently in cultivation has been derived from the seed capsules Naureen Cole sent out, mostly northwards, for some twenty-five years. Since Naureen sent whole capsules meticulously labelled, she never mixed up loose seeds from several species, an easy thing to do via fingernails, unchecked sieves, or blind machines. The Cole material set a standard for excellence which has hardly been touched in any other genus of succulent plants. It gave *Lithops* the unique position of a totally available non-monotypic genus. (An apparent exception, *L. halenbergensis* Tischer, is briefly discussed in Appendix 3, p.118.) In all, some 400 colonies were represented.

Another important lithops source was Ernst Fritz, a German-South African whose untimely death in 1986 terminated many promising horticultural projects. Fritz was a first-class grower, and his material had a distinctive look. Either he collected big plants unconsciously selected to suit his opulent aesthetic, or his further work with seedlings produced the effect of luxury, though the natural base of his collection was largely equal to that of the Cole collection — in any case, his plants were big! Most of his seeds went to Köhres, the German seed merchant.

Secondary derivations of the Cole material — seeds, and the second-generation plants produced in the US and UK from first-generation Cole seedlings — have unfortunately been handled rather rudely, and some "Cole material" was badly distorted in one or another aspect. (Alas, the same is true for Fritz's material.) The numbers were sometimes garbled, or two colonies were switched, or they were merged via wind-pollination of contiguous plants and careless, dilatory brushwork. Of course, further derivatives from such material have compounded any problems, suggesting that only material direct from the source should ever have been given numbers. This was the practice of the late Ed Storms, the renowned Texan nurseryman; if he pollinated e.g., *L. hookeri* var. *lutea* Cole 38, he listed the resultant seedlings simply as *L. hookeri* var. *lutea*, even though they were certainly pure and visually indistinguishable from Cole 38. (Alternatively, one might identify these second-generation, data-debased, plants as var. *lutea* "ex Cole 38", or var. *lutea* "Cole 38 × Cole 38".)

Whittling Down Data

Even with the most careful pollinations, at each stage we have had a potentially narrowing effect: the habitat plants in the Cole trays gave a selected representation of a dozen clones, a Cole seed capsule represented the combination of one mother and at most, half a dozen fathers, and further work with the progeny, while still giving a wide spectrum, produces a certain funnelling and channelling. On the other hand, some growers, and particularly Storms, obtained multiple capsules from each population; the resulting variability astounded Cole when he visited Storms' collection: "The range of variation ... was greater than we have ever collected or seen in habitat." (Cole 1988: 38). This suggests an explosive augmentation, not a diminution, even though it may not suggest a wholly "natural" representation. Furthermore, to cross, say, one *L. julii* population with another compounds any variability, already wide in this species. Does it matter, horticulturally? *L. julii* ex Cole 63 × *L. julii* ex Cole 64 is still *L. julii*, after all, and very pretty, but it begins to shift around a bit, and with enough secret mergers all species start to lose their edge of definition.

Most plants in cultivation (I mean "green" plants: lettuces, roses, petunias, rutabagas) lost their data and, often, their specieshood, long ago, while the succulent world has been comparatively rigorous if not fetishistic about data and the purity which it is presumed to bestow upon plants. This has given succulents an untamed quality which many of us find highly attractive. But I suspect that for most general growers, beauty and charm are paramount, purity slightly secondary, data-trueness a guilt-inducing chore. If I nonetheless recommend that everyone keep accurate records, it is for two reasons. One, information which seems irrelevant to you might be fascinating to another collector who will visit your greenhouse and see that you have, for example, a cinnamon-veined *L. ruschiorum* var. *lineata* Cole 312 from Cole's original distribution (few people do). Two, tastes and interests can change; what starts out a hobby can become a serious passion, the manic ramifications of which might even take you to South Africa a score of times. It happened to me.

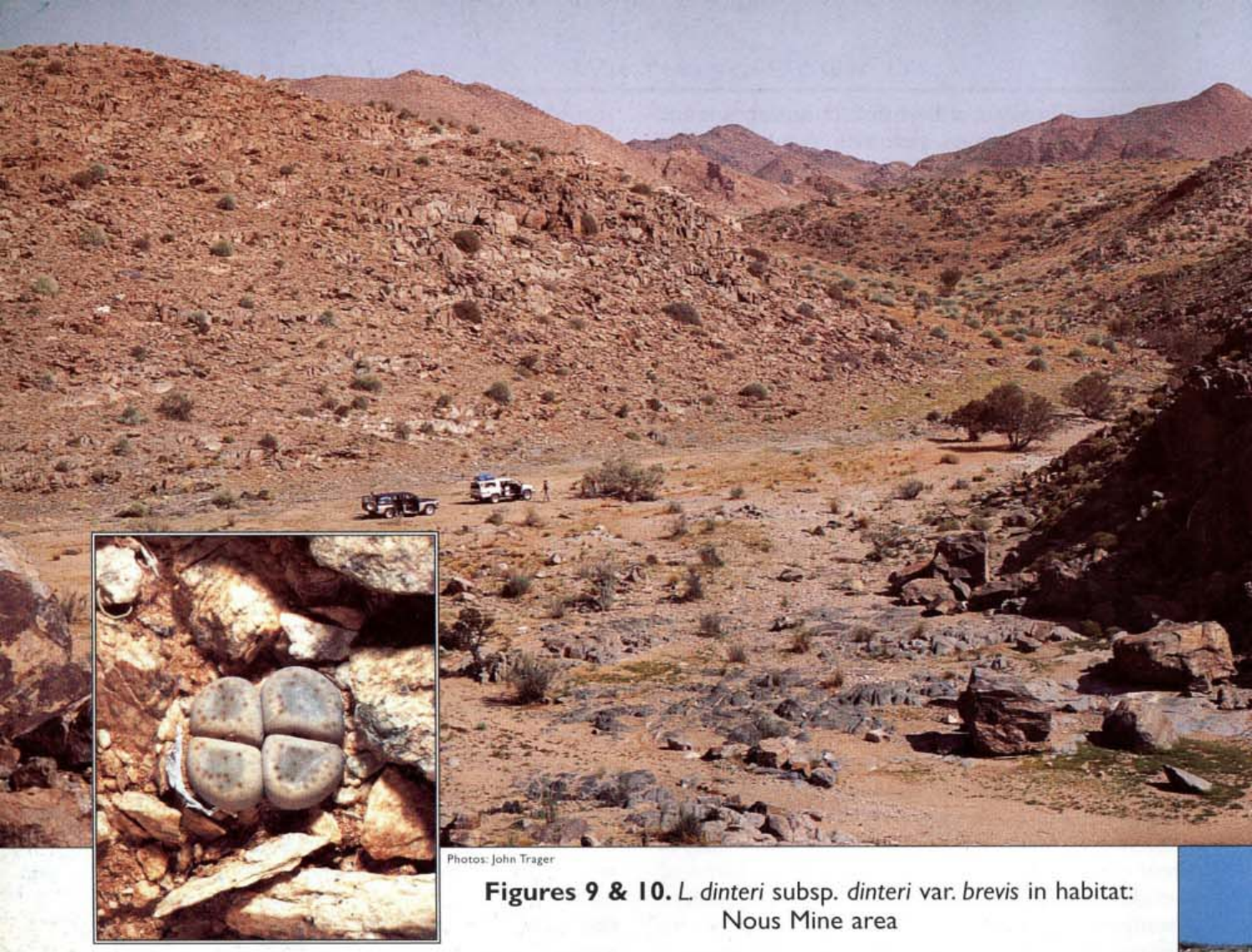
Lithops at Home

Though this book is centred on lithops as pot-dwellers, it would be sad to omit some notes on lithops as they grow in their natural habitat. Apart from the intrinsic interest of such information, much of it can be instructive when applied to cultivated plants. I should say straight away that although I have seen and admired most of the species *in situ*, these meetings were often superficial and in only a few cases involved any plant extraction or real study. I say this not to emphasize my relative benignity in terms of collecting, but rather to emphasize that I know little of how the plants actually survive in their native soils, even less about how or when they got there. Much of the following discussion is heavily indebted to the Coles, as are the notes on rock-types given under each species description.

Lithops occur exclusively in southern Africa: South Africa and Namibia, with minor incursions into Botswana and, probably, the southern tip of Angola (the latter has not been explored lately, for obvious and tragic reasons). The currently known distribution area covers some half a million square miles (Cole 1988). This vast area is unequally occupied by the various species. *L. lesliei* occupies the highest percentage of this territory, with hundreds, perhaps even thousands, of populations or "colonies", while *L. coleorum*, *L. viridis*, and *L. werneri* occupy tiny zones, being represented by one population each, small ones at that.

The total extent of lithops distribution is and will always be incompletely known (unless South Africa, like southern California, becomes a vast, paved-over and plantless shopping mall), but it seems safe to say that the broad distributional outlines are unlikely to be greatly extended. Apart from the Coles' very extensive fieldwork, and the efforts of other dedicated lithopsarians, we have had the input of farmers, shepherds, geologists, and many other amateur or professional naturalists. These people notice plants in strange places and have often provided very useful information — indeed, the recently published *L. coleorum* was found by an observant farmer on a stroll round her property. One can compare that with a wonderful account given by Ernst Rusch, who once sent specimens of *L. pseudotruncatella* to a Namibian farmer, asking if he had seen such things on his farm. The farmer replied: "We have not got such fruits on our trees!"

Quite apart from considerations of who-hasn't-looked-where, there are all sorts of places where lithops do not seem to be at home. As for South Africa: they probably do not grow in the Valley Bushveld of the eastern Cape (too dense a vegetative cover), in Lesotho (too cold?), in KwaZulu-Natal (too humid?), or near Cape Town (too wet?) or the greater part of the west coast, the so-called Strandveld. That leaves us with a great, well-occupied, lithops-friendly chunk of South Africa: the Little Karoo extending to the Steytlerville Karoo and the Great Karoo, the Free State Province (better known as the Orange Free State), the Knersvlakte, Namaqualand, the Richtersveld, and Bushmanland (the last four have partly been incorporated into the new Northern Cape Province), and Gauteng, the North-West Province, and the Northern Province (better



Photos: John Trager

Figures 9 & 10. *L. dinteri* subsp. *dinteri* var. *brevis* in habitat: Nous Mine area

known as the Transvaal). In Namibia, lithops occupy mostly the western, and especially the south-western, areas, but again there are large gaps. Inhospitable shale formations and swirling dunes may account for some of these. The southern Sperrgebiet (the "forbidden" diamond area) has been reasonably well investigated, but other areas need, and invite, further exploration.

Lithops niches are various and surprising, making generalizations difficult, but there are some constants. Lithops prefer places which often seem barren but which actually teem with life. Stony plains, the crests of mountain tops, or knolls ("koppies" in Afrikaans) can all harbour lithops. Sheer cliffs are unlikely to do so, but crevices of fairly steep slopes are suitable, offering the advantage of protection from predation. A "good" site often resembles the sort of rockery constructed by fastidious alpine gardeners: well-drained slopes dotted with small plants, no "weeds" and no disorder, the plants being quite neatly spaced and largely perennial. Often the slopes are wind-ridden, sometimes severely so, contributing to a general stunting of vegetation. Elevations range from near sea level (*L. optica*) to some 2,400 metres (*L. gracilidelineata* subsp. *brandbergensis*; Triebner reported the same altitude for *L. pseudotruncatella "alpina"* named for its lofty habitat).

The soil is more likely to be mineral than humic, though there are major exceptions to that statement. *L. aucampiae*, *L. lesliei*, and *L. pseudotruncatella* often grow in humusy areas with a short grassy cover; one might almost call them prairies or steppes. In some cases the cover dies away to a stubble each winter, but this is also the time when lithops shrink, retracting into the soil. The Coles once conducted a study of soil pH and discovered that the genus is subject to a huge range of acidity and alkalinity, from 4.5 to 10.5! They also report a wide range of rock types, but it is noteworthy that pale quartzites and pegmatites make common niches, perhaps

because they are cooler than the darker rocks. Those can be extremely hot; one can subject this to an uncomfortable touch-test on a warm summer's day in South Africa.

Somehow the plants adapt to toasty surroundings — not for nothing are they so thick-skinned — but they cannot handle heavy shade. Unlike haworthias and asclepiads, they do not prefer to grow under dense bushes. One does see the odd exception, e.g. *L. marmorata* luxuriating in the broken light of a perennial shrub (see fig.18), and in such circumstances a wild lithops can be as stretched and glossy as any greenhouse denizen, but even well-sheltered plants are subject to withering blasts of hot air in summer or autumn. Hot dry winds, known as berg winds (equivalent to Santa Anas, siroccos, or foehns), can occur in autumn or even winter, lasting for days and pushing the night (!) temperatures past 36°C (96.8°F); they can roast plants in short order. Lithops are also subject to considerable cold; many species regularly experience several degrees of frost in winter though, as N.E. Brown pointed out in an early discussion of *L. lesliei*, the chilled plants are usually dry, and often they are shrivelled as well.

Many apparently suitable areas seem to be devoid of lithops, though it is impossible to prove that a plant does not occur here or there; we can only speak of failed efforts to find it. But one can doggedly explore two adjacent and seemingly similar formations and find that the first oozes lithops while the other is barren. Is the latter somehow unsuitable, lying within a rain shadow or having, perhaps, too saline a matrix — or is it simply that seeds never reached the second ridge? Might they reach the ridge in the future? Via winds carrying aloft a few grains of sand and seed, or even a fragmented fruit? Via birds, tortoises, or the soles of my Nikes? Of course, it is also possible that plants used to live on the now-barren ridge and have vanished, decimated by the

Figures 11 & 12. *L. otzeniana* in habitat: Brakfontein, north-west of Loeriesfontein

Photos: Gerhard Marx

Photo: Gerhard Marx

Figure 13. N Grünau, Namibia – habitat of *L. karasmontana "mickbergensis"*

Figure 14. *L. divergens*, Steenkampskraal road, March 1996

Photo: Gerhard Marx

Figure 15. *L. fulviceps* var. *lactinea*, north end, Karasberge

Photo: Ria Kirsten

Figure 16. *L. francisci*, near Koichab. An interesting, out-of-the-way, non-Cole population

Photo: Sigrid Liede

Figure 17. *L. julii* subsp. *fulleri*, south-west of Kakamas

Photo: John Fraser

Figure 18. *L. marmorata* growing, untypically, in the shade of a bush at Kangnas, east of Springbok, November 1997

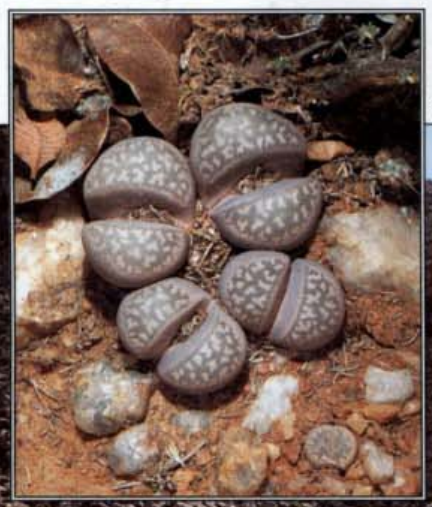
Photo: Robbin Frandsen

Figure 19. *L. verruculosa*, near Brandvlei

fungi that can melt them after abnormally heavy rains, by crickets, homunculi, or years of punishing drought.

Little is known of the distributional process; my own guesses involve mostly birds and winds, the same agents I propose for *Conophytum*. One may find widely disjunct but similarly-moulded formations — say, two high ridges separated by 15 kilometres of shifting sand-dunes — that look perfect for lithops and prove to harbour the same species. Since it is hard to imagine that the distribution was once continuous, sand being too unstable, the plants have evidently travelled from one ridge to the next. The Coles theorize that whatever attracts seed-carrying birds to one formation will attract them to its look-alike. But the wind theory also appeals me, because the seeds are small and light, and could be borne aloft by gusts. In any case, since lithops are generally self-sterile, it would take at least two lucky seeds to populate a new ark. Lithops fruits are held close to the plant bodies, often being wedged between them, so they tend to remain in place even after their contents have been largely emptied. This means that after the death and decomposition of a plant, seeds may remain at the same site. Thus the mother plant tends to disperse her seeds quite locally, at a place already proven to be congenial. Water is also a factor in lithops diasporations, most obviously because it is the agent (in the form of splashing raindrops) of seed ejection and, less obviously, because one can often follow a dried-up water course and see a trail of lithops along side it. In a larger sense, rivers affect the movement of birds and thus, perhaps, of lithops.

It is common to find a lithops growing with a suite of other dwarf succulent plants from several genera (naturally, these pose the same distributional questions). Usually one finds an anacampseros, an avonia, and often a crassula and an adromischus. Indeed, the latest lithops



Figures 20 & 21. *L. marmorata* in habitat (with *Euphorbia gregaria*): Kangnas; note the young seedling!

Photos: John Trager

Photos: John Trager

Figures 22 & 23. *L. geyeri* in habitat: Little Helskloof, eastern Richtersveld

discovery (see p.61), was growing with another new taxon, an undescribed miniature anacampseros. *Lithops* species sometimes grow socially with other unrelated lithops. Cole lists seven cases of sympatric (i.e., co-occurring) lithops, e.g., *L. hookeri* var. *hookeri* and *L. hallii* var. *ochracea*, or *L. schwantesii* var. *schwantesii* and *L. karasmontana* subsp. *bella*, always involving species from the different flower-colour groups. Even in these cases there may be a slight separation of niche-type. I know a hill near Niekerkshoop where the yellow-flowering *L. hookeri* favours the lower slopes, the white-flowering *L. hallii* var. *ochracea* the upper, with little overlap. From bottom to top there are slight or large differences in aspect, pebble size (and thus in protective power), and perhaps in mineral availability or excess. Where plants of both species touch, they are separated in time: *L. hookeri* flowers several weeks ahead of *L. hallii*, and even if the two happened to flower together, they would not readily hybridize (see p.27), due to powerful, genetically based, antipathies.

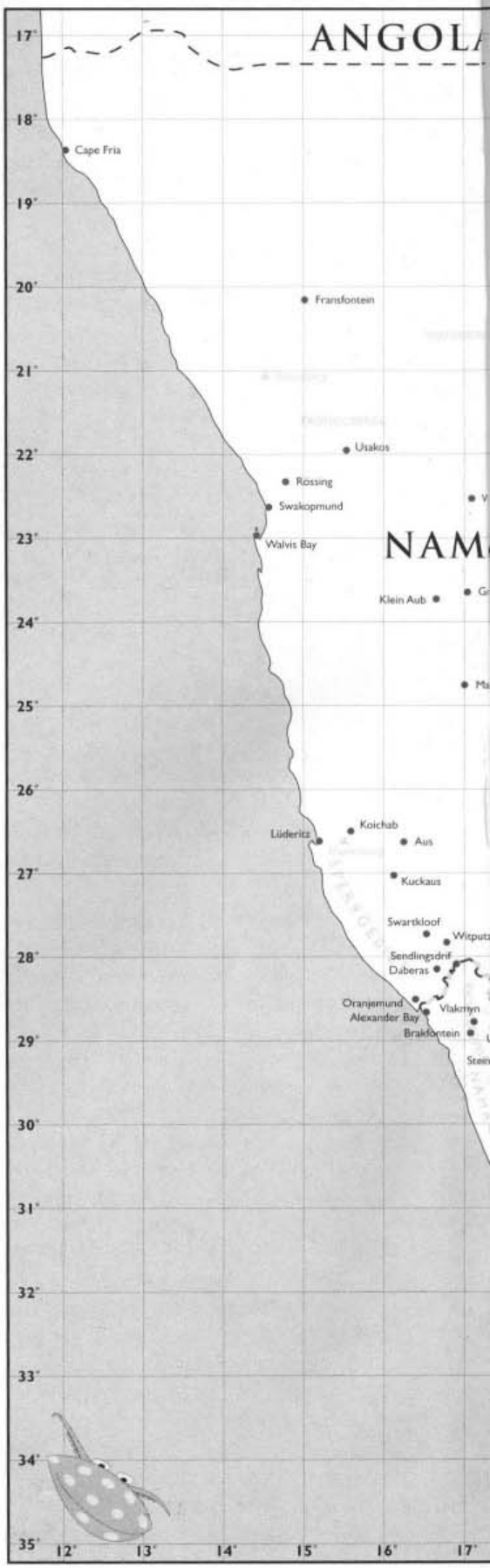
Reports of two white-flowering species occurring together are scarce. Probably this is a truly rare phenomenon, because the two species would have tended toward unification, so compatible are white and white. (See my tortured discussion of *L. karasmontana* subsp. *eberlanzii*, p.80.) However, I have seen *L. marmorata* and *L. julii* subsp. *fulleri* living a stone's throw apart, north-east of Concordia. There was no evident blending of the two, though the specimens of subsp. *fulleri* were among the plainest I've ever seen of that taxon. (For some reason, that subspecies tends to lose its colour as it approaches the more westerly domain of *L. marmorata*, which is partly distinguished from *L. julii* subsp. *fulleri* by its lack of ornate marginal markings.) Reports of two yellow species cohabiting are also rare, see *L. ruschiorum*, p.101. Near Griquatown, *L. aucampiae* and *L. hookeri* occur so close together that actual commingling would not be a great surprise.

Map Rap

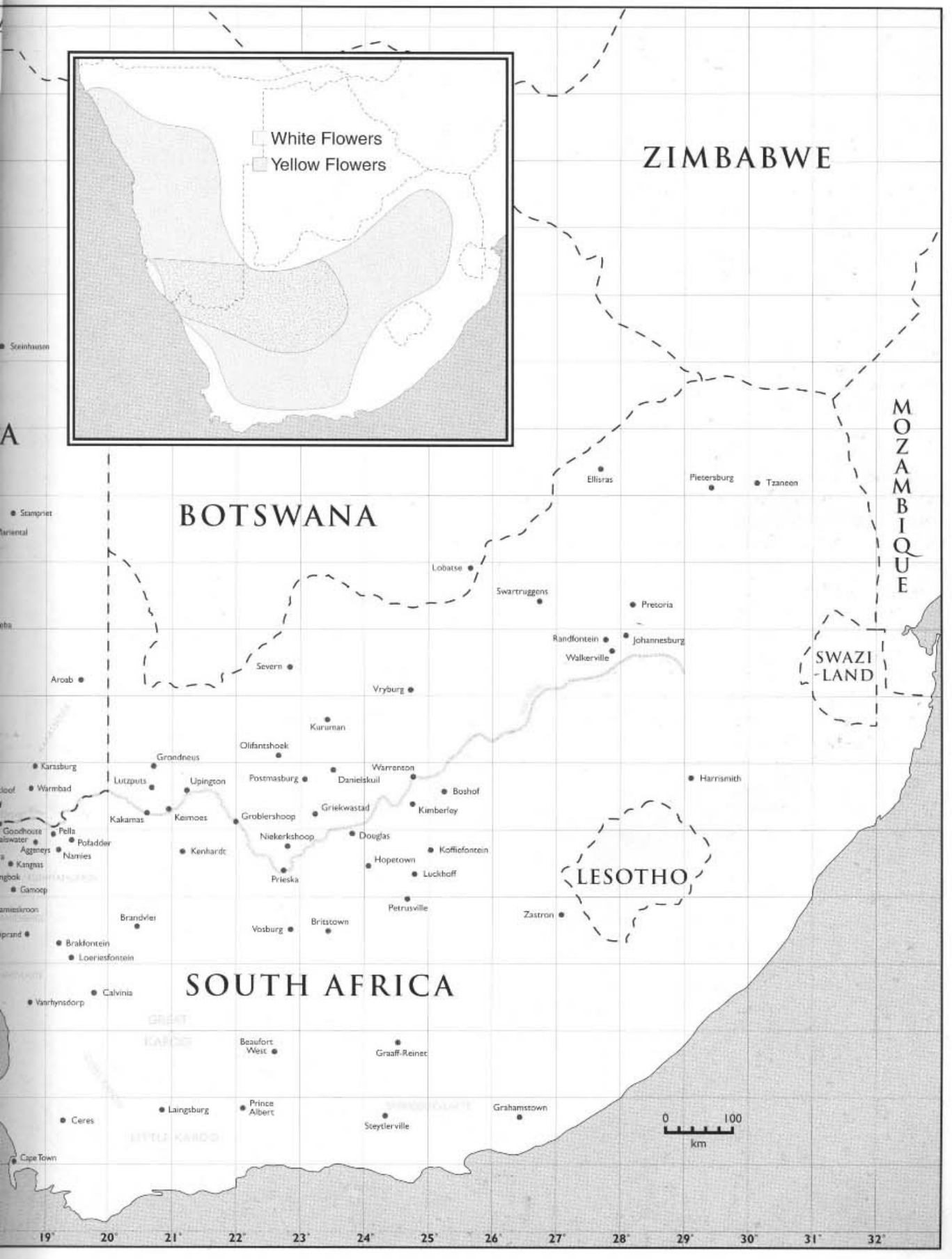
The place-name map shows the principal towns and hamlets mentioned in the text; it also gives some of the better-known farm names, ones for which discretion is otiose, and shows certain geographic formations as well. What a polyglot and poetic region this is! Afrikaans, French, English, Khoisan, Dutch, and German names abound; there is even a Toscanini in Namibia, and a Shalom in the southern Cape. Many towns and formations have been spelled, and continue to be spelled, in several ways (Aggeneys, Aggenys, Achenuis; Griekwastad, Griquatown). In some cases, names have been replaced altogether by new ones (Send[e]lingsdrif[t] = Ochta, N[ie]uwefontein = Kliprand). The famous "Umdaus" (!Umdaus [! = Nama click sound]) and certain other highly localised Richtersveld names have never appeared on standard maps. Some picturesque names are in confusingly common use throughout South Africa; the Brakfonteins (= Brackish Springs) seen here are just two of many. In general I have avoided the more sensitive names even at the risk of consequent vagueness.

On a map of this scale it would be only possible to represent distributions crudely, so I chose to represent instead the type locality of each taxon*. Even from this, the general patterns emerge quite well, with an obvious set of concentrations and absences. There is a node of entanglements along the Orange River, particularly in the vicinity of Pofadder. There are also large and puzzling gaps; one wonders how many of these are due to incomplete recording and/or to the inaccessibility of potential habitats (see pp.11–12). Why are there no lithops in the north-west Knersvlakte? Why nothing south of *L. meyeri*? West of *L. naureeniae*? Why is *L. pseudotruncatella* var. *elisabethiae* so discrete (and discreet)?

Note how *L. localis* stands out, unconnected with other species; a parallel to the case of *Conophytum truncatum*, which has a very similar distribution, partly overlapping with that of *L. localis* and hardly intersecting with other *Conophytum* species. Another intriguing puzzle is the centralised placement of the seven white-flowered species versus the much vaster range of the twenty-seven yellows which encircle them almost entirely, as represented on the first inset map. (*L. verruculosa* fits into neither group and, as can be seen on the type locality map, it is flanked by members of both the white and yellow complexes.) The second inset map takes us to Germany, the carpet-bagging cradle of *L.* ×*steineckeana*.



* In a few cases the type localities are not known; for these I have selected a probable or plausible spot. Four of Nels' taxa (*L. pseudotruncatella* subsp. *dendritica*, *L. hookeri* var. *marginata*, *L. ruschiorum* var. *lineata*, and *L. verruculosa* var. *verruculosa*) were incompletely or falsely recorded. For the last-named I have taken Nel's "Kenhardt" at face value (but see p.111).


White Flowers
Yellow Flowers
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MOZAMBIQUE
BOTSWANA
SWAZI LAND
LESOTHO
SOUTH AFRICA
Steinhausen
Stampriet
Aroab
Ellisras
Pietersburg
Tzaneen
Lobatse
Swartruggens
Pretoria
Randfontein
Johannesburg
Walkerville
Severn
Vryburg
Kuruman
Olifantshoek
Groendoeus
Karasburg
Warmbad
Lutzputs
Upington
Postmasburg
Danielskuil
Warrenton
Boshof
Harrismith
Griekwastad
Kimberley
Kakamas
Keimoes
Groblershoop
Goodhouse
Pella
Pofadder
Aggeneys
Namies
Kenhardt
Niekerkshoop
Douglas
Koffiefontein
Hopetown
Luckhoff
Prieska
Petrusville
Zastron
Brandvlei
Vosburg
Britstown
Brakfontein
Loeriesfontein
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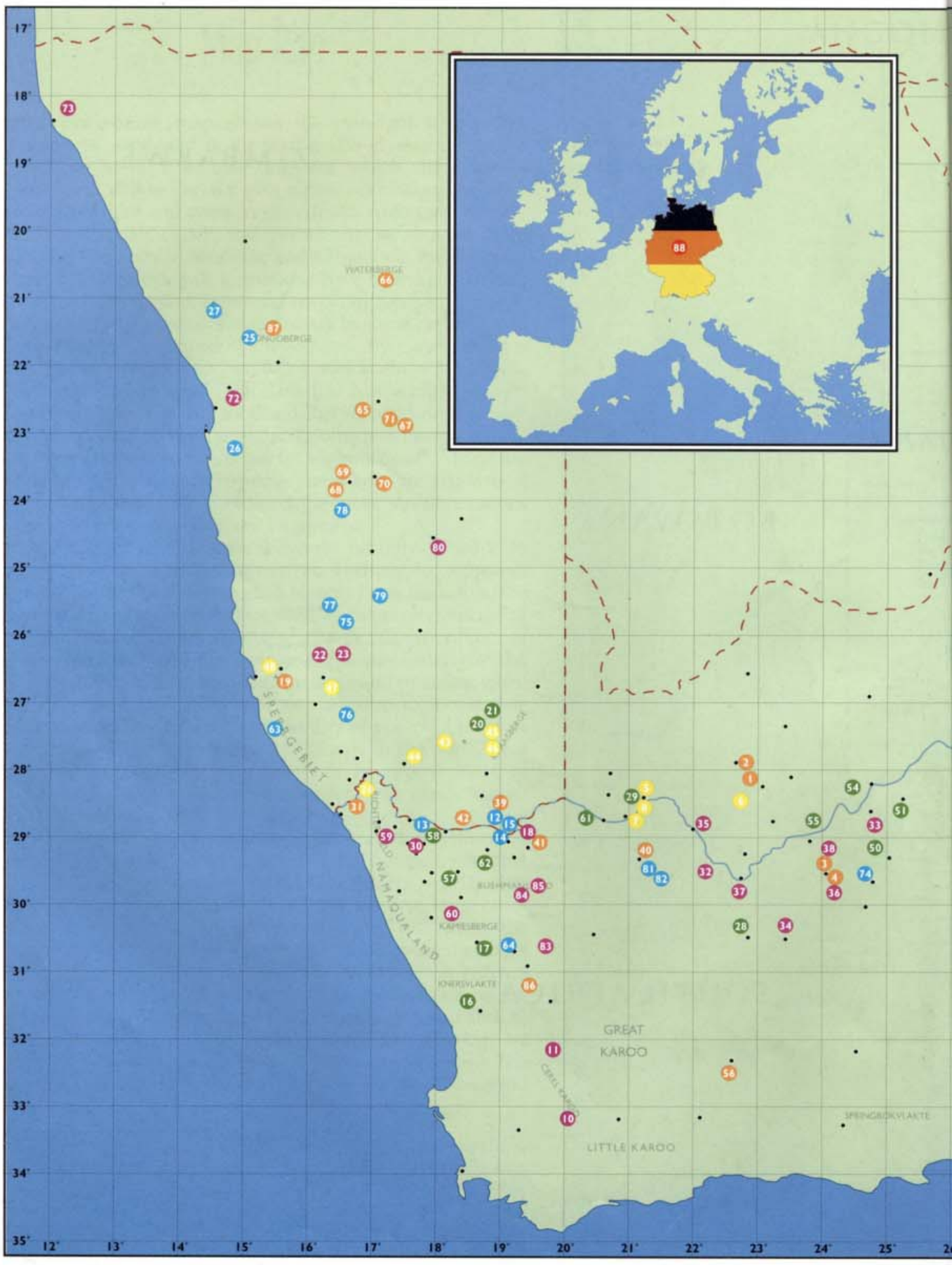
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WATERBERGE
KAROOBERGE
SPERGEBIET
NAMAQUALAND
KAMIESBERGE
KNERSVLAKTE
GREAT KAROO
LITTLE KAROO
SPRINGBOKVLAKTE
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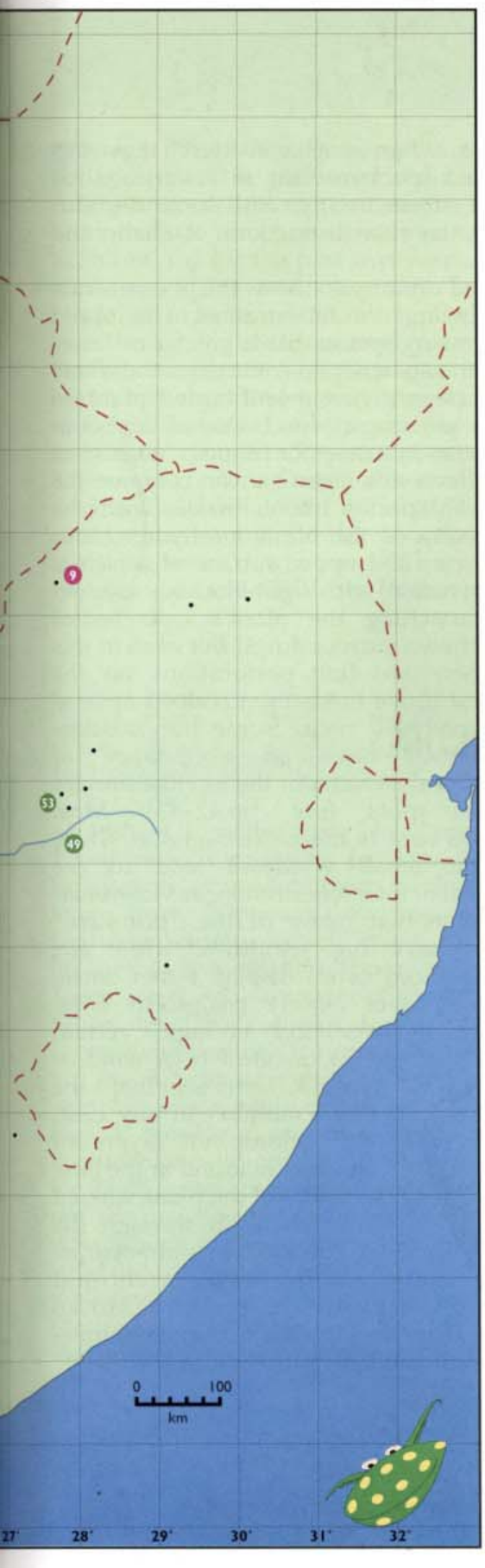


A Type Locality Map

To make this map easier to use the taxa are split, by colour, into groups representing their relatedness.

1 *L. aucampiae* subsp. *aucampiae* var. *aucampiae*
2 *L. aucampiae* subsp. *aucampiae* var. *koelemanii*
3 *L. aucampiae* subsp. *euniceae* var. *euniceae*
4 *L. aucampiae* subsp. *euniceae* var. *fluminalis*
19 *L. francisci*
31 *L. herrei*
39 *L. julii* subsp. *julii*
40 *L. julii* subsp. *fulleri* var. *fulleri*
41 *L. julii* subsp. *fulleri* var. *brunnea*
42 *L. julii* subsp. *fulleri* var. *rouxii*
56 *L. localis*
65 *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella*
66 *L. pseudotruncatella* subsp. *pseudotruncatella* var. *elisabethiae*
67 *L. pseudotruncatella* subsp. *pseudotruncatella* var. *riehmerae*
68 *L. pseudotruncatella* subsp. *archerae*
69 *L. pseudotruncatella* subsp. *dendritica*
70 *L. pseudotruncatella* subsp. *groendrayensis*
71 *L. pseudotruncatella* subsp. *volkii*
86 *L. viridis*
87 *L. werneri*
5 *L. bromfieldii* var. *bromfieldii*
6 *L. bromfieldii* var. *glaudinae*
7 *L. bromfieldii* var. *insularis*
8 *L. bromfieldii* var. *mennellii*
24 *L. geyeri*
43 *L. karasmontana* subsp. *karasmontana* var. *karasmontana*
44 *L. karasmontana* subsp. *karasmontana* var. *aliatiensis*
45 *L. karasmontana* subsp. *karasmontana* var. *tericheana*
46 *L. karasmontana* subsp. *karasmontana* var. *tischeri*
47 *L. karasmontana* subsp. *bella*
48 *L. karasmontana* subsp. *eberlanzii*
9 *L. coleorum*
10 *L. comptonii* var. *comptonii*
11 *L. comptonii* var. *weberi*
18 *L. dorotheae*
22 *L. gesineae* var. *gesineae*
23 *L. gesineae* var. *annae*
30 *L. helmutii*
32 *L. hookeri* var. *hookeri*
33 *L. hookeri* var. *dabneri*
34 *L. hookeri* var. *elephina*
35 *L. hookeri* var. *lutea*
36 *L. hookeri* var. *marginata*
37 *L. hookeri* var. *subfenestrata*
38 *L. hookeri* var. *susannae*
59 *L. meyeri*
60 *L. naureeniae*
72 *L. ruschiorum* var. *ruschiorum*
73 *L. ruschiorum* var. *lineata*
80 *L. vallis-mariae*
83 *L. villetii* subsp. *villetii*
84 *L. villetii* subsp. *deboeri*
85 *L. villetii* subsp. *kennedyi*
12 *L. dinteri* subsp. *dinteri* var. *dinteri*
13 *L. dinteri* subsp. *dinteri* var. *brevis*
14 *L. dinteri* subsp. *frederici*
15 *L. dinteri* subsp. *multipunctata*
25 *L. gracilidelineata* subsp. *gracilidelineata* var. *gracilidelineata*
26 *L. gracilidelineata* subsp. *gracilidelineata* var. *waldroniae*
27 *L. gracilidelineata* subsp. *brandbergensis*
63 *L. optica*
64 *L. otzeniana*
74 *L. salicola*
75 *L. schwantesii* subsp. *schwantesii* var. *schwantesii*
76 *L. schwantesii* subsp. *schwantesii* var. *marthae*
77 *L. schwantesii* subsp. *schwantesii* var. *rugosa*
78 *L. schwantesii* subsp. *schwantesii* var. *urikosensis*
79 *L. schwantesii* subsp. *gebseri*
81 *L. verruculosa* var. *verruculosa*
82 *L. verruculosa* var. *glabra*
16 *L. divergens* var. *divergens*
17 *L. divergens* var. *amethystina*
20 *L. fulviceps* var. *fulviceps*
21 *L. fulviceps* var. *lactinea*
28 *L. hallii* var. *hallii*
29 *L. hallii* var. *ochracea*
49 *L. lesliei* subsp. *lesliei* var. *lesliei*
50 *L. lesliei* subsp. *lesliei* var. *hornii*
51 *L. lesliei* subsp. *lesliei* var. *mariae*
52 *L. lesliei* subsp. *lesliei* var. *minor*
53 *L. lesliei* subsp. *lesliei* var. *rubrobrunnea*
54 *L. lesliei* subsp. *lesliei* var. *venteri*
55 *L. lesliei* subsp. *burchellii*
57 *L. marmorata* var. *marmorata*
58 *L. marmorata* var. *elisae*
61 *L. olivacea* var. *olivacea*
62 *L. olivacea* var. *nebrownii*
88 *L. ×steineckeana*

Hide and Seek

The nicest way to see a lithops is to come upon it suddenly, unawares, without any expectations; it is only then that one experiences how wonderfully these little plants blend in with, and then emerge from, their surroundings. Certain species really do match the stones among which they grow, a phenomenon which has been much debated. To quote Nel: "The question why these plants resemble their surroundings both in form and in colour has not been answered, and it is extremely doubtful whether it will ever be answered. It is, of course, quite easy, as has been done by some, to mount the Pegasus of phantasy and then postulate invisible or mysterious rays emanating from the soil and then influencing the plant to such an extent as to resemble it, but then one would be saying farewell to science and entering the domain of speculation not based on experiment. Why, for example *L. lesliei* is rust-brown in the reddish soil from ironstone and *L. gracilidelineata* is whitish amongst the white quartz pebbles is a problem which still baffles us." My friend M. Grande suggests that the rocks imitate the lithops!

Many species, without quite matching any stones, exhibit ornate patterns and differences in texture which confuse and distract at least the human eye. Nel made the point that he rarely saw any gobbled lithops, but Cole mentions that corn crickets (*Hetrodes*) can devour them down to the ground. (Even then they have a chance of survival, since the vital meristem is hidden below soil level.) After good rains, and especially when in flower, the plants are not necessarily difficult to see, once spotted. They may be very difficult to *find*, however, because their populations can be remarkably localized and widely scattered. In dry times, the lithops can retract to such an extent that their lairs fill in with blown sand, and then they can indeed be impossible to spot unless they are betrayed by a protruding dried fruit or by a fragment of an old leaf. Certain species, e.g., *L. verruculosa*, blend in amazingly well with their surroundings, which is particularly impressive when one considers that this varicoloured species occurs in a varicoloured mosaic of stones, with reddish sand-grains adding to the rich distractions of shade and texture.

A related mystery concerns the phenomenon of "windowing" or fenestration. The upper surface of many species has a greater or lesser degree of transparency. In some cases the whole surface is clear, giving a half-buried plant an eye-like or periscopic aspect. One of the South African common names for lithops, "oogies" or "eyes", reflects this fact. One can compare the "clear-eyed" species like *L. viridis* with the strong opacity of the blind, pachydermatous *L. vallis-mariae*, the upper surface of which is thickly encrusted with light-blocking calcium crystals, matching the plant's calcrete- or quartzite-strewn surroundings. But even in this species there are fine perforations on the surface, and if one holds up a scalped apex to the light, one will notice some transmission. Other species have an abundance of "miniwindows", which dot the top like freckles or grease spots (see pp.42–43). Most explanations tend to miniskirt the issue, which is: did the small windows lead to the development of total fenestration, or vice-versa? (It is notable that many of the "primitive" species have big windows, while the "advanced" ones display rather small, sometimes closely coalescent ones. Embarrassingly enough, certain species manifest both window types; *L. herrei* is perhaps the best example.) In any case, the chlorophyll layers of lithops are found at the base and sides of the plant; filtered light streams in through the clear, speckled, or semi-opaque apex and reaches the layers most effectively. The southern African sun is so intense that even double-filtered light suffices for growth.

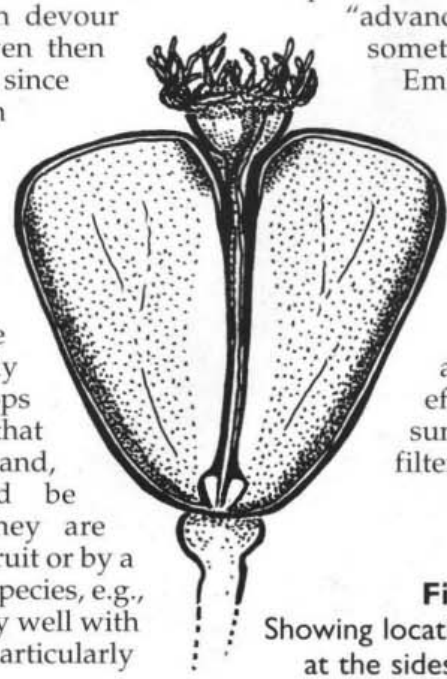


Figure 24.
Showing location of the chlorophyll at the sides — crowded dots

Dry as a Stone?

Though lithops usually occupy arid habitats, "aridity" can be measured in different ways. A farmer once told me that on his farm — a prime habitat for *L. comptonii* var. *weberi* — it hadn't rained for the past two years. He was a most reasonable and observant fellow, and I took him at his word (his unhappily lean sheep bore similar if mute testimony), yet when I saw the lithops plants later that day, they were beautifully turgid. Somehow they had received sufficient moisture, and this moisture had been maximally retained. Var. *weberi* occupies tiny holes on a calcrete reef; whatever moisture reaches these will collect into drainless pools. I could give many similar examples, many involving heavy dewfall, and all suggesting that we tend to underestimate the total availability of water.

A number of species are subject to summer thundersqualls in habitat; others receive modest winter and summer rains, or subsist largely on a vaporific diet of fog. The majority of lithops occur in the summer-rainfall districts, but the divisions between the districts are not as strict as one might think; some rain can fall at any time. In general the total annual precipitation is low, less than 500 millimetres, often far less (Cole 1988). Of course, lithops store water well, and they can store it for a long time, like little barrels half-buried in the soil, and they recycle much of it. Sometimes they store water too well; in wet years they may receive too much water, which leads to bloating, rupturing, and fungal epidemics. Triebner reported rare but disastrous mass meltdowns (see Flowering Stones, p. 210).

After Many a Summer ...

In spite of droughts, nasty blasts, mass-rot, and their various predators (crickets, Mammon's local agents, etc.), wild lithops can live for a very long time. Occasionally one encounters enormous clumps which enjoy an especially favourable redoubt and appear to be ancient. There are several accounts of geriatric lithops; Schwantes (1957) quotes a good analysis of *L. optica*, from which it appears that this species can live for almost a century. Being coastal, the plants receive a more or less reliable supply of fog. I would guess that even the "dry" Bushmanland lithops like *L. otzeniana* can live for 25–75 years, perhaps far longer. One might put the question the other way round and ask why lithops die at so young an age? After all, since they renew their leaves each year, replacing their finer roots as well, only the rootstock and the concealed branches are subject to aging, and indeed it is in these Achilles' heels that the plants seem to weaken. Slowly, gradually, the old branches elongate, and a self-burying habit cannot entirely compensate when a plant pushes itself too far out of the soil. Then too, rootstocks eventually grow so stout and corky that they seem to have absorptive difficulties.

It is likely that wild lithops require at least two years to reach sexual maturity, and assuming that such a plant flowers every year, it might produce *ca.* 100–500 fruits, and *ca.* 30,000–150,000 seeds, in its lifetime. Given these prodigious numbers, one might expect to find dense "thickets" of lithops, and indeed such stands do occur in favourable places. There is a famous lithops avenue near Namies, where *L. julii* subsp. *fulleri* occupies a fantastic strip of land several kilometres long. Here the plants actually crowd each other cheek by jowl (to use the common facial metaphor; see p.42 below). A similar density can be seen in the Steytlerville Karoo, where *L. localis* is king (fig.48). However, certain taxa are naturally sparse and localised. This might argue for recency of origin, or for the present-day travails of an ancient, too-specialized, line.

"Golden lads and girls all must,
As chimney-sweepers, come to dust"

— Shakespeare, Cymbeline

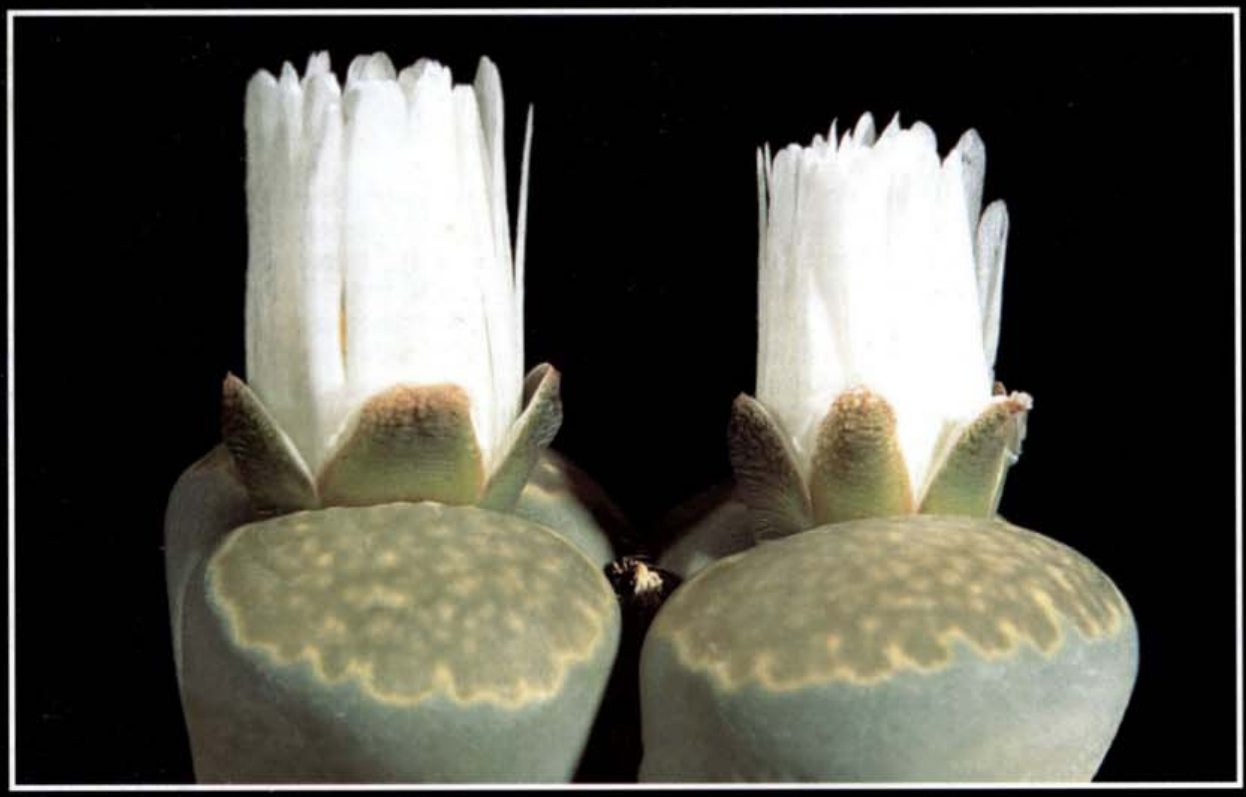


Figure 25. *L. salicola* preparing for active courtship

Figure 26. *L. karasmontana* "Signalberg form", Cole 65

Figure 27. *L. werneri*, Cole 188

Photo: John Trager

Figure 28. *L. ruschiorum*, ex M. Kimnach, Rössing Mine

Collection, Conservation, and Discovery

Averaged out over two centuries, one new *Lithops* species has been discovered every six years, one-third the rate of discoveries in *Conophytum*, a larger and far less coherent genus. Approaching the seven-year-itch point, we are due for another new *Lithops*, though the diamonds-on-the-beach period of "easy" discoveries, 1900–1970, has surely passed. At the present time there are few people collecting lithops in the wild, and indeed there would be little botanical justification for doing so. Newly discovered habitats do require (or invite) fresh sampling, and some scientific work involves a certain amount of uprooting, though eco-physiologists can now poke their minutely rude thermometers into undisturbed plants, *in situ*.

The permit process for legal collecting is far more restrictive than it once was and, fortunately, an awareness — at least, a minimally lip-serving awareness — of the conservation aspects of plant extraction and preservation is now general. But a great difficulty of collecting lithops in habitat, even with full permits, scientific rationales, and local cooperation, is that one feels brutal in doing so. They fit their surroundings so enchantingly, so cleverly, that to disturb their nests is a violation. Thus, many modern collectors admire them, hunt, perhaps, for a few seeds, and pass on. This is not to suggest that wild lithops are invulnerable, far from it. Even if collectors do not threaten them, goats and developers do. *L. aucampiae* subsp. *euniceae* var. *fluminalis* has been buried under asphalt, various pre-urban *L. lesliei* sites are now mass graves, part of *L. geyeri*'s territory has been usurped by a corral — and worse. Here we have one of the difficult paradoxes: if habitat details are given out precisely, errant collectors can poach more readily; if they are concealed, plant populations may be destroyed, unnoticed.

The conservation issues raised around many succulent plants have also affected lithops, but — largely because the Coles did their work so well — there is currently little market for collected material, good-sized nursery-born seedlings being widely and cheaply available. Furthermore, the Coles always furnished their seeds with data which was informative and symbolically correct but not pinpointedly precise, thus serving the needs of data-conscious growers without revealing too much. It has been many years since I have seen wild plants offered for sale (but then, I have never seen powdered rhino horn on offer either — that is to say, some markets are well-hidden). This is a decided improvement on the situation of the 1920's–1950's alluded to above. I should mention too that lithops are not currently "in". They mostly lack the cachet of elusiveness and novelty. Ironically, the most sought-after lithops specimens belong amongst the cultivars, a craving for which may threaten wallets, but not habitats.

The Bad Seed?

For a variety of reasons, some lithops seed, pure or dubious, produces ill-favoured seedlings: poorly shaped, pudgy, dull in colour, pygmified, naggingly ambiguous as to identity, sterile or absurdly vigorous. One can either accept these as part of the spectrum or ruthlessly discard them. A botanist might favour one solution, a horticulturist (horticultist?) another. But I can say, from long experience, that weak plants rarely grow stronger or more pleasing with age. Field-collected seed often yields a certain percentage of runts or plants otherwise so sensitive that they would hardly have survived in habitat. These are often interesting and are worth the necessary pampering, but they rarely make robust or trustworthy specimens.

Wild seeds are still on offer occasionally. Whether or not the collection of a few fruits actually impacts a population is uncertain, but my own feeling is that it is better to err on caution's side. I once gave 500 wild seeds (three capsules' worth) of *L. coleorum* to the Mesemb Study Group, arguing that this would reduce

collecting pressure on a rare, vulnerable, and newly discovered species; I hope that this was true. (To my knowledge, this species has been otherwise untouched in habitat.) Four years later, the MSG offered a goodly amount of *L. coleorum* seed, harvested under glass from seedlings raised from that first offering. This shows how quickly lithops seed can be produced; indeed, there are no easier succulent plants to pollinate. Keeping seed pure is another matter!

Colour Visions and Thoroughbreds

Quite a few cultivars — "cultivated variants" — adorn lithops collections. Most lithops-breeding has been directed toward the stabilization of various colour freaks: green mutations of brown-bodied species, white flowers in place of yellow. These achromatic goals have been achieved in many species, but there are other, far richer, possibilities: scarlet or pink flowers, ever more complex patterns, and shades more various than the candied red of *L. optica* 'Rubra'. Yet very few breeders have taken up the palette. Japanese breeders have produced a number of oddities: a few fine colour cultivars — see the grape-coloured *L. salicola* 'Bacchus' (fig.207) — and some Godzilla-big hybrids. My own goal has been the stabilization of traits I find charming, e.g., the smallest *L. olivacea*, the most nearly bronze *L. pseudotruncatella*, the shiniest *L. lesliei*, the most poker-faced and edibly chocolate-coloured *L. aucampiae*, the most stupendously and implausibly ornate *L. julii*.

So far, inbreeding has produced the best results. To inbreed, pick a plant you admire, A; pollinate it via a similar plant, B; sow the seeds from A, then choose the best of the offspring and apply its pollen to A. The resultant offspring should strongly favour A. Further incestuous repetitions yield better and better, more concentrated, results. This process usually takes at least three years, often ten or more. One can also attempt to self-pollinate any lithops, as with *L. meyeri* 'Hammeruby', on which this desperate strategem was successfully employed (see p.89). Plants produced by selfing often have odd characters not found in normal outcrossed material and not always desirable; for example, some hammerubies are abnormally slow in growth and weak-rooted.

Many deliberate hybrids have been attempted between species. Most of these are ugly, wan, and denatured; their horticultural value is less than nil. Not all combinations have been tried, however, and it is far too soon to dismiss future possibilities. (Furthermore, many of the hybrids have been made to "test" putative lineages rather than to create new beauties.) In general, species within each one of the two grand groupings, yellow- or white-flowered, will hybridize; the closer the taxa, the less secure the barriers. Thus *L. lesliei* var. *minor* × *L. lesliei* var. *lesliei* is perfectly fertile, while *L. lesliei* var. *lesliei* × *L. aucampiae* var. *aucampiae* produces weaklings and also provides an argument against the easy assumption that these two species are one. The crossing of "white" lithops with "yellow" ones often fails, or produces fragile weirdlings with glowing pink edges. Green-bodied yellow-flowered lithops like *L. olivacea* or *L. herrei* readily cross with their white-flowered counterparts, *L. marmorata* and *L. optica*, but then these are all quite close; indeed, *L. herrei* and *L. optica* are arguably two aspects, southern and northern, of a single species.

Hybridization with other genera has been successful in only a few cases. *L. lesliei* × *Dinteranthus vanzylii* (see figs.220 & 221) is strong, attractive, perfectly intermediate and fertile — even the seeds are intermediate — while *Argyroderma delaetii* × *L. divergens* var. *amethystina*, or *L. meyeri* (see fig.223), produces a few temperamental and heat-sick seedlings which need much coddling to survive. Nonetheless, the original ×*Argyrops*, a 50-year-old hybrid between a lithops and an argyroderma (the exact parentage went unrecorded), is quite strong; though it flushes to an embarrassed pink every summer, it recovers each winter and is then readily propagated by division. (Its distorted fruits harbour flat sterile seeds.). *L.* ×*steineckeana* is surely an intergeneric hybrid (see p.108 and fig.222) but to date no one has figured out the father, and the presumptive mother, *L. pseudotruncatella*, remains as stubbornly silent as Hester Prynne.

Photo: John Trager

Figure 29. *L. optica* 'Rubra' Cole 81, small seedlings en masse (*ca.* 3 months old)

Growing L

Brief horticultural notes are given below for the individual species, but I should say straight away that most lithops are very easy to manage. If they flower every year, they are happy. If they do not flower, they are underage, underlit, underwatered, or overfed (or any combination of those conditions). The main goal of my own lithops-growing is to have the plants as presentable and fresh-looking as possible for as long as possible. This means that they should absorb their old leaves quickly, avoid bloating and

Figure 30. Mature seed capsules; dry and closed, left (*L. verruculosa*, Cole 159); wet and open, right (*L. julii* "*reticulata*")

Photo: John Trager

Figure 31. Water, camera, action! — *L. pseudotruncatella* "Pallid form", Cole 264 — 'flipping their tops' after their annual hibernation

Figure 32. *L. optica* 'Rubra' seedlings some months later (*ca.* 10 months old) transplanted and ready for some serious growing

Lithops

especially, stacking (i.e., the simultaneous presence of two or three years' worth of turgid leaves on a single branch!), emerge cleanly and quickly each spring, and remain low, rather than proud, in the pot. Another sound goal is longevity; lithops can become one's lifelong companions. Most of the plants seen in this book were sown in July 1976 and they will probably continue to grow and flower for another twenty years or more.

Figure 34. Water, water, ... — *L. julii* "*chrysocephala*", Cole 205, showing 'I-need-water' wrinkles after another hard day in the sun

Figure 36. Natural variations on a theme — *L. gracilidelineata* Cole 309 — three individuals all from the same seed-batch!

Figure 35. *L. lesliei* seedlings en masse (*ca.* 4 months old)

Photo: John Trager

Figure 33. *L. herrei* (Cole 236) × *L. optica* (Cole 293) seedlings (*ca.* 2 months old) showing the typical long fissure of both species

As far as I can determine, the verifiably oldest lithops in cultivation is the clonotype of *L. marmorata* (see fig.152), collected over eighty years ago! Perpetuated by cuttings, it is still fresh as a mushroom ("splinternuut" [splinter-new/brand new] would be the apt Afrikaans phrase). Indeed, the best way to revive any older clustered lithops, antique or not, is to give it a new root system, either by cutting off the principal rootstock and re-rooting the plant en bloc, or by dismembering it and rooting each head separately.

Lithops really do look like stones, which are, of course, unchanging on the humanly perceived time-scale, and their stony or glacial pace is perhaps the reason why a sudden rotten "melt-down" is so shocking. This none-too-solid flesh can collapse overnight. The desire to avoid rot tempts many growers into the reckless caution of thimble-watering. I say "reckless" because plants so watered will never develop strong roots and will be in danger if they should ever receive a decent drink. Yes, once in a while, perhaps monthly in summer, lithops love the equivalent of a downpour. People who imagine that lithops "never" need water remind me of my former landlord, who was shocked one day when he found me watering what he had fancied to be my "pebbles".

Regardless of rainfall regimes in their original habitats, all cultivated lithops are most responsive to water in spring and autumn. This is as true for the species which naturally receive winter rains as it is for those which receive summer thundershowers. The northern hemispheric switch is complete; there is no legacy from their homeland, no atavistic pining for September's long-lost "spring". Lithops respond to day-length and temperature, not to the calendrical facts of April and December. Very roughly, the annual watering schedule can be as follows:

Late spring to late autumn: a good watering every 10 days or so, whenever the sides of the plants show wrinkles which persist overnight (mere daily wrinkles, the result of an afternoon's heat, are inconsequential unless they are symptomatic of a pre-burn state; see fig.34). There should be watering peaks right after the plants have flung off their old vestments, and right before they bloom in late summer or autumn.

Early winter: no water at all, unless the plants seem to be collapsing too drastically, or any visible (and pollinated!) fruits seem not to be filling out properly.

Late winter: a little water every 20 days or so, more if the fissures have not yet widened to expose the new growth.

Early spring: one or two moderate waterings, especially if the newly exposed leaves seem to be wrinkling. Terry Smale, an outstanding English grower, tells me that late winter and early spring splashings would be inadvisable in the UK, where winter light is so lamentably feeble, and might indeed delay the resorption of old leaves. In brighter areas — the south-western US, southern Italy and France, and the whole of South Africa — my advice might be more applicable.

General note: after a particularly hot day, whatever the season, I often mist my lithops in the evening. They do seem to respond to these ministrations — they are, after all, physiologically active at night — but this practice is probably unnecessary and possibly harmful in a climate as cool and humid as England's. I developed the misting habit in emulation of the nightly dews experienced in habitat. It is, however, a bad idea to mist any plant which tends to retain its old leaves for more than a year; the leaves are designed for a year's duration, no more, and not much less. Replacement = recycling!

The practices given above work for me; other growers have other modes and they also work well. (The Coles fussed far less than I do, and their plants were very beautiful.) So much depends on the extent of the transfer of resources from old leaves to new, on the heat and aridity of the plant shelter, on the pots — small or large, clay or plastic, and on the amount of light (morning sun tapering to a half-shaded afternoon is the least stressful). Remember that stressed plants need shade and/or water! Any root disturbance immediately renders well-lit lithops liable to burning, which tells us how closely linked are the fine lower roots and the ability of the plants to withstand heat and exposure. It takes a newly potted plant at least two weeks to re-anchor itself, two or three months for security. Insecure plants are quite liable to wilting, and if "wilting" seems a strange term in this context, that tells us how far we are from perceiving lithops as *pairs of leaves*.

Light in August

Well-established lithops can usually handle a good deal of light, all that an English summer is likely to provide. But even in England they need good ventilation to thrive, otherwise a still July or August afternoon is hot (or bright) enough to scorch them badly. In Mediterranean climates they will do best with some summer shading — probably 20–30% is enough. If given too little light (or too much!), lithops rapidly lose colour, fading to dull pastels; in poor light they will also crane their necks, becoming ungainly and rot-prone. I am assuming that the reader has a greenhouse, but if that is not the case, a fine collection can be maintained (and scorched) in a sunny window. In Mediterranean climes a simple frame screened to exclude curious birds may suffice.

Lithops can endure great heat; I know lithopsariums that reach 50°C (122°F) in summer for weeks on end. Generally, the plants which survive these Shadrachian conditions are given *ca.* 50–60% shade; they tend to be torpid and non-expansive until the heat wave passes. (Cool nights help to redress the balance.) But it is safer to keep them at a lower temperature; I am happier at 40°C (104°F) myself, and I suspect that they are too. On the other end of the scale, some (!) cultivated plants in dry but healthy condition can tolerate at least -8°C (17.6°F), and I have reports of survivals after exposure to far lower temperatures. In any case, extremes of heat, cold, or brightness are *not* necessary for fine colour. Suzanne Mace's lithops, which live in an unshaded greenhouse within earshot of Gatwick, are superbly coloured, and if this can be achieved in the even damp of England, it can be achieved anywhere.

Truth in Packaging

Lithops will grow in all sorts of odd soil mixtures, the most important point is simply that the degree of water-retentiveness of your mixture must influence your watering regime. As long as the mixture drains freely, it should work. One can try diverse mixtures simultaneously, but the advantage of settling on uniformity throughout one's collection is that watering becomes easier, as the pots dry out at a more or less uniform and predictable rate. Even then, individual attention will always produce the happiest and most compelling results.

Some of the many mixes in current use include: A: 1 part loam + 1 part pumice or scoria [crushed, iron-rich red lava rock] + a little grit; B: 1 part commercial peat-based potting mix + 2 parts grit, perlite, or pumice; C: 1 part coir (coconut fibre) + 1 part perlite or aggregate. Despite the very considerable range of soil types in habitat all species can — I do not say, will — thrive, and can be kept "authentic", in a single mixture. If a mixture is very rich, some plants will tend to balloon, and even to explode, unless watering is scant. Some media (e.g., C) have little or no food value and will thus require immediate supplementation.

Some growers prefer larger plants with many branches, others prefer a compacted maximum of two or three. Plenty of root-room favours the larger option, root-restriction favours the smaller, and it is only a question of personal preference. Habitat models can be found for either choice, though wild lithops very rarely grow as large as their cultivated counterparts. The big beauties one often sees on show benches have a surreal aspect, but they are undeniably impressive and when well-coloured can be magnificent.

Pot choices affect one's soil and watering choices as well. I prefer clay for its appearance, aeration, and durability, but I use square plastic because it is cheap and saves space and time. My pots are unseen in the slides used in this book, but my standard is the 12 × 12 × 12 cm virtual cube. Shallower pots work perfectly well for all species, though they tend to dwarf plants, and necessitate (or permit) frequent splashings. It is true that wild lithops have deep tap-roots and, in some cases, shallow lateral ones as well, the tap-roots serving as anchors while the laterals gather any bit of dew which has collected around — or even on — the self-

Figures 37 & 38. *L. pseudotruncatella "alpina"*, Cole 381, erupting into bloom

watering plant, but a potted prize has a far less stringent existence than a wildling.

Lithops can be planted in families or singly. They grow very well in crowds; they will tend to stay small and single-bodied (see fig.172), but the crowding enables one to display maximal variability in a minimal area. Generally it is best to plant only one species per container, lest unequal growth cycles cause awkwardnesses in watering or shading. As King Henry didn't say, there's a laggard chicken in every pot; to have mixed congregations invites uneven growth. But I must say that some growers plant twenty or thirty species in a single wide container, and these anti-geographic assemblages often do very well.

Pollination, Patience, and the Fuller Fuller Brush-Man

Having already asserted that pollination is easy, I should perhaps mention a few points which might remove any ambiguities. First of all, it normally takes two to tango: two clones, two siblings, two sole-mates, *not* two cuttings from the same plant. Moreover, the flowers have to be at more or less the same stage, two to five days past anthesis (the initial opening). Also, it is important to keep the flowers dry during the process; moisture blasts the petals and harms pollen as well. Conversely, it is good to give any freshly pregnant lithops a decent soaking, as this improves fruit quality.

When a lithops begins its flowering cycle, the fissure parts in advance. (I have only once seen a fissure actually split open before my eyes; it was startling to observe a lithops in active movement and I almost expected to hear a slight popping sound!) Soon after the fissure opens, the bud emerges, thrusting out its sepalled tongue; within a fortnight, often far less time than that, it is ready to open. Normally, lithops flowers expand between 2:00 and 5:00 in the afternoon and close around dusk. Observing a new flower, one may notice that the pollen is not yet ripe: the anthers show little or none of their powdery burden, and the stigmas are unreceptive. The next day the petals will spread more widely (opening slightly earlier than they did on the first day) and the pollen begins to shed, but the stigmas are still not receptive. By the third or fourth day, the stigmas expand and the pollen begins to age. When the stigmas are ready, they will be visible as greenish or yellow threads amongst the sea of yellow or white anthers. One can pick up pollen with a soft-bristled brush and gently paint it on the stigmas, repeating the process for the next two or three days. (The better your brush, the fuller the pollen-load you will transfer, so it is worthwhile to invest in a few good-quality sable brushes and treat them well. They can be cleaned and sterilized with isopropyl alcohol; the bristles should be reshaped after each cleaning.)

Petals age quickly if the greenhouse is warm and the flower is at just the right stage when pollinated. Within a week after an effective pollination, the ovaries will begin to swell as the shrinking petals turn a final red or blackish. Soon the fruit will expand to a fat, green-topped button; in some cases this is concealed within the fissure, in others, the fruit sits astride the fissure, exposed and vulnerable. The former position is of course better from the point of view of the lithops, worse from that of a hungry and hasty cricket.

All tangoing aside, lithops are occasionally self-fertile. If the flowers are "tickled" with their own pollen, this will, at times, induce a good fruit; even untouched flowers can also bear fruit. I do not know what triggers the breakdown of a plant's resistance to its own pollen, but it does happen. To test this, one must be absolutely certain that nothing else has provided any feasible pollen, so screening or isolating the plants is essential. Lithops are rather promiscuous — I once called them loving stones — and propinquity can produce unintended, forever puzzling, consequences. Mothers-to-be should be separated widely. One can sometimes stimulate a lonely lithops by means of foreign pollen, e.g., that of *Conophytum herreanthus*, *Fenestraria rhopalophylla*, or *Argyroderma delaetii*. Such pollen tends to break down any self-immunity without actually entering into the process genetically, acting rather as a kind of catalyst. Note that all lithops flowers are "perfect", i.e., they bear both male and female parts. A few freaks have filaments without anthers, but these flowers can usually receive pollen even if they cannot offer it. Deliberate emasculation of a flower guarantees against selfing, but it requires much delicate plucking.

Seed-Raising and Racing

The best way to learn lithops, and the best way to enjoy them, is to raise them from seed. The path from their cradle to your grave can be long and interesting. As with watering, there are many methods; here I will only sketch two that work for me. Lithops seeds last a long time; if kept dry they are viable for at least twenty years. It is best to store them in the fruits, the so-called capsules. After the fruits are gingerly crushed between the fingers, the seeds can be separated out by means of graduated sieves; it is best to remove all the chaff (fruit-wall fragments and any placental residues) as it can go mouldy. Alternatively, one can remove seeds by soaking fruits in a cup of water; most seeds will fall out within a few minutes and the rest can be teased out, using a soft brush or fine tweezers. Upon retrieval, seeds should be placed on a paper towel and either dried off and stored at room temperature in a paper envelope, or sown immediately.

Lithops seeds respond well to midsummer-sowing in an airy outdoor frame which has a rain-proof cover. They can be sown in 8 × 8 × 8 cm plastic pots, using the "adult" mixture B as given above (but sieved through a 2mm mesh, and carefully levelled in each pot), and !barely! decked with fine grit. (They can rot under too thick a layer.) The pots should be soaked once from below, and covered with glass or plastic for a few days only. This covering is only necessary to ensure that the seeds fully imbibe the sowing water. On the third or fourth day, the covering should be replaced with fine netting or screen, and the pots should be misted once or twice a day. Within a week, some seeds will probably have germinated; within two, most should be up. 100% germination is a reasonable goal, for them and for you. Speed of germination is partly dependent on temperature; your frame will be most effective if its temperature range lies between a low of *ca.* 15°C (59°F) and a high of *ca.* 30°C (86°F).

Keep the screen in place, as it will provide some shade. (More shading will be necessary in very bright climates.) Misting should be continued daily, unless you wish to experiment with the varied effects of rainfall and have sufficiently reliable precipitation to manage that. (Generally, light rainfall is excellent, but it can easily become too much of a good thing, leading to complete wipe-outs.) Once every few days the mistings should be heavy, lest the pots lose too much weight, but beware of total saturation! After about three weeks the mistings can be lessened periodically. I always add a small amount of fertilizer to the misting water.

As the cotyledons fill out, forming tiny, cylindric or conical bodies, they acquire some succulence, which gives them a little — only a little — drought-tolerance, and as the bodies lengthen, they can be lightly mulched with more grit, which props them up, retains moisture, and discourages beasties like sciara flies. The pots should never be flooded; flooding invites rot. Especially when the seedlings are tightly packed — *ca.* 100 per 8cm pot — they can easily succumb, though they seem otherwise to enjoy the mutual support and self-mulching of a mini-collective farm. Well-grown seedlings have a burnished bronzen look — if they are too green, they are also too soft, so one should monitor light levels carefully. If they suddenly bleach to a bone-white, they have received too much light; they cannot adapt to sudden stress.

Within three months, the cotyledons should be very fat, but their largesse will soon be absorbed or usurped by the new leaves developing within them. These will break through by late autumn. The seedlings now look like miniature adults — though their apical patterns are rudimentary, an instructive study in itself — and they can be treated like older plants, if a bit more indulgently. Throughout the process outlined here, seedlings respond well to frequent dilute feeding. Transplanting is best avoided until the subsequent spring or summer unless you are very dexterous and like to use fungicide. In any case it is best to transplant *after* the true leaves are fully developed and the cotyledons have been entirely absorbed. If your seedlings have three pairs of fleshy leaves, you have overwatered or overfed them grossly! However, some stacking is unavoidable, and keeping the roots active is more important than juvenile neatness. In your race to save time, certain seedlings will shed and acquire new leaves quickly and continuously, and it is possible to have them in flower in 10 to 12 months.

Lithops also do very well when sown under lights at any time of year. The actual sowing is as

above, though smaller pots are safer, and it is best to sterilize the soil first in a microwave or conventional oven (pretend you are baking a large toxic potato). Again, the covering should be removed within 4 days, otherwise the soil goes sour. Germination is usually quite rapid under lights (3–10 days) though, as with outdoor sowings, some batches will do nothing for weeks and then make an unexpected debut. Seedlings do best if the lights, and a closely placed fan, are kept on perpetually. Growth is very rapid with this method, but it is rather soft unless the pots are placed quite close to the light (±15cm). After 3–4 months it is best to place the pots in the greenhouse (preferably under the bench at first), or in a sunny window, sheltered behind or between some larger pots. Lithops can be raised under lights permanently, but after their first six months, they will need some sort of periodicity, oscillating between 14-hour and 18-hour "days". The ordinary "cool" fluorescent bulbs can be used in conjunction with the more expensive, broader spectrum grow-lights.

It should be noted that seeds sometimes fail to germinate. Methods which normally work well can result in a blank pot or pots, the reasons for this being quite obscure. However, if no seeds germinate after one month, I usually dry off the pot, put it in a dark corner, forget about it and then re-soak it a few months later. Sometimes I'll even put it out in the rain under a screen. Surprisingly often, this is soon followed by a emerald flush of germination. Whether or not this indicates the presence of inhibitors which are flushed out by repeated wettings, I don't know. Cole (1988) mentions that seeds may germinate better after a year's wait, which suggests the presence of inhibitors which simply lose force with age, and many people believe that seeds behave like a fine wine, improving yearly. However, seeds can be sown as soon as the fruits which contain them are fully dry, *ca.* eight months after pollination, and I have had so many cases of excellent germination of fresh-from-the-oven seeds that I am loathe to wait any longer. Whatever their age, seeds sometimes exhibit staggered germination patterns — two or three tardy waves of green over as many weeks (or even months!) — and I wonder if this in any way relates to the position the seeds occupied within the capsule, or to a related factor, viz., the size of the seeds, since some seeds from the same fruit are notably plumper, and seem to be better nourished, than others.

I have noticed no correlation between the average seed-size of a species and ease of germination. There is, however, a slight correlation between size and mortality rates: very large seeds (*L. lesliei*) produce large, resistant cotyledons; smaller seeds, e.g., those of *L. comptonii* and *L. otzeniana*, on down to *L. julii* and *L. verruculosa*, are slightly more prone to damping-off. (Chinosol, the well-known medicament [8-hydroxy-quinoline-potassium sulphate], is an effective and non-poisonous weapon against that malady.) Smaller seedlings are also more vulnerable to terminal munching, of course.

I should note that 50–150 seedlings will happily inhabit an 8 × 8 × 8 cm pot for a year; a pot half that size will of course harbour correspondingly fewer. This presupposes that one sows the seeds evenly enough to avoid clumping. An evenly sown brood will tend to produce a solid and level mat, crowding out algae and growing at a uniform rate. I have tried to sow seeds in large trays, individually, spacing them out widely in a grid pattern; I hoped that this would avoid the labour of early transplantation! This practice sounded good in theory, but in practice it was not a success; after all, transplantation is actually *stimulating* to lithops when done at the right time.

Ease and Disease

Generally, adult lithops are easily managed, but they do have an odd and distressing way of rotting when one least expects it. Summer or winter, one is never quite free of the rot roulette, and there are different kinds too: the sudden jelly-rot, with its disgusting odour of bacon and old avocado, the slow and dusty dry-rot, more like the damage inflicted on old wood by termites, and the spreading rot, which slowly moves around in a community pot if one is stupid or stubborn enough not to repot the survivors of a first attack. Prevention is better than any cure, and it involves a sensitivity to each pot (do not water one pot merely because

its neighbour was dry), an awareness of periodic susceptibilities (*L. schwantesii s.l.* is highly vulnerable in hot humid weather), an avoidance of prolonged dampness, and, above all, good air-flow. It is safest to water plants early in the morning, but it is not safest never to water!

Lithops are prone to mealy bugs, especially the ones which, having explored the flowers, then invade the opened fissure. A systemic insecticide is probably the best solution for a large-scale invasion; small guerilla attacks can be repelled with isopropyl alcohol. Root mealies can also be insidious; if they are really stubborn, a complete rootectomy is the best cure, and it may also revive the plant, as suggested above, p.30, in the discussion of recrudescence. Sciara flies are also dangerous, especially for young seedlings; their larvae attack seedlings basally, whereupon the whole plantlet topples like a girdled tree. One can either keep seedlings tightly screened, or train an electric fan on them. If the artificial breeze is strong enough, it will keep the flies from landing!

Another kind of problem — not exactly a disease, but certainly a source of deepening unease — is the tendency of plants to develop distorted growth: the fissures show curious lacerations, and the sides show irregular streaks, as if bits of tissue had been pulled past a rasping barrier. What makes me especially uneasy is that these distortions are far more common than they were twenty years ago. I tend to think that a virus might be responsible, but it could also be the result of a tiny mite's predations or exposure to rock music. In many cases the plants grow annually more Frankensteinian, though in a few cases the process is blessedly reversed.

This cosmetic damage may or may not be connected with burgeoning populations of greenhouse thrips. The so-called western flower thrip is responsible for many types of epidermal damage in mesembs, soft-tissued plants like mitrophyllums and glottiphyllums being particularly vulnerable. These thrips also attack the soft, newly forming bodies of lithops, having reached them via freshly opened fissures during the flowering season. The flowers themselves are the primary target, but thrips tend to mill about, causing a certain amount of extra damage in the process. They can also spread viruses. It is thus very important to control them, but it is also quite difficult, as thrips reproduce via rapid parthenogenesis. Fortunately, some clever biological controls have recently been introduced. I once sent a suspiciously streaky *L. pseudotruncatella* to a virus lab in Italy. A busy technician put the specimen in the lab refrigerator, and before he could investigate it, another worker had eaten the evidence, imagining it to be an exotic nougat, perhaps.

My catalogue of woe would be incomplete without a mention of the triplex syndrome: some plants develop fissures à la peace signs, each body being composed of three more or less equal leaves rather than the proper two (see fig.225). These tend to revert to normalcy, though some individuals exhibit a perverse triplicity from birth and retain it after each successive molt. Other plants develop strange "strawberry marks" — neon-bright epidermal blotches or stripes which are found on the sides of the bodies, contrasting vividly with the prevalent colour. These are usually the joy or curse of a single season.

Transmantled Beauties

Well-established lithops can be maintained in the same pot for decades. In 1979 I gave my last piano teacher, a man fond of the eternal symphonies of Bruckner, a clay pot of *L. bromfieldii*. Late in 1998 (!) he asked me if it wasn't perhaps time to transplant his beloved "Brownie" — instead I sent him a bit of plant food. Most growers will prefer a less leisurely schedule. Certainly, if a lithops seems to be rising too much in its pot, or conversely if it has sunk toward the bottom as its compost ebbs away, or seems loose or abnormally pallid, it is time to take action. When I transplant lithops I wash them first, and am frequently amazed by how quickly the tiny root hairs respond to moisture: within moments they extend themselves, newly whitened and actively seeking further sustenance.

If a plant is in bad condition, it deserves more than a wash: I will soak it in water to which I've added a bit of fertilizer and Vitamin B1. The immersion can last for a few minutes or

a few hours. I usually remove all the old skins. Not only does this help to revive the plant, it also reveals the most delicate colours, because the mantle (i.e., the upper portion of the sides, also called the shoulder) of a lithops is a curvaceous zone of fascinating and subtle shades; moreover, the cells are visible, and they actually sparkle. This area is never patterned or textured because it would normally be buried and/or protected by old skins (those gradually slough off in habitat, via winds or self-digestion), and for the same reason it is sometimes slightly tender.

After replanting a lithops I usually give it a top-dressing of gravel or fine grit. I do not try to match stone to plant although I sometimes retain an aleatoric combination if it happens to look good. Mulches reduce the need for watering and they provide a nest for any self-sown seedlings, while also discouraging any algal growth. White or pale gravel is preferable to the darker sorts; those can overheat.

Lithops and Their Lineage

There is a general theory that the genus *Lithops* — plants which represent the near-ultimate in leaf-reduction and fusion (fig.41) — derived from leafier, less compact plants. The obvious antecedents would be the genera *Lapidaria* and *Schwantesia*, as pointed out, appropriately, by Schwantes himself. These genera share many features with lithops, especially in flower, fruit, and seedling structures (the fused, flat-topped cotyledons of all three genera resemble miniature adult lithops), but they lack the crucial features of leaf-truncation, windowing, and the attendant leaf-ornamentation. Schwantesias and lapidarias have plain, usually dotless surfaces, marked only on their cheekbony leaf-keels. (Such keels are seen in some lithops, usually only as elevated vestiges which have not quite smoothed out.)

Photo: Sigrid Liede

Photo: John Trager

Figure 40. *Schwantesia borcherdsii* (from Upington) maintaining multiple toothy leaf-pairs as usual

Figure 39. *Lapidaria margaretae* angling for the best light near Aggeneys, March 1989

One could say that a lapidaria is a primitive lithops, but then one might ask: what was a primitive lapidaria? Is there any reason to suppose that *Lapidaria margaretae* remained stable, trapped in her ancient ancestral condition, while lithops advanced beyond theirs? Certainly, lapidaria failed to "achieve" the strictest form of leaf-reduction, but perhaps it was already perfectly fitted to its habitat (which it shares, incidentally, with various flat-topped *Lithops* species) and required no further modification. (That same sort of simple sophistication might account for the "primitive" nature of lithops fruits; there are few simpler structures in the family Mesembryanthemaceae.) It is interesting to note that *Lapidaria* is a monotypic genus, i.e., it has just a single species, *L. margaretae*, rather widespread (Warmbad — Pofadder — Aggeneys) and showing only minimal variation, chiefly in leaf size and in degree of branching.

Though they lack the camouflaging epidermal patterns of lithops, lapidarias are nonetheless cryptic, their unfused leaves having the colour and shape of quartz shards. The lack of leaf-fusion in *Lapidaria* has its parallel in certain of the "green", supposedly primitive lithops, e.g., *L. viridis*. This species and a few others (*L. meyeri*, *L. helmutii*, *L. comptonii*) have more or less divergent, unfused leaves which have no special textures or coloured tattoos. If a high degree of leaf-fusion equals advancement, one might correlate this with the fact that many of the highly fused species of *Lithops* (*L. pseudotruncatella*, *L. julii*, *L. dorotheae*) have elaborate epidermal patterns — sometimes! *Schwantesia* and *Lapidaria* have solidly yellow flowers, while the green "primitive" lithops have yellow petals with more or less obvious white bases. Flowers of all three genera are wide and easily satisfied.

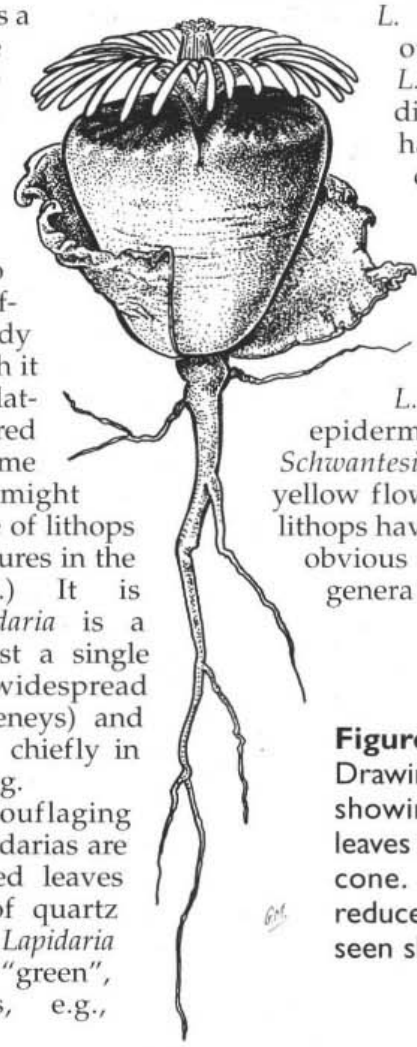


Figure 41.
Drawing of the Platonic lithops showing a whole plant, its leaves fused into an inverse cone. The old leaves are reduced to a crisp shell, here seen skirting the cone

Taxing Taxonomy, or, Order in the Hort

In one sense *Lithops* is a great genus to work with, taxonomically: all of its species look like ... lithops. That is what I meant above about the coherence of the genus. A few plants in other mesemb genera do resemble lithops superficially, but there is never a real identity problem: *Argyroderma* flowers are wide and shallow, their fruits are complex; *Dinteranthus* seeds are hyper-minute and give rise to minute bubbly cotyledons; *Conophytum* petals are basally fused (those of *Lithops* are free, i.e., unconnected); *Tanquana* leaves are soft and waxen; *Vanheerdea* has teeth. But apart from those minor confusions, *Lithops* stand out as a wonderfully clear genus, and only one exiled species, *Dinteranthus vanzylii*, has truly lithops-like traits. (See figs.44a–44b & 46a–46b.)

The genus was published by N.E. Brown in 1922. It won immediate acceptance though a few botanists stubbornly plumped for the old hyper-genus *Mesembryanthemum* until 1930 or so. Since the late 1920's, various grand intrageneric divisions have been propounded for *Lithops*. Nel (1946) recognized "windowed" and "unwindowed" subgenera, a baffling and untenable arrangement (a single species, *L. verruculosa*, was placed in both subgenera). As a systematist, Nel was preceded and succeeded by Schwantes, who recognized two subgenera based on flower colour and on the presence of short or long fissures.

There is a strong but incomplete correspondence between flower colour and fissure length (or, better, fissure structure): most

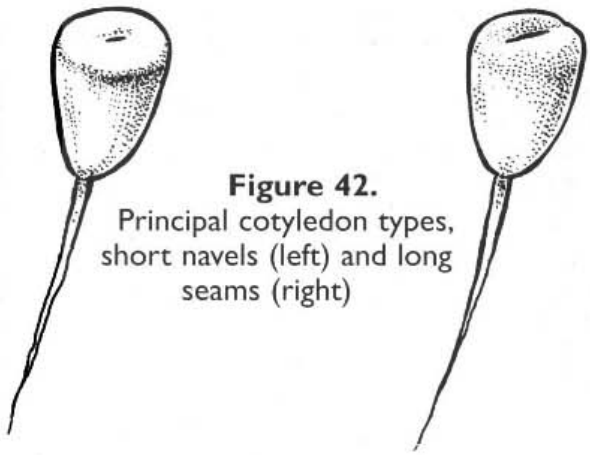


Figure 42.
Principal cotyledon types, short navels (left) and long seams (right)

yellow-flowering species have short dimple-like fissures at the broad-topped cotyledon stage (and well beyond it); the more nearly cylindric cotyledons of white-flowering species (disregarding the white mutants mentioned above) have longer seam-like fissures (fig.42). There are many other distinctions as well, especially in seed characters, white-flowered species having smaller and paler seeds, and so the basic Schwantesian division still works. The American botanist Rob Wallace now recognizes three core groups, modifications of the traditional two, and a third splinter party of one: the peculiar and uniquely ruby-pimpled *L. verruculosa*.

There are many ways to perceive or "parse" the lesser taxa (species, subspecies, varietas) in *Lithops*. The system adopted here is purely Coleian, and even if I had any taxonomic pretensions in *Lithops* I doubt that I would alter much of it, especially as it has internal logic and consistency. Partly because of the widespread dissemination of his material, Cole's concepts have taken deep root, and one might say that Cole-derived collections can best be understood by Cole rules. Cole recognizes 35 species (or 34, if *L. steineckeana* is discounted) and 52 taxa at lesser ranks, subspecific and varietal. (When his book appeared, *L. coleorum* was not yet known; it boosts the total to 36 or 35.) Some varieties are rather tenuous, as Cole himself recognizes, but then they are presented as *varieties*, elements which can blend into, and often overlap with, the main species. Subspecific rank is generally applied to populations which are discrete and which differ from their presumed near-relations in several morphological and/or floral characters; see *L. gracilidelineata* for a good example.

Much of the difficulty with *Lithops* taxonomy revolves around the inconceivable variability within and between populations. The plants are so diverse in pattern that it is difficult to assess or conceptualize the "standard" *Lithops*, and sometimes the varieties seem to melt into a fluctuating pool. Nel pointed out that the zone of contention is, after all, the apex of a leaf, and leaves are notoriously variable. An example: would we perceive *L. bromfieldii* var. *mennellii* as a separate entity if we hadn't learned to do so — would we, in other words, have just taken it for a form of *L. bromfieldii* with paler leaves and darker veins? Perhaps, and yet *mennellii* exists as a geographically separate and stable entity, not negated by the fact that it (or its simulacrum) also exists as a rare, pale-faced variant within certain quicksandy populations of *L. bromfieldii* var. *bromfieldii*. If it weren't for those, one might have regarded it as a good subspecies. Put the other way round, var. *mennellii* is never dark-skinned — it is never even rusty — while var. *bromfieldii* sometimes has a pallor suggestive of var. *mennellii*. We tend to regard the one taxon, *mennellii*, as a subset of the other, but that is partly an artefact of publication dates,

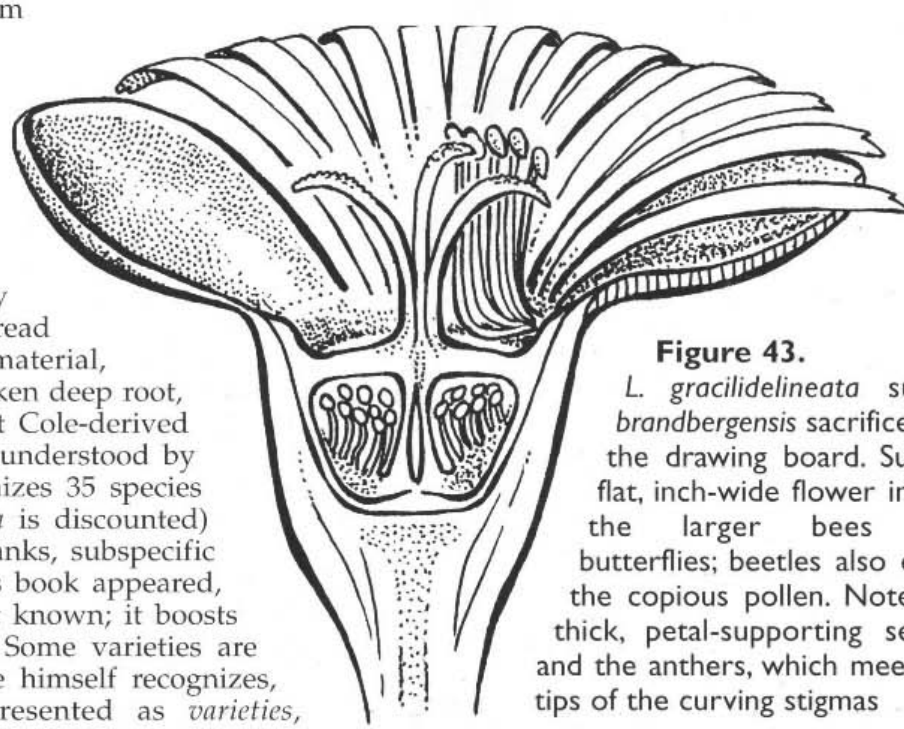


Figure 43.
L. gracilidelineata subsp. *brandbergensis* sacrificed on the drawing board. Such a flat, inch-wide flower invites the larger bees and butterflies; beetles also enjoy the copious pollen. Note the thick, petal-supporting sepals, and the anthers, which meet the tips of the curving stigmas

bromfieldii being the older epithet, and partly a question of distribution, *bromfieldii* being much the commoner of the two.

It is interesting to note that floral analysis has hitherto played little role in *Lithops* classification (fig.43). Apart from the issue of gross petal pigmentation, primarily useful as a clue which alerts us to other, strictly vegetative, features, there are many other points to observe in the flower, among them: sepal number and texture; the width and number of petals; the distribution of petal pigments (solidly yellow, basally white, or with a central white feather) and their quality as well (e.g., the tawny yellow of *L. vallis-mariae* is not like the bright yellow of *L. fulviceps*); the disposition of petals (straight out, springily incurving, or relaxed like an old haystack) and the crystalline streakiness of their surfaces; perfumery (many novel and nameless scents are discernable); rates of flower death and the colour changes associated with the early stages of this process (e.g., the petals of *L. gracilidelineata* can turn a clear red while still fresh); the number and texture of filaments, their basal furring, and the shape of the anthers — not to mention the whole microscopic world of pollen. Macroscopically, one can discern various shades of pollen — *L. hookeri* has the yellow of cooked sweet corn, *L. julii* has the colour of undyed butter — but this varies within species. *L. karasmontana*, for example, can show white or yellow pollen within a single population.

Fruits are also understudied, an interesting

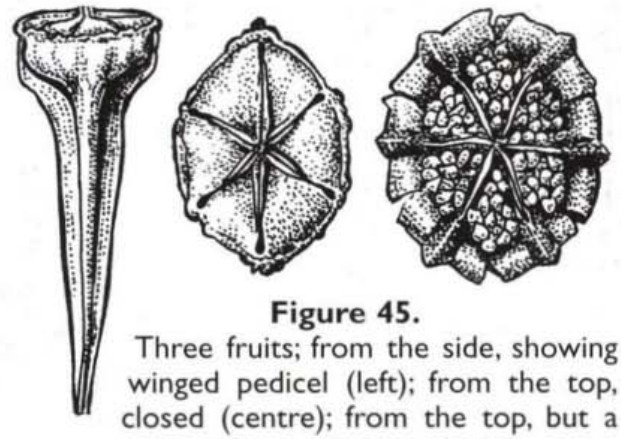


Figure 45.
Three fruits; from the side, showing winged pedicel (left); from the top, closed (centre); from the top, but a minute after moistening (right)

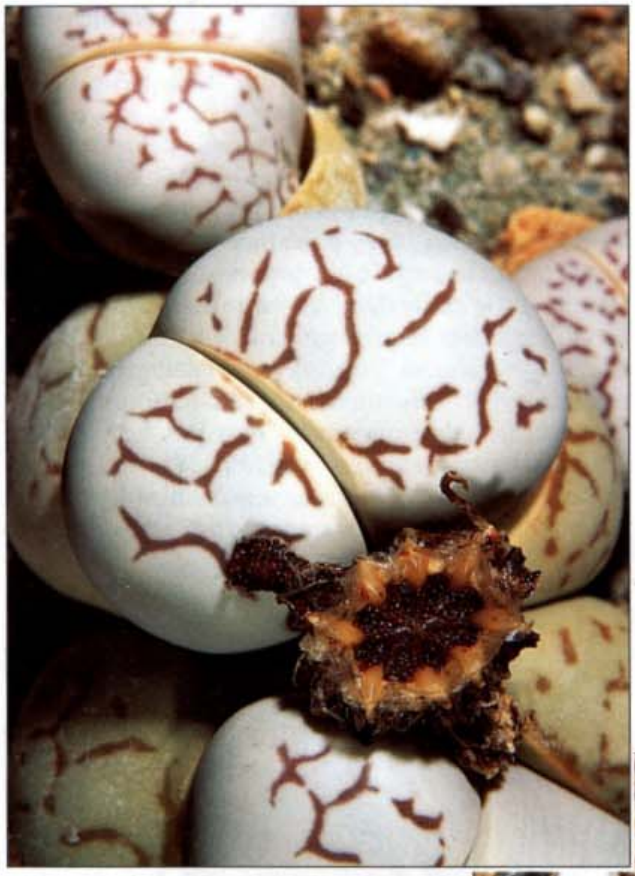


Figure 44a. *Dinteranthus vanzylii* — distinguished from *Lithops* by its minute seeds and bubble-celled cotyledons

Figure 44b. The soft waxen leaves of *Tanquana hilmarii*; its discoverer, Hilmar Lückhoff, initially likened it to a *Lithops*

Figure 46a. *Conophytum ratum* from Namies; this is the pre-dormancy colour of late spring; in winter the active plants are pale green

Figure 46b. *Conophytum pellucidum* trumpeting forth its flowers — the petals are basally fused, unlike the free petals of *Lithops*, and the modest anthers hide in a deep tube

lacuna which contrasts with the extraordinary emphasis given them in other generic contexts (fig.45). But this is partly because they seem to show no spectacular modifications; they lack the baffling buttresses and retentive membranes found in the elaborate fruits of, e.g., *Tanquana*. Their very simplicity is a challenge and I suspect that further study will yield many hitherto unanalyzed patterns. As it stands, we have a simple cup with four to six (rarely up to 12) partitions and no inner lids or retainers. The seeds, which are not firmly embedded, spill out during a light rain. The Coles have analyzed the shape of the fruits; *Lithops: Flowering Stones* records many interesting details not quoted here. One could also consider texture; some capsules fragment readily, others retain their integrity if not their contents.

I should mention too that some of the modern tools for classification include the analysis of tannin patterns, seed surfaces, and the extraction of enzymes. Enzymes and seminal details are beyond the scope of this book, but tannins can easily be observed on decaying leaves. Their arrangements, which were studied by de Boer, Dugdale, and latterly by Wallace (Wallace, 1988), are an integral part of the Cole classification. For more information, the reader is referred to Cole's book, which gives the tannin patterns for each taxon. Wallace's evidence generally supports Cole's decisions, strongly so, an exception being the case of *L. francisci* and *L. gesineae* (q.v., under *L. gesineae*), in which the tannin evidence would argue for Fearn's combination of the two. In the present text I mention certain tannin patterns which help to suggest relationships.

In the main text below, the species are arranged alphabetically, though I would rather have chosen an order based on decreasing levels of greenness and leaf-divergence, and increasing levels of marking and fusion. This would have been fascinating as an exercise, but probably confusing in a reference guide! Nonetheless I invite the reader to consider the following, partly geographical, partly fanciful, conjunctions or continuous linkages: *dorotheae* → *dinteri* → *bromfieldii* → *fulviceps* → *schwantesii* → *bromfieldii* (*glaudinae*) → *hookeri* (*marginata*) → *aucampiae* (*hornii*) → *lesliei* → *francisci* → *gesineae* → (*vallis-mariae* → *ruschiorum*) → *pseudotruncatella*

→ (*archerae/schwantesii*) → *gracilidelineata* → *werneri* → *coleorum* → *localis* → *divergens* → *comptonii* → *viridis* → *otzeniana* → *olivacea* → *helmutii* → *naureeniae* → *meyeri* → *geyeri* → *herrei* → *optica* → *marmorata* → *villetii* → *salicola* → *hallii* → *julii* → *karasmontana* → (*eberlanzii*) → *optica*! Note, for example: figs.126 and 128, 58 and 108, 103 and 157! One can read the list backwards. Note as well that I have not even the murkiest idea regarding the placement of *L. verruculosa* which is, in many ways, the most extreme species of all.

The Cole system avoids mid-range formal hierarchies, i.e., the paper groupings, in "sections" or "subsections", of apparently close species. In any case many of these are obvious; that *L. dinteri* and *L. dorotheae* are intimately related must strike every observer and particularly every seed-raiser; that *L. fulviceps* and *L. schwantesii* are rather close is also clear. To say that these two "species-pairs" are also linked is perhaps safe but far less obvious.

It would be immensely helpful to know the derivations: did an ancestral, red-speckled, pre-*L. dinteri* beget a striped *L. dorotheae*, or vice-versa, or did they both derive from *L. schwantesii*, which is often less complex in its ornamentations? Or from *L. bromfieldii*, which is a plausible interface? It does seem unlikely that the parallel ornamentations were arrived at independently. I hope that further work will address these questions of striped chickens and speckled eggs. And what are those red "ornamentations" for, anyway? Expressions of interior plumbing, or external decorations — or is mimicry actually involved? Why does the pulchritude seem so gratuitous? (Is pulchritude ever gratuitous?) And did lithops move north, or south, or did they radiate from some central point in Namaqualand? Was there one ancestral lithops or were there several? — in which case, from the monistic-cladistic point of view, *Lithops* may not be a monophyletic ("single-lineaged") genus. Such questions are still unanswered.

Descriptions and Proscriptions

Traditional descriptions of lithops have relied to a large extent on half-subjective metaphors: faces, seas, islands, peninsulas, hymens, windows, channels, chicken-feet, lips, pustules, pimples, shoulders, fissures, heads, and bodies, collectively sounding like something out of a guide for psychic lepers. But they all have their place, and the cubistic fracturing of metaphors (islands in the lip-split windows!) is part of the fun (fig.47). A few notes might help:

The truncated apex of a lithops (note that the word is both singular and plural) is often called its "face", the face is often "windowed", being more or less transparent; the "window" is regarded as the "sea" when it has "islands" (pigmented bits floating like cherries in blancmange); the sea's tempestuous waves often lap against "peninsulae". Going rootwards, the areas below the sea-bordered shores are called the "shoulders", and the whole structure is called the "body" or, for intellectual clarity, the "head". "Pimples" and grooves or "channels" are confined to its face, "pustules" lie like blisters within its "fissure" (the division between the nearly fused leaves); "chicken-foot-markings" scratch at its margins (or shores!), and "hymens", thin evanescent membranes, vainly guard the fissures and "lips" (the zones above and around the fissure). In *Lithops*, anthropomorphism has truly arrived, poultry and oceans notwithstanding!

The Coles employed a series of excellent terms for the head-shape of the various species (bicuneate or cordate profiles, etc.). Not wishing to borrow too much, I have simplified any phrenology in the descriptions given here, and in any case the shapes are less evident in cultivated plants, which tend to inflate in ways which obscure their angles — perhaps even the Michelin man once had a washboard stomach — altering, as well, any gaps between the leaves. One could argue that a very good reason to keep one's lithops taut is that when so grown, they are easier to test against descriptions based on wildlings.

Lithops have a terrifically wide palette. It is interesting to note that the pigments of wild lithops, and those of cultivated plants in good condition, are very similar; little is lost in the translation from wild to aisled. We have no common names for many of the colours seen in lithops; only in salons or paint shops might one encounter the requisite vocabulary and even

Figure 48. *L. localis* flowering in habitat, Springbokvlakte, Steytlerville

Photo: Gerhard Marx

A Note on the Photographs

Lithops do not always look perfect; changing throughout each year, they fade, shrivel, and scar. Usually they are photographed at their vegetative peak, soon after the new leaves have completely absorbed the old, and we have partly followed this convention though it is often a misleading one. In some ways this is a book of fantasies; the photographs reflect both the cyclic realities of life in a small pot and the glossy sort of airbrushed, hardly human perfection of Miss April.

Lithops can look "perfect" for much of the year, but they fade with the approach of winter. April is indeed present in many of the photographs, but we have shown some of her aging stages too, and here and there a salt stain or cosmetic cicatrix reminds us that these are living plants, not plastic sculptures. And more than that, the active shots — those showing plants cracking out of their shells like eager chicks — should give a hint of the dynamic horticultural qualities of lithops. Though the time-scale of their growth is usually similar to that of fingernails, they do change rapidly and dramatically at certain points in their cycle, altering colour like an inebriate's nose.

Background rocks and pebbles presented a constant problem. One of the glories of Cole's book is that the plants are portrayed against their native rock, harmonizing (or contrasting) with it in fascinating ways. Here we lack this option and tried instead for the unobtrusive neutrality of clay and sand. Chris Barnhill and I spent many hours on greenhouse patrol; he did the choosing and shooting after I did the minute grooming. Between his slides and my words we hope to have conveyed a realization of the beauty — and the fascinating cyclic nature — of lithops. Where possible we chose two or three plants of each species to show something of the range, and a few of the agglomerations (see fig.76) will at least give a hint of the multiplicity of these more-than-two-faced plants.

Terms and Endearments

clonotype: a living branch of the type specimen.

dividing: the way lithops multiply (see fig.49).

epithet: that part of the Latin name applied to the species or lower category.

fissure zone: this indicates both the exposed inner walls of the leaves, and the areas where they meet and part. In some cases the walls are puffy and oddly coloured; they are never patterned. They may also be called "pustules", a term otherwise used for the blistery, quickly expanding tissues at the bases of, e.g., cheiridopsis leaves.

L. = *Lithops*; in the present context it could only be confused with *Lapidaria*, which appears here only on pp.37–38, 110 & 126.

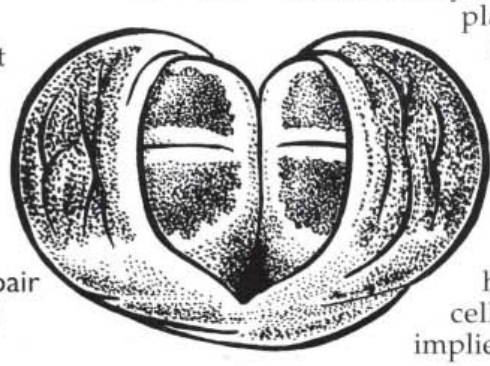


Figure 49.
Division; one leaf-pair begetting twins

leaf-pairs: Because the leaves are normally so closely contiguous, one tends to think of these as a single Siamese-twinned entity (as in a sense they are). But it is interesting to note that the leaves do have a certain independence; it is quite possible for one leaf of a pair to sicken and wither while the other remains sound. When I use the expression "leaf-pairs round from above" I mean that the *collective* effect of the pairs is of roundness.

lithops: used, sans a capital L and sans italics, as the non-fancy name for any or all of our beloved plants; it is used here as an informal singular and plural form, e.g.: I grow a single lithops [not a "lithop"!], or: all of my red lithops are turning blue.

locular: used in the expression 5-locular; it means that the fruit has 5 partitions (or chambers, cells, or divisions). 5–6-locular implies that while 6-locular capsules

are rather common, 5 is the more common count; 6–5-locular implies the opposite, etc. These numbers are adapted and simplified from Cole's text, with a few extensions of my own. Locule numbers must be treated with some circumspection because they vary according to the health and age of the plants. Some of the larger plants I obtained from Ed Storms in the late 1970's had enormous poly-locular capsules. However, the Cole counts were based on material raised under fairly uniform and "organic" conditions and ought, therefore, to be reliable statistically, especially as Naureen examined some 30,000 capsules!

lumpers: those who take a broad view of the *Lithops* species (see *L. geyeri* below). They argue that the minutest differences between "species" are illusory, statistically bogus, excessively localized, or misperceived. I have even heard the argument, advocated quite seriously, that there are really only two species in *Lithops*, white- or yellow-flowered. Certainly that is untrue if one sees a species as an assemblage of behavioural quirks. It is always far easier to identify a group of lithops plants than a lone individual!

miniature windows: these are the windows which are so obvious in, for example, a nicely speckled *L. localis;* the term is de Boer's and was shortened by Cole into the Orwellian "miniwindows". (I'd prefer the French-English *oeil de boeuf*, used for a window having the shape of an ox eye!) They may coalesce to form a generally translucent patch. Cole distinguished between these windows and "dusky dots", the dark, tannin-bearing idioblasts portrayed above (fig.47, on the pizza lithops). The dusky dots can be seen as tiny circular obscurities *within* the miniature windows. Since the anatomical distinctions between these features are not quite clear to me, I tend to speak, simplistically, of spots or dots, pending elucidations. Tanniniferous idioblasts give themselves away upon decomposition, condensing to the small blackish or reddish nuggets visible on old skins.

near: a cautious euphemism for 5–35 kilometres.

oval: used to describe the shape of the leaves as seen from above; there are many kinds of ovals, of course, and it should be understood that they often have reniform kinks and various other disproportions.

petals: properly, these are petaloid (petal-like) staminodes, i.e., showy modified stamens; I call them petals for short. After all, they do *function* as petals!

pimples and warts: as in *Lithops*, the epidermis of *Homo sapiens* has a number of strange protrusions (German feminist's joke: Q: What's the name for that useless bit of skin at the end of the penis? A: Man!) and we have a whole treasury of terms for them: wens, wattles, warts, pimples, pustules, boils, etc. In lithops-lore, most of these terms have also been employed via the usual humanoid identifications. But basically I use "wart" for any isolated structure which rises above the general epidermal level; these can be as large and dark as those seen in *L. fulviceps*, or as small as the tiny red beads of *L. verruculosa*. "Wrinkle" indicates a furrow in the epidermis, often the result of contraction, and of course that process also creates ridges, mountains being addicted to valleys. Lithops' skins manifest many kinds of temporary foreign lesions; some eruptions may result from overfeeding.

rubrications: I use this term, which was adapted by Cole from a medieval term, for the tiny reddish lines or dashes imbedded in lithops windows like flies in amber; see *L. salicola*. Their anatomical import is probably various. The thickly "painted" red lines seen in, e.g., *L. dinteri* and *L. dorotheae* could be called rubrications too, and Cole uses the term in this sense, though they probably have another origin and, perhaps, function. They seem to float on the surface and contribute to the spectacular beauty, if spectacles can be so minute, of several species.

s: used in informal plural locutions, as in: I cultivate many bellas. This is certainly less cumbersome than: I cultivate many specimens of *Lithops karasmontana* subsp. *bella*.

***s.l.*:** *sensu lato*, in the broad sense.

splitters: close-up viewers of a genus; note that lithops themselves are splitters. If the recent positions advocated by Goldblatt and Manning for *Gladiolus* (1998) are adopted, well-informed, habitat-oriented splitting may come back in fashion; certainly it provides a kind of localized precision for collectors. "Differences in habitat preference, soil type, pollinator, or flowering time provide definite grounds for recognizing taxa. We have recognized variant forms as *species* [emphasis mine] when they differ in at least two qualitative features and also show geographic, ecological, or phenological differences from the archetype."

spp.: the abbrievated plural of species, another word which sounds plural but is actually

singular *and* plural.

synonym: a name which, having gone by the wayside, has ended up in the firm or watery synonymy of another taxon. See Appendix 4.2 (pp.120–123) for a full list of synonyms.

TL: type locality, the habitat from which the type plant (i.e., the dried and pressed specimen forever lodged in a designated herbarium) was collected.

window: this term, which originally signified the translucent portion of a lithops' apex, has come, via extension-corruption, to signify the apex itself, windowed or not! The conflict between poetry, precision, and consistency is one I would not even hope to solve.

" ": Validly published redundancies which currently float, like messages in a bottle, in the great sea of synonymy are given in italics within double quotes e.g., *L. karasmontana "opalina"*. Unpublished names are given in normal type, also within double quotes, e.g. *L. hallii* "Brown form" and, following Cole's practice, I capitalize the first word therein.

' ': Following current ICNCP convention single quotes are used only for cultivars (cv.).

Author, (Author)

A glance at the epithets shows that many names were coined as honourifics, often commemorating the first person to bring the species to the describing author's attention, not necessarily the first person to have found it! I have given very brief accounts of these diverse people; they range from friends and colleagues (*L. julii*) to diplomat-discoverers (*L. geyeri*) to quite casual but happily observed observers (*L. dorotheae*); men outnumber women by two to one, but collectors balance scientists.

Formally, the full name includes the Latin (or Latinized) generic name plus the species epithet and that of the describing author, thus, *Lithops dorotheae* Nel. This distinguishes that name against all others, for example, "*Lithops dorotheae* M. Grande", were he foolish enough to publish so direct and naked a synonym. It will be noticed that Louisa Bolus was responsible for many a christening, as were Kurt Dinter and N.E. Brown (who always appears in the truncated form N.E.Br., a tribute to his prolificacy). In some cases, two or more authors jostle parenthetically, as in *L. julii* (Dinter & Schwantes) N.E.Br. This formula tells us that Dinter and Schwantes first described the species in another genus — in this case, *Mesembryanthemum* (though one cannot determine, merely from the formula, what the former genus was) — and that it was N.E. Brown who later transferred the species to the genus he'd erected for such plants. Had Dinter and Schwantes subsequently transferred the species to, say, *Conophytum*, we would have had "*C. julii* (Dinter & Schwantes) Dinter & Schwantes". Fortunately they didn't, and so we don't. Actually we do have *C. julii* Schwantes, but that is another story.

N.B.: Before every descriptive statement, "usually" could usually be inserted. *Lithops* has a genius for exceptions; to qualify every statement would be both tedious and silly. This is not a statistical study, but where "never" is used, it means that in the 500–10,000 plants I've raised of each taxon, the trait was not observed. Certain points do seem to be absolute: no known *Lithops* has a hairy epidermis, teeth, tuberous roots, broad bottoms, or long internodes (except when raised in caves). And certain points are taken for granted, e.g., leaf-pairs are unequal, flowers are scented and single, though one can find the rare bouquet of two or three flowers emerging from a single leaf-pair.

The use of the "tiered" subspecies-and-variety system automatically necessitates dreadfully verbose formulae, e.g., *L. aucampiae* subsp. *aucampiae* var. *aucampiae*, etc. To avoid further logorrheic trinities, I sometimes use "taxa" to refer to an assemblage which includes one taxon at specific rank and another at subspecific or varietal rank. To avoid another sort of redundancy, I give the flower colour only for the first element in a species complex. Thus, *L. aucampiae* subsp. *aucampiae* var. *aucampiae* has yellow flowers, and all of its satellites (subsp. *euniceae*, etc.) share the archetype's colour. The rare exceptions are noted amongst the cultivars. In the same way, I mention fruit-locularity only at the beginning of each species complex; if it differs much within the complex, I mention it again.

The Species

The number of species recognised here will seem generous to some readers, parsimonious to others. A dedicated lumper might well abolish the majority of lower-rank taxa, but if one takes these to represent tendencies, not absolutes, they provide an effective, even if partly symbolic, framework. I have tried to indicate the more cogent comparisons, and the most likely confusions, between taxa, but to fully explore such concatenations would take a gargantuan chapter.

N.B.: The date given in parentheses is that of the original publication of the taxon, not the date of transfer (if any) to its present rank. Most of the rearrangements were published in Cole 1973 or Cole 1988.

L. aucampiae L. Bolus subsp. *aucampiae* var. *aucampiae* (1932)

Named for Juanita Aucamp, who collected plants on her father's farm near Postmasburg. **Figs.50–51, p.51**

Plant large, often forming a clump of 6 or more bodies. Leaf-pairs roundish as seen from above, slightly convex to flat in side view, face smooth (never grooved or deeply pitted), brown to greyish-brown or brick red with a slight waxen sheen, window obvious, large, often as dark as bitter chocolate (the "Kuruman form", fig.51), sometimes splotchy or streaked, rarely absent. Marginal markings numerous, finger-like or fringed, extending slightly down the sides. Flowers the largest in the genus, golden with a reddish underlay, appearing in early autumn; fruit 6–5-locular, very large.

L. aucampiae subsp. *aucampiae* var. *koelemanii* (de Boer) Cole (1960)

Named for At Koeleman (pronounced "curl a man"), prominent Pretorian succulent collector and breeder of better aloes. **Fig.52, p.51**

This differs principally by its smaller clumps — two bodies being its usual limit — and by the opacity of its ever-reddish leaves, which have the dulled and pitted texture of old brick. A few specimens exhibit a window but in most this is not present, thus the whole upper surface is uniform, matt, and opaque.

L. aucampiae subsp. *euniceae* (de Boer) Cole var. *euniceae* (1966)

Named for Eunice Burmeister, a friend of Herkie Horn, who collected this, and many other lithops, in the 1960's (see *L. lesliei* subsp. *lesliei* var. *hornii*). **Fig.53, p.51**

This subspecies differs by the fineness of its markings — which line up around the margins, forming a reddish-orange translucent fringe, sometimes even spilling down the sides, like glaze on a cake, and by its severely truncate shape. It is smaller than subsp. *aucampiae* and its general colour is a faded reddish-brown, never grey. The central window often has a certain cross-hatched or etched quality.

L. aucampiae subsp. *euniceae* var. *fluminalis* Cole (1970)

Named for its riverine habitat. **Fig.54, p.51**

This was first distributed by the Coles as *L. aucampiae* var. [sic] *euniceae* "Grey form." It is distinguished by its overall greyish-tan colour and by the greater fineness of its more numerous and darker markings, which give it the optical fascination of moiré. Toward winter the plants tend to acquire a faint greenish coloration.

Distribution

The complex has a large distribution in the areas between Olifantshoek in the west, Severn in the north, Vryburg in the east, and Hopetown in the south-east. Var. *aucampiae* occupies most of this territory, aided by its omnivorous appetites for varied rock-types: it grows on chert, ironstone, reddish quartzite, and dark sandstone. Var. *koelemanii* occurs within the range of var. *aucampiae*, on reddish quartzite, while the Hopetown area harbours the two outliers, var. *euniceae* and var. *fluminalis*, the former on brown sandstone with amygdaloidal (lucky dip-style) lava, the latter on lava with quartzite. The Hopetown habitats abut those of *L. hookeri*, which is otherwise quite separate from the *L. aucampiae* complex, aside from a small amount of overlap to the south-west of Griquatown.

Notes

One of the strongest lithops, and certainly the most robust, *L. aucampiae s.l.* tolerates ample water. The different localities offer many subtleties; Cole 46 has a lovely muted red colour, while Cole 61 is often an odd greyed-brown. The "Kuruman form" (Cole 11, 12 & 173) is particularly attractive when it has a dark chocolate window, though not all specimens show this. Of the two Cole populations of var. *koelemanii*, Cole 16, the TL, is the more convincingly distinct. In some populations of var. *aucampiae* near Griquatown, plants very similar to var. *koelemanii* can be found.

L. aucampiae is confusable with *L. lesliei*, which has a higher proportion of evenly splattered markings, much larger seeds, and — not that one can see this in a pot — a more easterly distribution. *L. lesliei* var. *hornii* seems particularly close to the *L. aucampiae*-complex and at one point de Boer even considered it as a variety of *L. aucampiae*. Var. *fluminalis* has a close resemblance to its neighbour, *L. lesliei* subsp. *burchellii*, which tends to have charcoal-grey or bluish tints, and coarser, irregularly spaced or splattered lines, and to some forms of *L. hookeri* var. *marginata*, which are usually more richly textured and reddish.

Cultivars

L. aucampiae subsp. *aucampiae* has three of these: 'Storms's Snowcap', which looks like the "Kuruman form" but has a white flower; 'Betty's Beryl', having a garish green body and a white flower, and 'Jackson's Jade' (fig.55), which is equivalent to a yellow-flowered 'Beryl'. Both greenies originated from old Triebner material, while the 'Snowcap' was stabilized from a large seedling batch sown shortly before Storms' death. Storms originally had a single white-flowering freak; he pollinated it with a yellow-flowering conformist. Upon maturity, 10% of the offspring bore white flowers, and *ca.* 2% showed attractive pale lemon flowers which were abnormally large. I made a white × white backcross, and the next generation was pure white. Some of the plants have a strange tendency to lose their leaf pigments in midsummer; by autumn they are as green as any non-fickle 'Jade'. Jossie Brandt has discovered a fine saturated red var. *aucampiae* and we are working together on its promulgation. As performance artists say, var. *fluminalis* 'Green River' is a work-in-progress; the green gauge has yet to be satisfied. The original mutant, a wildling, has a soft grey-green colour, weak hints of this shade can be noted in many clones of var. *fluminalis*. I have also been working with a glowing specimen of var. *euniceae*, another of Storms' legacies; it radiates like a ripe orange jack-o'-lantern pumpkin.

L. bromfieldii L. Bolus var. *bromfieldii* (1934)

Named for H. Bromfield, about whom I know nothing beyond the fact that he collected plants of this species in 1933.

Fig.56, p.54

Plant medium-sized, often forming a clump of 10 or more bodies. Apex (narrowly) oval from above, slightly convex to flat or concave in side view, usually with broad grooves or humps, reddish-brown to ivory orange with pale greenish tones, with a strong waxen or plastic sheen, especially when turgid. Window rather obvious but subdivided into numerous panes with reddish or brownish lines and spots and bordered by strong margins. Flowers relatively small, appearing in autumn, yellow; fruits 5-locular.

L. bromfieldii var. *glaudinae* (de Boer) Cole (1960)

Named for Glaudina Venter, whose father's farm was the first-known locality for this taxon. **Figs.57–58, p.54**

This variant has a broad, flattened, blackish-red apex, and its numerous dots have the graphitic lustre of pencil lead. Some of the more recently discovered populations (especially the often pale and roughened Cole 382, fig.58) do not fit this model well; they represent an extension of range and concept. An old Karoo Garden collection from the "Kougas" area showed the same sort of aspect. Some populations are embarrassingly close to var. *bromfieldii*, having a peculiar brightness.

L. bromfieldii var. *insularis* (L. Bolus) Fearn (1937)

Named for its occurrence on and near islands in the Orange River. **Fig.59, p.54**

This differs from var. *bromfieldii* by its (slightly) smaller bodies, which are darker and smoother, lacking humps unless very dry. The basic colour tends toward a deep muddy green, dark brown, or black, having little of the orangy brightness of var. *bromfieldii*. The lines are dark as well, as are the shining spots. Plants tend to cluster readily.

L. bromfieldii var. *mennellii* (L. Bolus) Fearn (1937)

Named after its first known admirer, Brian T. Mennell. **Fig.60, p.54**

This variant is always pale-skinned and opaque, which renders its impressed (indented) chocolate brown lines very striking. Often it is runted and tiny, particularly in habitat, where it grows pitiably exposed, but cultivated specimens can achieve quite robust dimensions.

Distribution

This species complex is centred around Upington, extending east to a point south-west of Postmasburg (var. *glaudinae*), and to the west near Keimoes (var. *mennellii* and, slightly further west, var. *insularis*). The latter often grows in well-protected crevices of low ridges; var. *bromfieldii* grows on substantial hills, plastered to the rusty quartzite rocks, much in the manner of many conophytums.

Notes

L. bromfieldii s.l. is a very attractive and resistant species. Var. *insularis* can take a lot of water and will then cluster very quickly; this is especially true of the "Minor form" from Cole 42. I might mention a look-alike; var. *mennellii* strongly resembles *L. karasmontana* (especially Cole 225 and Cole 226), but that has cuneiform script, a pinkish-translucent cast, and white flowers. Var. *glaudinae* and *L. hookeri* var. *marginata* approach each other in some ways, though the latter has fine lines and lacks sheen. Some plants of Cole 382 seem particularly ambiguous, as if they had tarried with both *L. aucampiae* and *L. hookeri*; indeed, in his 1988 booklet, *Lithops Locality Data*, Cole still gives this population's identity a question-mark. Some unfortunate artificial hybrids have confused the distinctions between var. *bromfieldii* and var. *insularis*.

Cultivars

A white-flowered, brown-bodied *L. bromfieldii* is currently being stabilized. The well-known green-bodied var. *insularis* 'Sulphurea' (fig.4, p.8; fig.61, p.54) has yellow flowers and a manic disposition, clustering uncontrollably. When crossed with var. *mennellii* it loses all its greenness and resembles a slightly muddy var. *mennellii*. I have a single abnormally red var. *glaudinae* from Cole 393 which is very promising. Var. *bromfieldii* could be bred for clearer red colours; var. *mennellii*, for better definition of its calligraphic "Hebrew script" (a metaphor dating back to Mennell himself).

Figure 50. *L. aucampiae* var. *aucampiae*, Cole 257

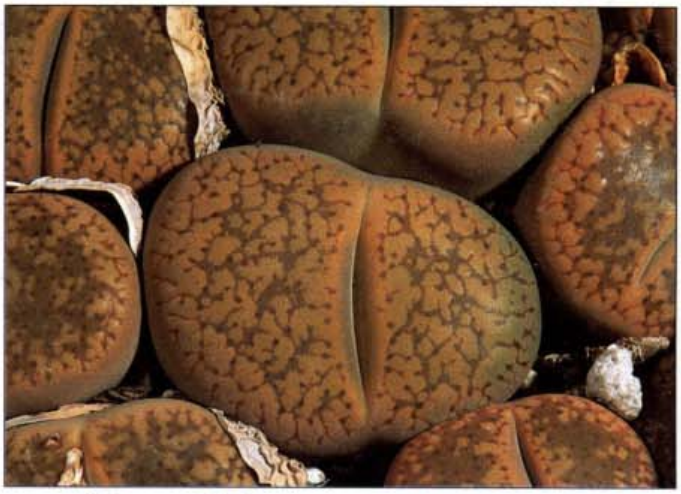


Figure 51. *L. aucampiae* var. *aucampiae* "Kuruman form", Cole 12

Figure 52. *L. aucampiae* var. *koelemanii*, Cole 16 (TL)

Figure 53. *L. aucampiae* subsp. *euniceae*, Cole 48

Figure 54. *L. aucampiae* subsp. *euniceae* var. *fluminalis*, Cole 54

Figure 55. *L. aucampiae* 'Jackson's Jade'

L. coleorum S.A. Hammer & R. Uijs (1994)

Named collectively for Desmond and Naureen Cole, whose tremendous efforts on behalf of this genus have inspired so many.

Figs.62–63, p.55

Plant small, usually 2–3(–6) headed. Leaf-pairs oval as seen from above, strongly convex in side view, smooth, never lumpy, slightly shining, pale tan to pinkish-grey or orange-buff, window sometimes obvious, more often subtly compounded of numerous miniature windows which are sometimes arranged in lines or loops. Margins vague. Flowers small, sparsely petalled, dull yellow with a narrow, inconspicuous, longitudinal stripe of white, appearing in early autumn; fruits 5–6-locular. Wild plants usually tuck their fruits inside the fissure, cultivated ones place them externally, i.e., their pedicels are much longer.

Distribution

This is known from a single small conglomerate formation near Ellisras in the Northern Province (a part of the former Transvaal). As far as is presently known, it is mono-colonial, but the area has not been well-explored. We did check similar formations in the vicinity and found only an avonia, *A. rhodesica*, which also grows with *L. coleorum*. The area receives a generous rainfall, up to 900mm per year.

Notes

Though this surprising and lovely little species occurs near the north-eastern edge of *L. lesliei*'s territory, it has no apparent connection with that species. It seems rather to relate either to the *L. pseudotruncatella* group, geographically so distant, but close in fruit structure, or to *L. localis*, also distant in kilometres, but morphologically closer. Fortunately it is a very easy species to grow; in a pot it multiplies quite readily. It tends to balloon radically if given a soft soil, so I would recommend firm soil, and not much of it, for growers who wish to see an authentic *L. coleorum*. I might mention here that the Coles' own practice was to raise their lithops in field-collected soil, which is nothing if not firm!

L. comptonii L. Bolus var. *comptonii* (1930)

Named for Prof. Harold Compton, who has a number of interesting mesembs to his credit, including *Conophytum comptonii*, which receives much of the rainfall denied to *L. comptonii*.

Fig.64, p.55

Plant small, usually 1–2 headed or dead. Leaf-pairs oval as seen from above, convex in side view, smooth, plum-coloured to greyish-brown, window obvious, often with subtle whitish cobwebs, rarely showing tiny miniwindows. Flowers rather small, golden with a white centre, appearing in mid-autumn; fruit 5–6-locular.

L. comptonii var. *weberi* (Nel) Cole (1940)

Named after a Mr. Weber of Calvinia, who presumably had a first name — unrecorded by Nel — and who definitely provided Nel with information and/or plant material.

Fig.65, p.55

This differs from var. *comptonii* principally by its often flatter and usually more boldly marked bodies, which are powdery bluish-grey or lilac in colour, often with a pinkish, slightly puffy, fissure zone. The margins are sometimes raised like a crimped pie crust and the markings tend to be prominent.

Distribution

Both varieties are restricted to the Ceres (Tanqua) Karoo, a hot dry stretch to the north and north-east of Ceres. Var. *weberi* occurs to the south-east of Vanrhynsdorp, on shallowly pitted calcrete reefs, along with the peculiar shrublet, *Hammeria salteri*. Var. *comptonii* occurs further

south, in deeper soils amongst dark and pale rocks (ironstone, quartz, calcrete, and chert). It extends past Karoopoort to a formation where it is actually quite abundant. It keeps interesting company: the unique *Didymaotus lapidiformis*. I know one population on the south-west edge of its distribution where it grows amongst a higher than normal percentage of calcretes; the plants are quite greyish.

Notes

Both varieties are rather difficult to grow well, tending to early and permanent retirement. If fed heavily they can puff up, losing first their colour and then their meristems. Seedlings of var. *comptonii* are particularly vulnerable at the 4-month-old, transfer-of-resources stage. On the other leaf, they will tolerate great heat when older. Var. *weberi* is perhaps confusable with *L. ozteniana*, which can be seen as a transformed, fat, long-bodied var. *weberi* occurring on deeper soils. Var. *comptonii* is similar to *L. viridis*, but that species is greener, plainer, and has much longer bodies, which fit into deep sockets in habitat. It is curious that all these "primitive" taxa are so elusive to cultivate, or at least to cultivate beautifully.

L. dinteri Schwantes subsp. *dinteri* var. *dinteri* (1927)

Fig.68, p.58

Named for Moritz Kurt Dinter, who made great contributions to our knowledge of southern Namibia's flora, and who took a particular interest in the "Sphaeroidea" (lithops and conophytums).

Plant small, forming a modest clump. Leaf-pairs oval to elliptico-rectangular as seen from above, flat to slightly convex in side view, face smooth, pale pinkish-brown to greyish-green, windowed, with a few to numerous red spots and streaks and an abundance of minute pale dots, these often nebulously agglomerated. Flowers yellow, small, appearing mid-season; fruits 5–6-locular.

L. dinteri subsp. *dinteri* var. *brevis* (L. Bolus) Fearn (1932)

Figs.9–10, p.12; Fig.69, p.58

Named for the "brevity" of its unfused leaf-tips — brief, that is, as compared to *L. olivacea*, with which Bolus had allied it. (She often used epithets based on an implicit comparison of one taxon with others published along with it.)

This is slightly softer-looking, less truncate, and usually duller or more mustardy in background colour, than var. *dinteri*. The red spots are sparser or faded-looking, and sometimes entirely absent. The plants have a greater tendency to form clumps, and in age or shade they tend to get a bit long in the tooth.

L. dinteri subsp. *frederici* (Cole) Cole (1973)

Figs.70–71, p.58

Named for Frederik Herselman, who probably discovered this neat pygmy.

Much smaller than subsp. *dinteri*, more convex, more narrow oval and more delicately marked. In some cases the heads have a pale ivory colour with very little red. The flowers are likewise smaller and quite sparsely petalled, the fruits are also small but they have the normal locularity.

L. dinteri subsp. *multipunctata* (de Boer) Cole (1966)

Fig.72, p.58

Named for the multiplicity of its fulgid spots.

Slightly to much larger and broader than var. *dinteri*, this is also more richly coloured and is often magnificently decorated with bold red stripes which seem to float on the surface. It is sometimes flatter than the other variants, which also gives it a tenuous distinction from *L. dorotheae*.

Figure 56. *L. bromfieldii* var. *bromfieldii*, Cole 41

Figure 57. *L. bromfieldii* var. *glaudinae*, Cole 116

Figure 58. *L. bromfieldii* var. *glaudinae*, Cole 382

Figure 59. *L. bromfieldii* var. *insularis*, Cole 42

Figure 60. *L. bromfieldii* var. *mennellii*, ex A. Roux

Figure 61. *L. bromfieldii* 'Sulphurea'

Figure 62. *L. coleorum*, SH1500

Figure 63. *L. coleorum*, SH1500

Figure 64. *L. comptonii* var. *comptonii*, Cole 125

Figure 65. *L. comptonii* var. *weberi*, Cole 126

Figure 66. *L. divergens* var. *divergens*, Bitterfontein

Figure 67. *L. divergens* var. *amethystina*, north-west Loeriesfontein

Distribution

Var. *dinteri* is confined to a small area in southern Namibia, to the west and south of Warmbad, where it occurs on pegmatite and quartzite. The other varieties have crossed the Orange River. Subsp. *frederici* is known only from the vicinity of Pella, where it lives in fine gravel (small bodies = small gravel?); subsp. *multipunctata* occurs slightly to the north and gives the complex its eastern extremity. Var. *brevis* extends quite far into the kloofs (canyons) to the south-east of Vioolsdrif; it also occurs on small quartzite-feldsphathic ridges closer to that navel of Hades and reaches points even further west, making it the westernmost element in the complex.

Notes

Of the four taxa treated here, one, subsp. *frederici*, is so small and has such convex faces that it is unmistakable; the others are similar to each other in shape and represent extremes of ornamentation, var. *brevis* being the plainest, subsp. *multipunctata* the most ornate (especially Cole 181), with var. *dinteri* in the middle. Subsp. *multipunctata* is readily confusable with *L. dorotheae*. In the young stage (6–12 months) these taxa are hardly distinguishable. *L. dorotheae* could be easily proposed as a further subspecies of *L. dinteri*, which occurs *ca.* 50 kilometres to its north-west; it shares the tannin patterns of the whole complex. All the *L. dinteri* variants are rather susceptible to rot and are best grown in clay pots. Clay will have the additional benefit of restraining subsp. *frederici*, which should be the daintiest of all lithops. Conversely, subsp. *multipunctata* can be one of the larger lithops and is an excellent show plant, particularly if one elects a Byzantine specimen for grooming.

Cultivars

L. dinteri 'Dintergreen' (fig.73, p.58) has a fine muted greenish colour, which is not so strong as to obscure its faint red dottings completely (in other words, betalain production is not completely suppressed). It dislikes intense sun and grows better in some shade, otherwise its roots tend to singe and its colours to bleach. Its flowers have the normal yellow pigments.

L. divergens L. Bolus var. *divergens* (1934)

Named for its divergent lobes.

Fig.8, p.9; Fig.14, p.14; Fig.66, p.55

Plant small, forming a modest clump. Leaf-pairs very small, oval as seen from above, truncate or laxly v-shaped in side view, short, face rough from fine permanent wrinkles, often "pebbled" in texture, pale whitish-green or pale greyish-brown to bronze, never purplish, always vaguely windowed, often frosted with numerous cobwebby whitish lines. Flowers yellow, small, stubby, white-centred, appearing in early autumn; fruits 5-locular.

L. divergens var. *amethystina* de Boer (1961)

Named for its amethyst-coloured bodies.

Fig.67, p.55; Fig.225, p.112

Plant small or large, often forming a 5–10 headed clump. Leaf-pairs round as seen from above, convex and steeply V-shaped in side view, elongate, face smooth (though it often shows transverse seam-like wrinkles), pale purplish-green to amethyst or deep bluish-green, strongly windowed, with numerous whitish flecks or, in one population (Cole 356) lacking these entirely. Flowers yellow, large, white-centred, appearing in early to mid autumn; fruits 5–6-locular.

Distribution

Var. *divergens* occurs in the Knersvlakte quartzites which have an underlay of decomposed yellowish shale. Var. *amethystina* occurs further to the north-east, between Kliprand and Loeriesfontein, on shale and calcrete in hot, punishingly exposed places, along with *Vanheerdea divergens*. One population south of Kliprand occurs on a quartzite ridge, and these lovely plants really manifest the proper gem-like shade, as I realized after I saw an exhibit of South African amethysts in Los Angeles!

Notes

Nel had assumed that the Knersvlakte populations *and* those from Nuwefontein (= present-day Kliprand) represented a single taxon; his photographs (figures 30 and 31) seem to represent both forms. De Boer recognized that there are two aspects to this species. Var. *divergens*, being pale, fragile, and tiny, cannot be confused with any other lithops, while var. *amethystina* is a larger, more deeply fissured and colourful plant. One eastern population of var. *amethystina*, the anomalously immaculate Cole 356, could almost be confused with *L. comptonii* var. *comptonii*, but it has longer bodies, a deeper purple-blue epidermal colour, and sharper angles. It was discovered by Peter Bruyns. Var. *divergens* can be a bit tricky to grow; in strong light it often burns up. The more robust var. *amethystina* is easier to manage but it tends to wrinkle, and even when the plants are turgid they still bear stretch-marks.

Cultivars

I have been selecting for more convincingly amethyst-coloured examples of var. *amethystina* and for ever-tinier var. *divergens*; soon the latter will be invisible and they tend, alas, not to flower.

L. dorotheae Nel (1939)

Named for Dr. Dorothea Huyssteen, whose father had obtained plants from Aletta Eksteen, the actual collector.

Figs.74–75, p.59

Plant forming a modest or ample clump. Leaf-pairs oval as seen from above, convex in side view, face smooth, often glossy, pale yellowish- or whitish-brown, well-windowed, with numerous "enamelled" blood-red stripes or streaks and, often, an abundance of pale incursions from the margins. Flowers yellow, appearing mid-autumn; fruits 5-locular.

Distribution

Apparently restricted to the vicinity of Pofadder, where it is associated with quartz and feldspar. The old records for "Pella" might have involved *L. dinteri* subsp. *frederici*, sheer malice, or confusion.

Notes

This is perhaps the most overtly and astonishingly beautiful of the lithops. Fortunately it is quite easy to grow; the only real difficulty lies in deciding how many seedlings to raise to a provocative maturity. By all accounts, it is a rare species — I have never seen it in nature — but it has been very heavily collected commercially, and it is now impossible to assess its pre-Mammonian (pre-tithing?) status. Of the two Cole populations, Cole 124 (the TL) and Cole 300, Cole 124 is the more richly coloured, at least as represented via the several capsules Naureen sent to me in the late 1970's. *L. dorotheae* is quite confusable with *L. dinteri* subsp. *multipunctata* (q.v.), but that is less convex and less shiny.

Cultivars

My efforts to stabilize one of Ed Storms' unnamed selections resulted in the protocultivar 'Zorro' (fig.76, p.59), named for the zig-zagged, lightning-bolt patterns which adorn its apex. I've also attempted to breed a windowless cultivar and its converse, plants with completely open windows; neither attempt was really successful or sensible.

L. francisci (Dinter & Schwantes) N.E.Br. (1925)

Named for Frantz de Laet, the Belgian nurseryman. When Latinized, Frantz takes the form used here, though *frantzii* would have been permissible. The single-i ending is used because Franciscus is already Latin, hence *francisci*: "of or belonging to Franciscus".

Fig.16, p.14;
Figs.78–79, p.59

Plant forming a modest or ample clump. Leaf-pairs soft, oval as seen from above, convex in side view, face smooth or lumpy, pale whitish-green or ivory, not centrally windowed but always

Figure 68. *L. dinteri* subsp. *dinteri* var. *dinteri*, Cole 206

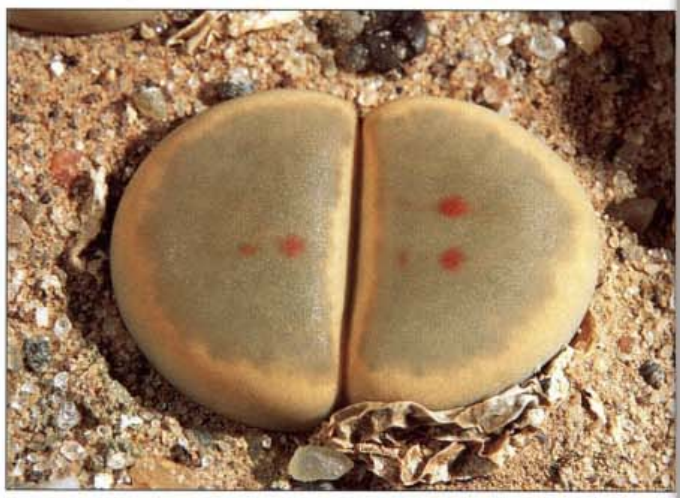


Figure 69. *L. dinteri* subsp. *dinteri* var. *brevis*, Cole 84

Figure 70. *L. dinteri* subsp. *frederici*, Cole 180

Figure 71. *L. dinteri* subsp. *frederici*, Cole 180

Figure 72. *L. dinteri* subsp. *multipunctata*, Cole 326

Figure 73. *L. dinteri* 'Dintergreen', Cole 206A

Figure 74. *L. dorotheae*, ex hort.

Figure 75. *L. dorotheae*, Cole 124

Figure 76. *L. dorotheae* protocultivar 'Zorro'

Figure 77. *L. geyeri*, SB1098

Figure 78. *L. francisci*, Cole 140

Figure 79. *L. francisci*, Haalenberg

"perforated" by numerous small transparent dots which are sometimes regimented into rows, markings otherwise absent. Flowers yellow, smallish, appearing — if at all — in mid to late autumn; fruits 5-locular.

Distribution

Restricted to a few very gneiss hills in and around the Namibian Sperrgebiet: Ha[a]lenberg and Kovisberg, with extensions to the south near Tschaukaib, and considerably further north, near Koichab, where it occurs on white quartzite.

Notes

This distinctive species often looks like a fluffy tapioca pudding, especially as it tends to "blow up"; in some seasons a gummy porridge might be more like it. The leaves have an awkward tendency to stack or get stuck; some plants only change their leaves every two years, and the obsolete leaves look quite bedraggled by their second winter! As with all lithops, flowering will guarantee leaf change, but *L. francisci* can be difficult to flower unless watered well. Nonetheless it is somewhat rot-prone, so a clay pot and a good bright position are helpful — though some of my most successful plants have been grown in the half-shade of tall pots and watered very irregularly. Their low-stress position gives them a certain safety.

L. fulviceps (N.E.Br.) N.E.Br. var. *fulviceps* (1914)

From the Latin for tawny head.

Figs.80–83, p.62

Plant one- to two-headed, or forming an ample clump. Leaf-pairs round or oval to kidney-shaped seen from above, truncate to slightly convex in side view, face often finely wrinkled, pale pinkish-brown to orange or dingy greyish-lilac (*"lydiae"*, figs.82–83), not windowed, with numerous fine reddish or bright orange streaks between the prominent greenish or bluish warts, those sometimes very large, to 1.5mm diameter, in one population flush with the surface, margins not strict. Flowers yellow, large, with drooping, shoulder-hugging, petals, appearing mid-autumn; fruits 5–6-locular.

L. fulviceps var. *lactinea* Cole (1973)

Named for its milky colour. N.B.: This is frequently misspelled as *"lactinae"*.

Fig.84, p.62; Fig.15, p.14

Var. *lactinea* is very much like the above but it often has broader and (perhaps) firmer pale pinkish-white to skimmed-milk-blue bodies. Its red markings tend to be paler and less conspicuous than those of var. *fulviceps*.

Distribution

L. fulviceps var. *fulviceps* is bi-national, mostly Namibian (environs of the Karasberge) but extending to points near Lutzputs and Pofadder in the Northern Cape, South Africa. The Lutzputs and Pofadder populations are curiously disjunct, and the latter, which occurs on yellowish gneiss, is quite distinct-looking (see Notes). Var. *lactinea* is restricted to a small population lying well to the north of the other populations, where it hides on a pale calcrete formation. By all reports it is very scarce (but so are the reports).

Notes

This species comes in many colour forms; apart from those mentioned above, there is the mustard-coloured, smooth and surprisingly convex "Pofadder form", and the beautifully bright red Cole 170 (40 kilometres north of Karasburg). In age, *L. fulviceps s.l.* tends to form a laxly domed clump, an unnatural growth-form and one which needs some pampering. It is not advisable to remove all the old leaves from such plants, their massed wads tend to protect the new leaves and the old, increasingly more exposed, stems. Other plants remain delightfully compact even at thirty years old.

Cultivars

The chartreuse, irritatingly uniform, *L. fulviceps* 'Aurea' (fig.85, p.62) has reached the wholesale stage. Its white flowers make a pleasant contrast to the insipid green of its body. (I am perhaps prejudiced, as I once had to transplant 5,000 aureas in a great sleepless hurry.) Tim Jackson, the American breeder, has crossed 'Aurea' with normal plants of *L. fulviceps* and obtained all sorts of fascinatingly muddy shades and oddly skinny shapes. In 1990 I crossed 'Aurea' with *L. bromfieldii* 'Sulphurea' and discovered that there is no colour bar between these two: the offspring are bright green and slightly convex.

L. gesineae de Boer var. *gesineae* (1955)

Dr. de Boer named this, his first taxon, after his beloved wife Gesine. **Figs.86–87, p.63**

Plant double-bodied or forming a small clump. Leaf-pairs oval as seen from above, convex in side view, face smooth, pinkish-grey to greenish-brown or rosy, often centrally windowed and always with small greenish smudgy windows; reddish lines or spots entirely absent. Flowers appearing in mid-autumn, yellow, relatively large, strongly perfumed; fruits 6–5-locular.

L. gesineae de Boer var. *annae* (de Boer) Cole (1956)

This was named for Anna Geyer-Joubert, Dr. Geyer's ideal veld companion and the discoverer of the present taxon. "With an exclamation, [my wife] … suddenly went down on one knee. Beside the footpath she had spotted a partly hidden specimen of the species that was to be named after her …" **Fig.88, p.63**

This is quite similar to the above, but its leaf-pairs are fewer, larger, broader, less convex, and more reddish-brown or tawny-orange in colour; the flowers are larger as well. The tannins are also differently disposed. Lame though it may sound, it is far easier to see the differences than it is to describe them!

Distribution

The symmetrically uxorial *L. gesineae* complex is highly restricted. Cole's map shows two populations of var. *gesineae*, both to the north-east of Aus in Namibia, while var. *annae* occurs at two spots to the west. In all cases the plants favour gneiss (or does gneiss favour the plants?). At least one of the var. *annae* populations has been severely depleted by humans.

Notes

The varieties of *L. gesineae*, plus the closely-related gneiss-dweller, *L. francisci*, make a little complex found west and north of the north-eastern corner of the Sperrgebiet. A new variant in this complex, my 2003 (fig.89, p.63), was found five years ago in precisely that corner. The plants are quite small, greyish (rarely pinkish), often strongly windowed, and somehow reflect the sharp greyish shards of dolomite (interspersed with fine sand) amongst which they grow. They have certain aspects of both var. *gesineae* and *L. francisci*; like var. *gesineae*, they are quite tractable, flowering much more readily than *L. francisci*.

Cultivars

I am currently working with a promisingly reddish specimen of var. *gesineae*. Otherwise, there are a number of accidental hybrids running about which involve var. *annae* and errant members of the *L. pseudotruncatella* subsp. *dendritica* group. Insofar as these elements might be related — and I think they *are* close (consider their similarities: tannins and singlehood *vs.* their differences: (red) markings and disparate flowering times) — the hybrids are interesting. But they certainly do not improve on either parent, lacking the sharpness of the one and the soft glow of the other.

Figure 80. *L. fulviceps* var. *fulviceps*, Cole 170

Figure 81. *L. fulviceps* var. *fulviceps*, near Pofadder

Figure 82. *L. fulviceps* var. *fulviceps* "*lydiae*"

Photo: John Trager

Figure 83. *L. fulviceps* var. *fulviceps* "*lydiae*", Cole 219

Figure 84. *L. fulviceps* var. *lactinea*, Cole 222

Figure 85. *L. fulviceps* 'Aurea'

Figure 86. *L. gesineae* var. *gesineae*, Cole 207

Figure 87. *L. gesineae* var. *gesineae*, Cole 207

Figure 88. *L. gesineae* var. *annae*, Cole 78

Figure 89. *L.* sp. aff. *gesineae*, SH2003

Figure 90. *L. herrei*, Sendelingsdrif

Figure 91. *L. herrei* "*translucens*", Cole 361

L. geyeri Nel (1943)

Named for Dr. Albertus Geyer, South African High Commissioner to London and an intelligently ardent lithopsarian. Appendix 6 reprints a delightful lecture given by Geyer in 1951.

Figs.22–23, p.17; Fig.77, p.59

Plant twin-headed or forming an ample clump. Leaf-pairs rather small, narrowly oval as seen from above, convex in side view, slightly divergent, face smooth, pale whitish-green to creamy white, often with pinkish hints (the former *L. hillii*), usually centrally windowed, rarely nearly opaque. Flowers yellow, white-centred, often relatively large and spidery, the petals being splayed out over the leaves, strongly perfumed, appearing mid-autumn; fruits 5-locular.

Distribution

This species is less restricted than was once thought to be the case — one recently discovered population which enjoys the august company of *Conophytum hammeri* is quite dense — but on the other hand it has been heavily and clumsily abducted from the Little Hellskloof; one famous formation has been quite stripped. It occurs on gneiss and white quartzite, on ridges, or on the fringes of sloping quartz scree. Another locality, the former headquarters of *L. geyeri "hillii"*, is now a much-trampled corral.

Notes

This is one of the Richtersveld "greenies", closely related to the westerly *L. herrei*, which tends to be fatter and broader, and to the southerly *L. helmutii*, the leaves of which are more steeply angled and more divergent. The tannins of all three are identical and lumpers would probably merge them into a single species, *L. herrei*. In a pot, *L. geyeri* can take a lot of light; given that, it retreats into the soil in a manner which pleases authenticists and disappoints growers who expect their plants to be perpetually "at home".

L. gracilidelineata Dinter subsp. *gracilidelineata* var. *gracilidelineata* (1928)

The "thin-lined" *Lithops*.

Fig.7, p.9; Fig.36, p.29; Figs.92–93, p.66

Plant solitary or twin-headed, very rarely making an ample clump. Leaf-pairs round as seen from above, truncate in side view but sometimes puffed up like a quilt, face chalk-white to bluish-white or pale pink, "the colour of pale milky tea" (Dinter), pale brown to curry colour; rough from numerous, reticulate, brown or red-lined channels, rarely smooth (Cole 373), usually opaque but sometimes with an obscure translucence. Flowers yellow, often pale, relatively small, strongly perfumed, appearing rather early in summer, but not as early as those of *L. pseudotruncatella*; fruits 6–7(–12)-locular.

L. gracilidelineata subsp. *gracilidelineata* var. *waldroniae* de Boer (1963)

Named for Molly Waldron, who lived quite near this taxon and collected it in 1960.

Fig.94, p.66

Plant solitary or twin-headed, but sometimes making an ample clump. Leaf-pairs as in var. *gracilidelineata* but rather more convex, smaller and always whitish, with deeper and closer channels which are often feathered at the margins, so the plant is more convincingly brainy. Flowers (much) punier, often pale; fruits smaller (which follows, of course, from the smaller flowers).

L. gracilidelineata subsp. *brandbergensis* (Schwantes ex de Boer) Cole (1963)

Named for the Brandberg, by many accounts the grandest mountain in Namibia.

Fig.43, p.39; Figs.95–96, p.66

Plant usually solitary and robust. Distinguished by its striking orange, bronze, or yellowish colours, richer, more broadly painted reddish lines, and larger, often darker yellow flowers.

Distribution

This complex occupies a long strip in Namibia between Walvis Bay in the south and Fransfontein in the north. A population near Walvis Bay was the slender basis for the beautifully embossed var. *waldroniae*. Usually the plants occur on quartzite but some darker rocks may be present as well. I wonder where the "brick red" and "deep red" plants reported by Triebner occurred? (He is tacitly quoted in Jacobsen's Handbook Vol. 3: 1231 [1960].) Subsp. *brandbergensis* occurs at a high altitude, the highest for the genus, on granitic rocks. Its habitat lies in the upper third of the complex's distribution area and I might note that the Brandberg, which is large and isolated, harbours a number of odd endemics, eleven at least (see Nordenstam 1974: The Flora of the Brandberg, in *Dinteria* **11**).

Notes

This is one of the few species complexes which has an inherently solitary quality; even at 20 years old, most plants stay bacheloric. Var. *waldroniae* is often difficult to distinguish from var. *gracilidelineata*, and its theoretical tendency to be more deeply etched only holds true for plants from the TL, Cole 189; Cole 243 plants are larger and less finely humped, and mostly belong in var. *waldroniae* by geographical courtesy (Cole mentions this ambiguity in Cole 1988). Var. *gracilidelineata* is sometimes confusable with *L. pseudotruncatella* subsp. *dendritica*, another mono-headed taxon, but that is usually smooth-topped, and only rarely whitish (*"farinosa"*). Oddly enough, var. *gracilidelineata* Cole 373 is so smooth as to resemble *L. pseudotruncatella* subsp. *volkii*, it has dendritic lines where its grooves ought to be.

For many years, subsp. *brandbergensis* was rare in cultivation, though de Boer kept it going and sent seedlings to collectors in England and South Africa. Mias Kennedy maintained a tiny but useful brood of de Boer's plants. Those compared closely with later collections: one by the Coles (Cole 383), one by Peter Bruyns, and one by a friend of the Coles who provided material from a different population which was given the number Cole 394. (A few other Cole numbers were not self-collected.) Cole 394 is quite a bit redder than Cole 383, the one which has now achieved such wide circulation. Subsp. *brandbergensis* was likened by both de Boer and Schwantes to *L. pseudotruncatella* subsp. *dendritica*, and indeed there is an interesting overlap of characters between these complexes. The earthy epidermal colours of subsp. *brandbergensis* meet their match in some forms of subsp. *dendritica*, but the full colour range of subsp. *gracilidelineata* is poorly understood, at least by me. A pure white, "hard as wood" variant was described by Schwantes as *L. streyi*, but he later recognized this as merely "an extreme colour form". This corresponds to the beautiful Cole 373, twice mentioned above.

Cultivars

White-flowered cultivars have been produced from both var. *gracilidelineata* and var. *waldroniae*, and indeed the cultivars can hardly be distinguished, a measure of the closeness of these varieties. 'Fritz's White Lady', bred from var. *waldroniae*, is the one usually seen. 'Café au Lait' (fig.97, p.66) is a pattern-cultivar bred for its swirling bronze and cream colours, a tendency extracted from Cole 309. I once tried to breed subsp. *brandbergensis* for darker orange bodies and got, instead, paler plants! This subspecies also has a greenish, non-bronzing tendency, which several breeders, including Frik du Plooy of Kocksvlei, have worked with. I have also tried to breed var. *waldroniae* to enhance its embossments; I might yet succeed. Already I have some seedlings with unusually obvious red lines.

L. hallii de Boer var. *hallii* (1957)

Named for Harry Hall, the outstanding English-South African collector, cultivator, and observer. **Figs.98–99, p.67**

Plant forming twin-headed hoof-prints or an ample clump. Leaf-pairs broadly oval as seen from

Figure 92. *L. gracilidelineata* subsp. *gracilidelineata* var. *gracilidelineata*, ex hort.

Figure 93. *L. gracilidelineata* subsp. *gracilidelineata* var. *gracilidelineata*, Cole 262

Figure 94. *L. gracilidelineata* subsp. *gracilidelineata* var. *waldroniae*, Cole 189

Figure 95. *L. gracilidelineata* subsp. *brandbergensis*

Figure 96. *L. gracilidelineata* subsp. *brandbergensis*, ex P.V. Bruyns

Figure 97. *L. gracilidelineata* 'Café au Lait', Cole 309

Figure 98. *L. hallii* var. *hallii*, Cole 50

Figure 99. *L. hallii* var. *hallii* "White form", Cole 45

Figure 100. *L. hallii* var. *ochracea*, Stinkbrak

Figure 101. *L. hallii* 'Green Soapstone', Cole 111A

Figure 102. *L. hallii* 'Soapstone' × *L. salicola* 'Malachite' F_2

Figure 103. *L. helmutii*, Cole 271

above, truncate in side view, tightly joined, face rough from small pyramidal bumps, pale to dark brown or greyish-brown, rarely whitish-tan or pinkish, usually subtly windowed, always with a few submerged fine red "needles" (rubrications), border thick, scalloped, plain, and prominent. Flowers white, often with pink tints, appearing late in the autumn; fruits 6–5-locular.

L. hallii var. *ochracea* (de Boer) Cole (1962)

Named for its "ochre" colour, not a felicitous choice, since the plants show far more red than yellow.

Fig.100, p.67

Similar to var. *hallii* but with a reddish, greyish-pink, orange (or ochre) colour and a greater tendency to have smoothish, blank (or "open") windows. Sometimes the borders are even more pronounced than in var. *hallii*.

Distribution

Large, occupying a triangle stretching from Hopetown to Britstown to Grondneus, crossing the Orange River but not extending into Namibia. Var. *hallii* favours flattish calcrete formations, but also occurs on sandstone (the "Brown form"); var. *ochracea* favours white and pink quartzite and pegmatite. The areas occupied by the two varieties overlap, but most of the var. *ochracea* colonies occur to the north of var. *hallii*.

Notes

This species resembles *L. hookeri* so much that for many years it was assumed to be that species, which co-occurs with *L. hallii*. That may account for its relatively late publication. Both Hall and de Boer were struck by the shining white flowers, a strong contrast to the rich yellow ones of *L. hookeri*. The "Brown form" (Cole 135 and 136) has rich colours and, sometimes, a strong opacity; the close, nail-file roughnesses block any transparency. Some colonies tend toward grey (as in the "Grey form", Cole 119) or grey-green, and in this respect they resemble *L. salicola*; this is especially true of de Boer's former *L. salicola* var. *reticulata* (Cole 87), which Cole regards as *L. hallii* with a natural admixture of *L. salicola*. The latter is usually a smoother-skinned species.

The "White form" (fig.99, p.67; the name is mine, not Cole's) of *L. hallii* (Cole 45) is quite puzzling; it has the coloration of *L. julii* subsp. *fulleri* var. *fulleri*, even showing its pinkish or pale blue colours. In texture and pattern it is closest to var. *ochracea*. The latter is confusable with *L. villetii* subsp. *kennedyi*, but that has a stricter border zone and is generally greenish to maroon in colour. In all its forms, *L. hallii* is of the easiest cultivation and is excellent for the novice. Var. *ochracea* is especially attractive; of its many representatives, Cole 59 is usually the reddest, having a fierce vermillion shade, Cole 39 is a bit more rusty, and Cole 303 is often rather brown.

Cultivars

'Green Soapstone' (figs.101 & 102, p.67; Cole 111A) is an attractive non-bloating mutant of var. *ochracea*. Rubrications appear as faint ochre specks, presumably having been "bleached out" by the prevailing albinism, and the whole plant has a pale chartreuse colour. I've crossed 'Green Soapstone' with *L. villetii* subsp. *kennedyi*. The resultant plants are strong but they have the unpleasant pink of anti-nausea potions, and they seem to be nearly sterile. That is interesting in view of my idea that subsp. *kennedyi* is rather remote from the septuple-l (*hallii–julii–fulleri–salicola*) complex, a Welsh dream of euphony.

L. helmutii L. Bolus (1933)

Named after Helmut Meyer, who as very young man accompanied his Reverend father on collecting trips. Both Meyers lived in Stellenbosch, where Helmut raised exquisite *Disa* hybrids.

Fig.6, p.9; Fig.103, p.67

Plant forming a twin-headed or smallish clump. Leaf-pairs long, narrowly oval as seen from above, strongly but irregularly convex in side view, almost "faceted", slightly to strongly divergent, face

smooth, pale to grass green, rarely showing purplish hints, always centrally windowed, windows streaked like the glinting eyes of cats. Flowers yellow, white-centred, relatively large, strongly perfumed, appearing in mid to late autumn; fruits 5-locular.

Distribution

Only two small populations are currently known, both on quartzite hills north of Steinkopf; they are literally within a stone's throw — and a pollinator's reach — of each other, and might be better regarded as a single population.

Notes

This easily raised species is another of the "greenies". It is as common in cultivation as it is rare in habitat. It has been confused with greenish forms of *L. marmorata* from near Steinkopf, which grow right across the road. Curiously, those forms exude the same strong floral perfume as *L. helmutii*, and one was even known as *L. helmutii "albiflora"*. However, these plants lack the distinctively bevelled shape of proper *L. helmutii* and they are, of course, white-flowered; they also lack its curious glassiness.

L. herrei L. Bolus (1932)

Named for Adolar "Hans" Herre, one of the greatest explorers of Namaqualand's succulent flora. **Figs.90–91, p.63**

Plant forming large multi-headed clusters. Leaf-pairs oval seen from above, convex to slightly truncate in side view, smooth, fattish, greyish-green to whitish-ivory, highly variable in pattern, from wholly and uniformly windowed (*"translucens"*, fig.91) to mossily embroidered, often with a wide opaque border. Flowers (dark) yellow with a white centre, rather small, appearing in mid-autumn; fruits 5-locular, soft.

Distribution

This species is confined to a fog-bathed strip on either side of the Orange River, from Alexander Bay to Sendelingsdrif and Daberasdrift. The western populations are embedded in lichens, while the eastern ones experience more aridity and exposure. At least two populations occur on the Namibian side of the river; the plants I've seen on grey schist near Daberas were small and undernourished, while the extreme robustness of E. Fritz's plants from *ca.* 65 kilometres north-north-east of Alexander Bay (= Cole 355) suggests a healthy, large-bodied population.

Notes

L. herrei has a number of forms; perhaps the most striking is Cole 355, which is unusually large, somewhat truncate, and almost opaque. One could almost take it for a stubby-toed *L. meyeri*! Some of the Sendelingsdrif (Ochta) forms are similar to Cole 355, having a beautiful chalky whiteness, while forms found nearer the Atlantic coast (near Alexander Bay) are so clear-headed as to be virtual *L. optica*. Indeed, the only real difference between *L. herrei* and *L. optica* may lie in their differing latitudinal adjustments; the species readily hybridize (fig.33, p.29). *L. geyeri*, daintier in body but much larger-flowered, confuses the issue, but it can often be distinguished from the opaque forms of *L. herrei* by its greenish or pinkish tints and slightly narrower shape. In any case, *L. herrei*, like its relatives, is quite easy to cultivate, responding well to light misting, and dividing nicely.

L. hookeri (Berger) Schwantes var. *hookeri* (1908)

Named for Sir Joseph Hooker, who in 1874, confused this species with *Mesembryanthemum* [*Conophytum*] *truncatellum* Haw. (1803). He had applied Haworth's epithet to a fine coloured illustration of the plant we now know as *L. hookeri*. Berger corrected the error in 1908, giving Hooker's name to the new/old species. Errors are not often so well rewarded! Thus the concept dates from 1874, the actual name, from 1908. **Fig.104, p.70**

Figure 104. *L. hookeri* var. *hookeri* "Vermiculate form" Strydenburg

Figure 105. *L. hookeri* var. *dabneri*, Cole 13

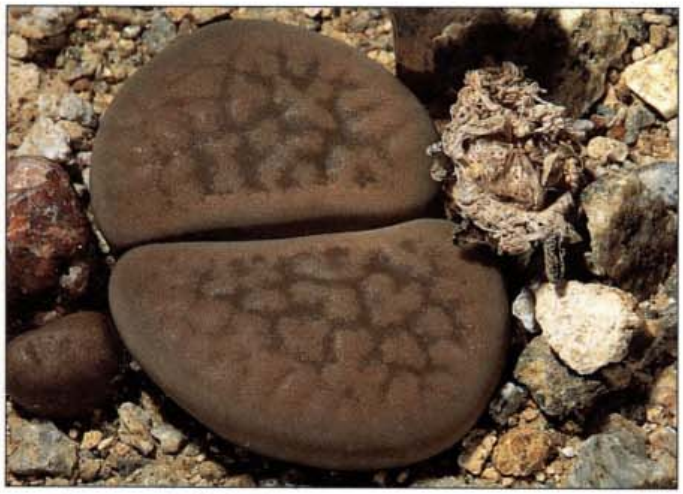


Figure 106. *L. hookeri* var. *elephina*, Cole 92

Figure 107. *L. hookeri* var. *lutea*, S. Hammer 869

Figure 108. *L. hookeri* var. *marginata*, Cole 338

Figure 109. *L. hookeri* var. *subfenestrata*, Cole 21

Figure 110. *L. hookeri* var. *susannae*, Cole 91

Figure 111. *L. hookeri* 'Envy', Cole 336 × Cole 336

Figure 112. *L. localis*, Cole 345

Figure 113. *L. localis*, Cole 376

Figure 114. *L. localis* 'Speckled Gold', Cole 345A

Figure 115. *L. localis* 'Violetta', ex S. Hammer 119

Plant forming modest or large to very large clusters. Leaf-pairs round or oval seen from above, apex truncate in side view, pale brown to reddish or greyish-brown, brainily rugose from coarse or fine, often deeply impressed channels, these having thin red inlays, window reduced to channels and usually with a distinct, sometimes prominent, border. Flowers yellow, large to huge, appearing mid-autumn; fruits 6–7-locular.

L. hookeri var. *dabneri* (L. Bolus) Cole (1965)

Named for Mr. Dabner, whose first initial mutated from L. (Bolus 1965 [JSAB: 237) to F. (Bolus 1965 [JSAB: 311]) to A. (Cole 1988). In any event, the plants were found by Dabner on his farm south (not "north-west") of Kimberley.

Fig.105, p.70

This can be recognized by its pale, greyish-blue colour (Bolus: "pinkish-grey") and by its dark, crowded channels, which have a murkily windowed background. De Boer to Bolus, 30 October 1965 wrote: "I have to tell you that this plant is quite identical with *L. marginata* Nel ...". Bolus accepted the sinking — though she wondered at the source of de Boer's *L. marginata*, which was, at that time, quite an obscure taxon — but in 1973 Cole recognized var. *dabneri* as being "consistently distinct" in colour from *L. marginata*, at the same time placing the latter as var. *marginata*. Probably de Boer's *marginata* material came from A. Roux; de Boer's *dabneri* was obtained from Harry Hall.

L. hookeri var. *elephina* (Cole) Cole (1970)

Named for its elephant-grey colour, not for any trunk.

Fig.106, p.70

Similar to var. *hookeri* but with a peculiarly dull elephant's colour and shallow, rather sparse, channels. It seems to look wrinkled and thirsty even when it isn't, and divides reluctantly.

L. hookeri var. *lutea* (de Boer) Cole (1964)

Named for its "yellow" leaves; was de Boer thinking of Conan Doyle's Adventure of the Yellow Face? — that also was hardly yellow.

Fig.107, p.70

Distinguished by its convex, orange-brownish bodies, with coarse humps defined and surrounded by glowing reddish lines. The plants tend to stay at the two-headed stage for life.

L. hookeri var. *marginata* (Nel) Cole (1946)

Named, apparently, for its margins, which Nel described as being laciniated (fringed) on the outer margin and denticulate in the inner one. Perhaps Nel ran out of epithets, perhaps he lacked a second adorabelle Muse?

Fig.108, p.70

Similar to var. *hookeri* but with finely scratched lines and (often) a somewhat more obvious translucence, its patterns giving the eyes a 3-D dizziness; its greyish-green, taupe, beige, or cerise shades are also distinctive and collectively weird, such colours being rare in the rest of the complex, barring var. *susannae*, which is also a pastel study.

L. hookeri var. *subfenestrata* (de Boer) Cole (1964)

Named for its "somewhat windowed" apex, though the use of the epithet was probably directly inspired by de Boer's contemporaneous struggles with *Conophytum subfenestratum* Schwantes. De Boer's friend, Arthur Tischer, had recently revamped that taxon.

Fig.109, p.70

Similar to var. *hookeri* but weakly humped and rich chocolate brown to violet brown with a delicious sheen. It is usually at least somewhat "subfenestrate". The *"brunneo-violacea"* form (Cole 19) was published along with var. *subfenestrata* and differed only in minor respects, being crasser, somewhat less shiny, brighter and less fenestrate.

L. hookeri var. *susannae* (Cole) Cole (1970)

Named for Susanna Bergh, who was associated with the discovery.

Fig.110, p.71

Rather similar to vars. *dabneri* and *marginata*, but with a strikingly pale tan-grey or even a wan yellow colour, and slightly broader and somewhat fragmentary channels — as an aqueduct, they wouldn't make it very far. The plants tend toward rich division.

Distribution

The complex occupies the zone between Groblershoop in the north-west, Britstown in the south, and Kimberley to the east — and it gives us a great illustration of the transformative power of rock-types and even, I suspect, pebble size. Var. *hookeri*, the generalist, occupies the western and southern zones (on various quartzites, sandstones, and lavas), var. *subfenestrata* the centre (on dark ironstone), var. *lutea* the north-western edge (on coarse pink or brownish quartzite), var. *elephina* the south-eastern edge (on unfriendly doleritic sandstone — I can think of nasty dolerite formations which are devoid of mesembs altogether) and, toward the east, vars. *marginata* (on shale, quartzite, lava and dolerite), *dabneri* (on calcrete), and *susannae* (on gravelly pegmatite). The plants are often associated with *Titanopsis calcarea* and *Mestoklema arboriforme*.

Notes

This widespread species has a large number of geographic forms, some of which have never been formally named. One of the best of these, the "Vermiculate form" (fig.104), has fine, densely aggregated humplets; var. *lutea* is its blimpishly exaggerated opposite. Var. *marginata* forms a vari-coloured complex in itself — the Coles listed "Cerise" and "Red-brown" forms, both of them delicately shaded — while var. *susannae* and var. *dabneri* make an obvious pair, and var. *subfenestrata* and var. *elephina* form their own sort of matt/glossy paradox. All the variants are easy to grow and one could have a satisfying — and highly colourful — collection just of these. Until 1988, *L. hookeri* was known as *L. turbiniformis* (Haw.) N.E.Br., and that name is still common on aging labels. Haworth's name is subject to impossibly ambiguous interpretations. Though it certainly applied to a species of *Lithops* — the very plant discovered by Burchell — it cannot be pinned down further. Brown's 1920 interpretation was optimistic at best ("auto-suggestion" sensu Bolus!).

Cultivars

'Envy' (fig.111, p.71) appeared in a pot of *L. hookeri* Cole 336 × Cole 336, and in some cultivated Australian plants; it has yet to make its general debut. Var. *marginata* could and should be bred for greater windowing. I've already tried this with Cole 338, the Coles' master tray of which has a number of wondrous, semi-windowed specimens (see Cole 1988, p. 143!).

L. julii (Dinter & Schwantes) N.E.Br. subsp. *julii* (1925)

Named by Schwantes and Dinter for their mutual friend, Dr. Julius Derenberg of Hamburg, who supported Dinter's expeditions while also working out the best modes of northern European cultivation.

Fig.30 (right), p.28;
Fig.34, p.29;
Figs.116–119, p.74

Plant single to multi-headed, mostly paired. Leaf-pairs oval/reniform seen from above, truncate in side view, sides whitish to pearl grey, apex usually slightly bumpy, highly variable in colour and pattern, from uniformly white ("*pallida*") to brown-blotched ("Fuscous form", fig.119), to beautifully red- or brown-netted ("*reticulata*", figs.30 & 116), the patterning sometimes impressed and brownish, rarely with further greenish or maroon colours in jagged grooves ("*chrysocephala*", figs.34 & 117–118), rubrications bold, subtle or absent. Fissure usually marked with at least a few dark dots, vestiges of the "lipstick smears" which sometimes encircle the fissure without compromising it. Flowers white to pinkish-white, appearing late in the autumn season; fruits 5–6-locular, seeds very small, very pale.

Figure 116. *L. julii* subsp. *julii* "*reticulata*", Cole 64

Figure 117. *L. julii* subsp. *julii* "*chrysocephala*", Cole 205

Figure 118. *L. julii* subsp. *julii* "*chrysocephala*", Cole 205 "Pallid Form"

Figure 119. *L. julii* subsp. *julii* "Fuscous form", Cole 218

Figure 120. *L. julii* subsp. *fulleri* var. *fulleri*, Cole 62

Figure 121. *L. julii* subsp. *fulleri* var. *brunnea*, Cole 179

Figure 122. *L. julii* subsp. *fulleri* var. *rouxii*, Cole 215

Figure 123. *L. julii* subsp. *fulleri* var. *rouxii*, Cole 324

Figure 124. *L. julii* subsp. *fulleri* var. *rouxii*, south-west Warmbad

Figure 125. *L. julii* 'Fullergreen'

Figure 126. *L. julii* 'Hot Lips' ['Monica']

Figure 127. *L. julii* 'Peppermint Crème', Cole 297A

L. julii subsp. *fulleri* (N.E.Br.) Fearn var. *fulleri* (1927)

Named for Ernest Fuller, who collected a number of interesting mesembs in the Kenhardt-Pofadder area (*L. olivacea*, *Ebracteola fulleri*, *Conophytum fulleri*, *Cephalophyllum fulleri*). As Postmaster at Kenhardt, he must have had many chances to explore obscure side-roads. **Fig.120, p.74**

Similar to *L. julii* subsp. *julii*, differing mainly in the patterning of its scalloped borders, which are bicoloured and elaborately cross-stitched with fine rubrications, and in its lack of lipstick (say that thrice, quickly). The window is often arranged in a complex mosaic, as in the "Fuscous" *L. julii*, but with additional colours. Subsp. *fulleri* also "differs" in its reluctance to cross the Orange River in the area north of Pofadder.

L. julii subsp. *fulleri* var. *brunnea* de Boer (1962)

Aptly named for its brown window, this was probably collected by Herkie Horn, who collected a pink-flowered *Conophytum calculus* subsp. *vanzylii* in the same area and at the right time (NBG 238/62). **Fig.121, p.74**

Similar to var. *fulleri*, differing mainly in the often-simpler patterning of its browner, more strongly convex window; its shoulders tend to be slightly darker as well.

L. julii subsp. *fulleri* var. *rouxii* (de Boer) Cole (1964)

Named for A.A. Roux (pronounced "rue"), who collected it in 1963. Forgotten today, Roux once had an exquisite collection of *Lithops*. **Figs.122–124, p.75**

Similar to var. *fulleri*, differing mainly in its sharply scalloped borders, which are ornately tricoloured (this is true even for the inner, fissure-lining borders) and in a certain tautness which suggests its nearest neighbour, subsp. *julii*; the texture makes me think of unglazed porcelain.

Distribution

The *L. julii* family holds court over a large turf, but it breaks down into zones: var. *julii* occurs within the triangle defined by Goodhouse, Karasburg and Pofadder, stopping short of the Orange River and thus remaining exclusively Namibian, while var. *fulleri* is South African, crossing the river but only in the area around Keimoes and Grondneus, reaching as far south as Gamoep and as far west as a point near Concordia. Both taxa occur on pegmatite, with or without quartzite gravel. Strictly, var. *brunnea* is currently known from only one colony east of Pofadder, on gneiss, but a colony from north of Aggeneys (SH 553) is vegetatively half-way between var. *brunnea* and var. *fulleri*, being quite as convex as, but slightly paler than, a normal *brunnea*; its rock type is the same. (Aggeneys itself harbours a proper, quite pale, var. *fulleri* which grows with *Conophytum burgeri*). Var. *rouxii* occurs far to the west, north of the Orange River at several points north-east of Vioolsdrif. It is curious that it "skips over" *julii*'s territory while being closest, morphologically, to *fulleri*. It does look like a transmogrified *fulleri* — and indeed, more than a few specimens of *fulleri* have *rouxii*-traits! The whole area is shared with various species of *Dinteranthus*.

Notes

This is probably the most attractively complex complex in *Lithops*. All the taxa, apart from var. *brunnea*, are widespread and wildly variable, subsp. *julii* most amazingly so. The "*L. fulleri*" seen in Schwantes' Flowering Stones (pl. 61B) resembles (and probably is) the "Fuscous form" of *L. julii*, a variant never formally named. *L. julii* var. *littlewoodii* de Boer was a relatively large, quite pale and pleonastic form, discarded taxonomically by Cole. *L. "helmiae"* was proposed, but never published, by Triebner; I would guess that it matched Nel's magnificent "*chrysocephala*". That variant was rediscovered by Cole on a farm south-east of Warmbad.

De Boer did a lot of work with *L. julii* and observed that the pattern variants were "true-breeding" and should therefore be accepted as varieties. But anything can be "truly bred" in the captive world of horticulture; de Boer was

assuming a correlation between his breeds and Nature's. There are indeed places on one huge farm near Warmbad where *"pallida"* seems to be the dominant element, and others where *"reticulata"* is dominant (the farmer calls it his "newsprint plant"!). But on the same farm, *"pallida"* and *"reticulata"* can be found together. The northernmost *L. julii* known to me, Cole 64, has a very high percentage of splendidly reticulate plants along with a few pale faces; it shows few of the other colour forms. Cole 349, found further south, is often very pale and marshmallow-puffy.

The different populations of var. *fulleri* have distinct regional faces, Aggeneys being pale, Upington bold, and Cole 259 (east-north-east of Gamoep) having a high percentage of plants with dense red venations. Cole 323 (south-west of Upington) is very heavily embossed, and Cole 203 has a bold simplicity. But such statements are based on a few pots' worth of clones (and on the Coles' master trays) and are perhaps quite false or misleading in any statistical sense. Plants growing in the Namies *fulleri*-lane are so dramatically various that one could probably spot all of the above "forms" in half a day's walk.

Cultivars

L. julii subsp. *julii* 'Peppermint Crème' (fig.127, p.75) is a fine, pale green freak which has arisen in at least three Cole colonies (Cole 297, 349 and 205), an interesting phenomenon considering that at least two of these colonies are discrete. The anagrammatic *L. julii* subsp. *julii* 'Hot Lips' (fig.126, p.75) was bred to match a wild plant I once admired near Rambawd. A few of its seeds gave rise to the cultivar, via several trials of elimination and exaggeration. The beautiful 'Fullergreen' (fig.125, p.75) was bred from Namies material and has lately been corrupted with *L. salicola* 'Malachite', which was hardly an improvement.

L. karasmontana (Dinter & Schwantes) N.E.Br. subsp. *karasmontana* var. *karasmontana* (1920)

Named for its habitat, the Karas Mountains in southern Namibia.

Fig.26, p.24; Figs.128–132, p.78

Plant usually multi-headed. Leaf-pairs elliptic seen from above, truncate or slightly concave in side-view, firm, sides whitish to pale tan, sometimes a sombre bluish-grey, apex usually with rolling hillocks and numerous grooves, but sometimes quite flush, highly variable in colour and pattern, from uniformly bluish-white (*"opalina"*, fig.132) to yellowish-brown (*"summitatum"*) or solid brick red (*"lateritia"*, fig.130), sometimes marked with chocolate wedges (*"mickbergensis"* fig.131), sometimes very finely lined, the patterning sometimes deeply impressed, rubrications occasionally absent, usually obvious, windowing non-obvious, but if present often broken into numerous "panes". Fissure unmarked or rarely surrounded by twin half-moons. Flowers large, white or rarely pinkish, appearing late in autumn; fruits 5–6-locular.

L. karasmontana subsp. *karasmontana* var. *aiaisensis* (de Boer) Cole (1964)

Named for Ai-Ais (pronounced aye-ayes), a grand canyon south-west of the Karas Mountains, where Roy Littlewood collected plants in 1961.

Fig.1, p.8; Fig.133, p.78

Plant branching only sparsely, 1–3 headed. Leaf-pairs elliptic, very firm, apex truncate, smooth to slightly rough, greyish-ivory to creamy white to slightly pinkish, never reddish, mottled or marbled over the whole surface, often opaque, never glossy and often with a blank or matt aspect, showing fine, dark, chicken-foot markings at the margins, these sometimes scratched out (the plant then essentially = *"opalina"*, but warmer in hue).

L. karasmontana subsp. *karasmontana* var. *lericheana* (Dinter & Schwantes) Cole (1925)

Named for Peter le Riche, a farmer who directed Dinter to the first-known locality.

Fig.134, p.79

Figure 128. *L. karasmontana* subsp. *karasmontana* var. *karasmontana*, Grünau

Figure 129. *L. karasmontana* subsp. *karasmontana* var. *karasmontana*, ex H. Herre

Figure 130. *L. karasmontana* subsp. *karasmontana* var. *karasmontana* "*lateritia*", ex Harry Johnson

Figure 131. *L. karasmontana* subsp. *karasmontana* var. *karasmontana* "*mickbergensis*"

Figure 132. *L. karasmontana* subsp. *karasmontana* var. *karasmontana* "*opalina*", Cole 169

Figure 133. *L. karasmontana* subsp. *karasmontana* var. *aiaisensis*, near Ai-Ais

Figure 134. *L. karasmontana* subsp. *karasmontana* var. *lericheana* ex P.V. Bruyns

Figure 135. *L. karasmontana* subsp. *karasmontana* var. *tischeri*, Cole 182

Figure 136. *L. karasmontana* subsp. *bella*, Cole 143a

Figure 137. *L. karasmontana* subsp. *bella*, Cole 108

Figure 138. *L. karasmontana* subsp. *eberlanzii*, 35 km S Luederitz

Figure 139. *L. karasmontana* 'Avocado Cream'

Plant usually multi-headed. Leaf-pairs elliptic, apex truncate, with pastel tints of pink, bronze or dull green, sometimes a very pale green, windowed areas broad but murky, with faint wispy rubrications and a slight roughness from the prominence of the pale islands.

L. karasmontana subsp. *karasmontana* var. *tischeri* Cole (1973)

Named for Arthur Tischer, whose early mesemb interests included *Lithops* (he later graduated to *Conophytum*) and who had planned, at an early stage, to give this population another name: *L. "fossulifera"*. Dr. Tischer, who was born in 1895, is still enviably robust and alert. Taxonomic practice cannot be *all* bad.

Fig.135, p.79

Plant usually 2-headed. Leaf-pairs elliptic, often strongly reniform, robust, apex truncate or even concave, always grooved or humped, often intensely reddish, the colour having a peculiar molten aspect and extending down the sides, lined with blood-red, often green- or red-spotted as well, darkly windowed with a slight bluish lustre. Flowers very large.

L. karasmontana subsp. *bella* (N.E.Br.) Cole (1922)

Named for its prettiness; the Latin *bellus* is also the ultimate source of belle.

Figs.136–137, p.79

Plant often clustering thickly, sometimes remaining 2-headed. Leaf-pairs elliptic, rather soft, apex convex, patterns usually involving the interplay of broad greenish windowed channels and their pale ochre to pale yellow to orangish banks, the whole surface usually quite smooth unless the plant is starved, rubrications very faint and seemingly deeply "imbedded".

L. karasmontana subsp. *eberlanzii* (Dinter & Schwantes) Cole (1925)

Named for Friedrich Eberlanz, decorator, gardener, and collector of many interesting species native to the vicinity of Lüderitz where he died in 1966, at the age of 87.

Fig.138, p.79

Plant forming a modest cluster. Leaf-pairs elliptic, rather soft, apex convex to flattish, creamy white to bluish-white, beige, taupe, or pinkish, markings fine and subtle, reddish to blackish, window present in streaks or slits, but sometimes opening up so much as to rival that of subsp. *bella*.

Distribution

Exclusively Namibian, *L. karasmontana s.l.* has a complex distributional pattern. Var. *karasmontana* itself is clear enough, confined as it is to the greater Karasberg–Ai-Ais area on formations of quartzite, pegmatite, or gneiss, with the presumably derivative var. *aiaisensis* occupying a small south-westernmost niche, on gneiss and white quartzite. (One can see var. *karasmontana* as the direct continuation of, or replacement for, *L. julii* subsp. *julii*, which occurs to the south-east, with no known overlap; compare *"opalina"* and *"pallida"*!). Var. *lericheana* occurs to the north-east of var. *karasmontana*, thus north of Karasburg [sic], and its probable offshoot, var. *tischeri*, occupies the south-west corner of that territory, north of Grünau on "brown, white, and red-stained quartzite" (Cole 1988). Subspp. *bella* and *eberlanzii* intersect in a curious pattern, with the isolated, southernmost, *bella* occurring near Witputs, which is eberlanzian territory otherwise, and extending to points north of Aus, where it joins other gneiss-lovers. Some specimens of subsp. *eberlanzii* are indistinguishable from typical subsp. *bella*, and I have seen one locality (near Kuckaus in the Sperrgebiet, perhaps the very one known to Dinter) where the two taxa collide or intersect (or merely flirt?) on a ridge of quartzite. At another colony in the Sperrgebiet, west of Swartkloof, I found such a wide range of plants that, once again, subsp. *bella* and subsp. *eberlanzii* could both be recognized, picked out from the crowd along with the quondam *L. "erniana* var. *witputzensis"*, de Boer's name for a large pale form of subsp. *eberlanzii*. However, at other spots, and especially in the north-western Sperrgebiet, subsp. *eberlanzii* is less ambiguous. Quartzite is more likely to

harbour *eberlanzii*, while gneiss better accommodates *bella*. Perhaps the rock-types play a larger role than we realize, not so much in the colour of the plants as in their ability to function *characteristically*.

Notes

L. karasmontana s.l. is certainly one of the best white-flowering lithops for horticulture. It is easy to grow though slow to slough, and has so many attractive variants that one can collect and enjoy dozens of plants without the fear — or even the possibility! — of repetition. Var. *karasmontana* changes its shades and its patterning throughout the year, the checkered reds tending to knit together while pale faces grow more opalescent. Both *"opalina"* and var. *aiaisensis* can resemble the pallid forms of *L. julii* subsp. *julii* to a disconcerting extent; in colour and in their blank polish, all three can be very similar. However, var. *aiaisensis* almost always shows chicken feet, while *L. julii* shows lip smears (chickens don't have lips), and a proper *"opalina"* has a hint of cold blue not seen in its less frigid relatives. Narrow distinctions, of course. The "Signalberg form" (Cole 65 (fig.26), Cole 328) tends to have a slightly rusty or pale yellowish apex but can best be recognized by a certain overweight, top-heavy quality.

Some dull specimens of var. *tischeri* can be confused with var. *lericheana*, which is usually much paler, even manifesting a weak green colour in some cases. The most rubicund specimens of var. *tischeri* can closely resemble *L. schwantesii "gulielmi"* and can best be distinguished, in the absence of flowers, by their slightly pitted angularity. Incidentally, the images of *"L. gulielmi"* in Nel's book — Kraemer's watercolour, and the black and white photograph, which obviously shows the same pale grey plant — have nothing to do with *L. gulielmi* L. Bolus. I puzzled over this for years and only recently noted that Nel cites two localities for Bolus' taxon: farm Florida (as recorded by Bolus), and Ai-Ais! The latter record antedates Littlewood's 1961 discovery by at least fifteen years, and must be the one represented in Nel's illustrations. In yet another confusion, some *L. marmorata* specimens really do resemble subsp. *bella* (hence the old citations by Bolus and Fearn), but they invariably lack rubrication and ochre.

Cultivars

Subsp. *eberlanzii* has given rise to another gustatory sensation: 'Avocado Cream' (fig.139, p.79). Unfortunately, most seedlings have the muddy colour of oxidized guacamole, only a few have the much-desired clear green. The milkiest forms of *"opalina"*, and the ruddiest *"lateritia"* forms, have also achieved a kind of cultivar status via their long-attempted purifications. I am still attempting to achieve a purple-topped *"lateritia"* — I know it is possible, because Harry Johnson, the famous California nurseryman, had one in his propagation house; I saw it in 1977. It was probably bred from Triebner's old stock, though Johnson also worked with material from de Boer. (In the trade, *"lateritia"* has usually been identified as *"summitatum"*, and de Boer also used the name "var. *summitatum*" for the pure red-topped cultivar of var. *karasmontana*. But it is clear from Dinter [as filtered via Schwantes] what the names should signify. *Lateritia*: "top surface flat, brick red to bright orange, with eight to ten humps. The marking is hardly discernable ... cone and the tips [i.e., the upper sides] are india-rubber grey" [Flowering Stones: 231]. *Summitatum*: "color like that of *L. karasmontana* [brownish greyish blue] ... with very much branched, little impressed grooves." Since these forms occur together in nature, the names have a very minor import at this point!)

Out of all the var. *aiaisensis* seeds I've received from Naureen Cole, I once obtained a fantastic plant, topped a bizarre bright orange. It has the typical *aiaisensis* hardness and shape, so I don't think it can have been a mistake. I have of course been breeding this beauty, though its offspring come out honey brown at best.

L. lesliei (N.E.Br.) N.E.Br. subsp. *lesliei* var. *lesliei* (1912)

Named for T.N. Leslie, a keen mesemb lover; see his photographs in *Mesembryanthema* (1931).

Fig.35, p.29;
Figs.140–143, p.82;
Fig.228, p.112

Plant double- to multi-headed. Leaf-pairs large, roundish seen from above, truncate to slightly convex in side view, sides always brownish,

Figure 140. *L. lesliei* subsp. *lesliei* var. *lesliei*, Cole 352

Figure 141. *L. lesliei* subsp. *lesliei* var. *lesliei*, Walkerville

Figure 142. *L. lesliei* subsp. *lesliei* var. *lesliei* "*luteoviridis*", Cole 20

Figure 143. *L. lesliei* subsp. *lesliei* var. *lesliei* "*luteoviridis*", Cole 20

Figure 144. *L. lesliei* subsp. *lesliei* var. *hornii*, Cole 15 (TL)

Figure 145. *L. lesliei* subsp. *lesliei* var. *mariae*, Cole 141

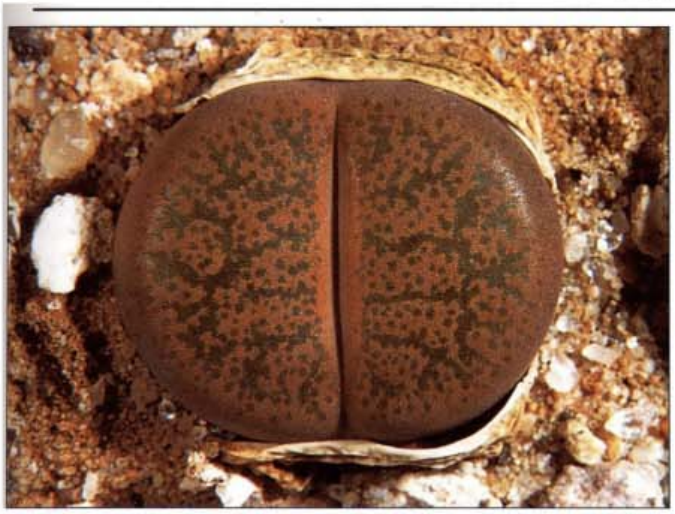


Figure 146. *L. lesliei* subsp. *lesliei* var. *minor*

Figure 147. *L. lesliei* subsp. *lesliei* var. *rubrobrunnea*, Cole 17

Figure 148. *L. lesliei* subsp. *lesliei* var. *venteri*, Cole 1

Figure 149. *L. lesliei* subsp. *lesliei* var. *venteri*, Kimberley, ex J. Brandt

Figure 150. *L. lesliei* subsp. *burchelli*, Cole 308

Figure 151. *L. lesliei* 'Fred's Redhead'

apex smooth, coffee-brown to grass green, grey green, pinkish-grey, or rust red, always windowed but highly variable in pattern, sometimes with a few star-like larger islands (as seen in the robustious "Pietersburg form"), commonly with numerous finely manic speckles which are usually ± agglomerated or filagreed, rarely lined or completely open. Border variable, sometimes wide and slightly raised like a dam, but often merging with the patterning, which vanishes towards the sides. Flowers large, clear yellow, rarely white, appearing mid-season; fruits 5–6-locular, seeds very large, reddish.

L. lesliei subsp. *lesliei* var. *hornii* de Boer (1966)

Named for Herkie A. Horn, born raconteur and collector. **Fig.144, p.82**

Distinctly orange-brown to pinkish-brown in colour, coarsely and irregularly patterned, and relatively opaque, this is almost a brown var. *venteri*! It clusters sparsely.

L. lesliei subsp. *lesliei* var. *mariae* Cole (1970)

Named for Maria Huysamen, who first noticed the distinctive features of this variant. **Fig.145, p.82**

Very similar to var. *lesliei*, differing mostly by the extraordinary fineness of its busy spots, which approach the resolution of good quality computer pixels. It is uniformly toffee-brown in colour and tends to cluster well.

L. lesliei subsp. *lesliei* var. *minor* de Boer (1961)

Named for its minimal dimensions. **Fig.146, p.83**

Differing by its narrowly oval outline, its dark reddish-green to Chinese red colour, very slightly greater sheen, and, principally, by its often-minute size. Its flowers are relatively small, but its seeds are very large! Some depauperate plants never develop more than two heads, others form beautiful multi-headed domes.

L. lesliei subsp. *lesliei* var. *rubrobrunnea* de Boer (1962)

The name comes from the Latin for red-brown. **Fig.147, p.83**

Differing by its purplish-red wine-stained coloration and subtle sheen. Some dyed-in-the-wool specimens are intensely red, others are pale greyish-red, and these seem less distinctive. Cole 204 is more beautifully coloured than Cole 17, the TL, though the populations are close. Both are quite similar to var. *minor*.

L. lesliei subsp. *lesliei* var. *venteri* (Nel) de Boer & Boom (1940)

Named for Major Hendrik Venter, who also collected haworthias and sired a botanist. **Figs.148–149, p.83**

Differing by its silent movie coloration: black, greyish and white, and by its often-jagged patterns. In many cases the windows are black and wide-open; this form was described by de Boer as *L. lesliei* var. *maraisii*, a name now subsumed under var. *venteri*. None of the *venteri* forms show the green-undertoned brownish or reddish colours so typical for var. *lesliei* but they all tend to have a certain "powdery" or rough-dusty look.

L. lesliei subsp. *burchellii* Cole (1988)

Named for William Burchell, the extraordinary 19th-century naturalist who first recorded the existence of plants that could be mistaken for pebbles.

Figs.150, p.83

This differs by its smaller size, sparser head count, finely linear or "meshlike" markings, club-shaped marginalia and bluish-grey concrete colours. It shares with var. *venteri* a tendency toward a dark central window patch; until 1988 the Coles distributed it as var. *venteri* "Douglas form", though it is much slower to grow than any *venteri*. Its flowers are often rather puny.

Distribution

In nature as in horticulture, *L. lesliei* is the most widespread of all *Lithops* species. Var. *lesliei* fills a bloated rhomboid bordered by Tzaneen in the north-east, Lobatse (Botswana) in the north-west, Kimberley to the south-west, and Harrismith to the south-east, though the shape is slightly spoiled by an outlier near Zastron and, probably, by 100 others. Colonies can even be found within greater Pretoria, though the rapid expansion of that city has obliterated several beautiful sites. Contained within the vast *lesliei*-rhomboid, vars. *minor* and *rubrobrunnea* occupy small zones west and north-west of Johannesburg, near Swartruggens and Randfontein, respectively. Var. *mariae* is found much further south-west, near Boshof; further south-west, we find var. *hornii* randily inching towards *L. aucampiae*'s turf, and north of that is a gaggle of var. *venteri* populations, which come in obvious contact with var. *lesliei* (Cole's "Kimberley form"). Subsp. *burchellii* occupies an isolated patch near Douglas, some 100 kilometres south-west of the nearest *venteri*; as is often the case in this genus, we find strong distinctions on the fringe of a general distribution. Though brown sandstone seems to be a common factor for this complex, some of the varieties are specialized; *hornii* likes chert with dolorite, *mariae* a "fine-grained sandstone shale", *rubrobrunnea* a striking rhubarb-red (!) siltstone, so beautifully visible in Cole's photograph, while both var. *venteri* and subsp. *burchellii* favour calcrete, not surprising in view of their mutual coloration.

Notes

L. lesliei s.l. is ideal for the novice as it comes from districts where rain falls mostly in summer and often amply, so it forgives and almost welcomes excess. It was Cole's first lithops — mine too — and it remains the wholesale lithops par excellence, as seed has long been available in large quantities. Many of the unnamed Cole colonies, e.g., Cole 10, 33, and 138, are as distinctive, attractively odd, and recognizable as the named variants. The cinnamon-coloured "Warrenton form" (Cole 5, 36 and 96) is robust and speckled; the "Grey form" (Cole 8, 9 and 151) is, well, grey. The "Kimberley form" seems to represent the meeting of var. *lesliei* and var. *venteri* and looks very much like de Boer's artificial hybrids of those two. The former "*luteoviridis*" (Cole 20; figs.142–143, p.82) is not exactly yellow green, as its name would suggest, rather it is a lively but veiled green and has a peculiar buttery smoothness. Peter Bosch's "Walkerville form" (non-Coleoric) is extremely small, but unlike the blackish-red var. *minor*, it has a pale cinnamon colour and a fine, *mariae*-like dotting.

Cultivars

L. lesliei var. *lesliei* 'Albinica' has lost its brownish pigments, cannot find them again, and is thus a bright yellowish-green; its flower has suffered a similar absence and is pure white. 'Storms's Albinigold' is essentially the same thing, but it has gold (or even, by way of overcompensation, apricot-orange) flowers. 'Witblom' is var. *minor* with a white flower, while 'Albiflora' is var. *lesliei*, likewise white-flowered (this mutation has been seen in widely disjunct populations). 'Greenhorn' is an albinistic var. *hornii*; it was lost for many years, but recently reappeared in one of Frik du Plooy's seedling trays. 'Fred's Redhead' (fig.151, p.83) is a fantastic neon-red sport of a normal Warrentonian var. *lesliei*; self-fertility has given it a few new playmaids. It resembles an idealized var. *rubrobrunnea*, but it actually originated as a red-headed branch of a normal (!) brown plant.

×*Dinterops* 'Stonesthrow' is a hybrid between *L. lesliei* 'Albiflora' and *Dinteranthus vanzylii*. It is unusually strong and produces fertile offspring which resemble the proper *D. vanzylii* after a visit to the tannin parlour. A few of the offspring produce the white flowers of their grandam; I have crossed these together and will probably obtain a white-flowered virtual *D. vanzylii*!

Figure 152. *L. marmorata* var. *marmorata*, clonotype

Figure 153. *L. marmorata* var. *marmorata* "*framesii*", Hammer & Liede 572

Figure 154. *L. marmorata* var. *marmorata* "*umdausensis*", Hammer & Retief 462B

Figure 155. *L. marmorata* var. *elisae*, Cole 252

Figure 156. *L. marmorata* 'Polepský Smaragd'

Figure 157. *L. naureeniae*, Cole 304

L. marmorata var. *elisae* (de Boer) Cole (1961)

Named for J.J. Elisa van den Thoorn, a Dutch succulentophile. Fig.155, p.86

Larger than var. *marmorata* and sometimes forming big clumps, leaf-pairs often widely divergent and slightly twisted, window usually somewhat obscured by broad creamy whitish bands which rarely achieve total, blinding, opacity and which are sometimes subdivided.

Distribution

This species has a number of geographic forms, some of which complicate the *marmorata/elisae* dichotomy as presented above. The *"framesii"* form (fig.153, p.86), from the western edge of Bushmanland (Concordia to Kangnas) has pinkish or violet grey tints in its cataracted windows and represents the easternmost extension of the species. The *"diutina"* form, from further west (much nearer Steinkopf), tends to be greener and smaller, more narrowly elliptic (more helmutiesque); even further to the west, the *"umdausensis"* form (fig.153, p.86) often has brown and ivory tints. But at Umdaus (a valley north-west of Steinkopf) I have seen this form growing right next to a perfect "virtual-*elisae*", on pegmatite. Rock-types may influence the issue; var. *marmorata* favours white or rusty-gold quartzite, while var. *elisae* is associated with coarse calcrete and gneiss pebbles.

Notes

Mesembryanthemum marmoratum N.E.Br. was published along with *M. locale* — same page — but unlike *locale*, it never caused any identity crisis, as living material was always available. It is, however, redundant or ironic to speak of a *"framesii"* form of *L. marmorata*, since that is an exactly synonymous synonym, described from the same plant-rich area as Brown's original material. "*L. marmorata* is all around Springbok & Steinkopf, and abundant also further east. The Kennedys showed us where a suitable spot was within reach of camp fire wood. Then to select a place and make a little fire — but wherever we looked, plants of *L. marmorata* would have been cremated & assuredly were for they were just all over." (Hall to Hammer, 1981.)

As implied above, var. *marmorata* and var. *elisae* can be confused. There are a number of intermediate forms around Jakkalswater, but I was recently introduced to a pure stand of var. *elisae*: massive, uniform, beautifully opaque plants, they looked strikingly different from any forms I'd seen elsewhere. This might have been merely a matter of deeper soil and a single-mothered brood, but still, it was impressive. Gratuitous confusions are possible between var. *marmorata* and *L. geyeri*, especially as both have pinkish tinges, though *L. geyeri* tends to be more delicate, and often has creamier markings; *L. naureeniae* (q.v.) also confuses the picture, resembling some eastern marmoratas in colour and patterning.

Horticulturally, var. *marmorata* is easy and long-persistent, see fig.152, a cutting of Brown's original plant! Some of the pinker forms are extremely attractive. Var. *elisae* is a bit touchier; it is easy enough to grow, but to keep it nicely coloured and compact requires much brightness, otherwise its otiose stacked leaves have as many chins as a Chinese directory.

Cultivars

'Polepský Smaragd' (fig.156, p.86) arose in Czechoslovakia and matured in the Czech Republic. "Smaragd" (Czech for emerald) was well-chosen; the plants have a really green colour, an intensification of the shade often seen in some Steinkopf populations. I have also selected out some especially pinkish seedlings, reared from my old Triebner material. Perversely, I am working on a completely opaque var. *elisae*, a new kind of defenestration, and not of Prague. It resembles a hypothetical meeting of *L. meyeri* and *L. ruschiorum*.

L. meyeri L. Bolus (1932)

Named for the Reverend Gottlieb Meyer, who often explored the lonely byways of Namaqualand during his stints as pastor at Komaggas and Steinkopf. Figs.158–159, p.90

Plant slowly forming large multi-headed clusters. Leaf-pairs rubbery, oval seen from above, deeply cleft, markedly divergent, apex convex in side view, smooth, creamy whitish-green, sometimes faintly suffused with pink, variable in pattern but usually dimly to streakily windowed, window often adorned with faint bluish or green spots, these lightly raised. Flowers large, deep yellow with a white centre like a nougat bar, appearing in mid-autumn; fruits 5-locular.

Distribution

This is one of the few Richtersveld lithops; curiously, the genus is not well-represented there, though *L. meyeri* is common enough on the rubbly quartzite plains near Brakfontein. It occupies a narrow area *ca.* 25 kilometres long from north to south, and exhibits very little local variability. Note that the nearest other species — *L. herrei*, some 30 kilometres to the north-west, and *L. geyeri*, as far north-east — are both members of the yellow-flowered, white-centred group.

Notes

This uniform species is easy to grow, but it is not always neat, as the thick old leaves are most reluctant to dry up. It presents the same liabilities as *L. marmorata* var. *elisae*, q.v. Some of the *L. meyeri* in the trade is "infected" with *L. herrei*; such hybrids are impossible to place or trace, particularly when recrossed.

Cultivars

L. meyeri 'Hammeruby' (fig.160, p.90), named when the present author colluded posthumously with the Old Testament lawgiver, has a beautiful milky carmine colour, something like raspberry ice cream. Its flowers are nearly orange and their stigmas resemble threads of saffron! It was produced by selfing a single reddish mutant, a plant collected near Vlakmyn. The selfing gave rise to a small brood of reddish plants and two grey ones; those two, pollinated together, produced a further batch, superior in shade, inferior in vigour. Some of them have a shade richer than that of the most famous red cultivar, *L. optica* 'Rubra'.

L. naureeniae Cole (1980)

Named for Naureen Cole, Desmond's wife, scholar of *Lithops*, kind midwife to 1,000,000 plants, keen observer of many thousands.

Fig.157, p.86

Plant forming small or large multi-headed clusters. Leaf-pairs oval seen from above, slightly to widely divergent, deeply fissured, apex convex in side view, smooth, dull brown-green to pale orange-brown, usually coarsely and strikingly spotted with star-like patterns, always windowed, borders sharply defined, not by texture but by a special translucence. Flowers golden with white centres, shining, appearing very late in the autumn — usually, with *L. olivacea*, it is the last of the yellows; fruits 5–6-locular.

Distribution

This species has a very restricted geographic range on the eastern fringe of the Kamiesberg, and is (accordingly?) quite uniform. It occupies brownish and pinkish gneiss on low ridges, and keeps diverse company: a strange, white-flowered form of *Conophytum lithopsoides*, and an equally displaced *C. stevens-jonesianum*. What intrigues me is that *C. lithopsoides* has characteristic company elsewhere: *L. marmorata*.

Notes

In the two decades since its discovery by Peter Bruyns, only a few more populations of *L. naureeniae* have turned up. It was initially suspected to be a southern variant of *L. marmorata*, but its more divergent leaves have brownish tones, and its rather broad yellow petals also set it apart. It has far closer links with *L. olivacea*, which is more compact, and with *L. helmutii*, which is never orange or brown. *L. naureeniae* looks best when given quite a lot of bright light but it also grows well in subdued light; in such lobotomizing circumstances it hardly needs water at all, happy (if flowerless) in its stasis. A few plants never show brown pigments; these are especially easy to confuse with other species.

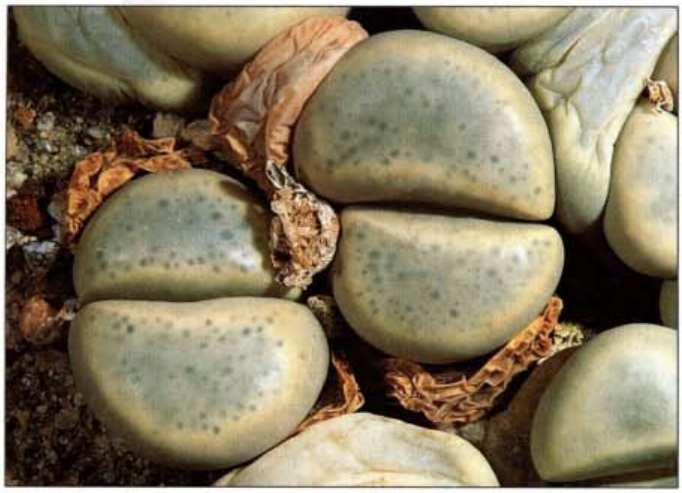


Figure 158. *L. meyeri*, N. Brakfontein

Figure 159. *L. meyeri*, N. Brakfontein

Figure 160. *L. meyeri* 'Hammeruby'

Figure 161. *L. olivacea* var. *olivacea*, Achab

Figure 162. *L. olivacea* var. *nebrownii*, ex. M. Bayer

Figure 163. *L. olivacea* 'Red Olive'

Figure 164. *L. optica* "Maculate form", Cole 311

Figure 165. *L. optica* 'Rubra'

Photo: John Trager

Figure 166. *L. optica* 'Rubra', F_6 ex Cole 81A

Figure 167. *L. otzeniana*, ex S. Hammer 531

Photo: John Trager

Figure 168. *L. otzeniana*, ex Cole 280

Figure 169. *L. otzeniana* 'Aquamarine', Cole 128A

L. olivacea L. Bolus var. *olivacea* (1929)

Named for its olive-green epidermal colour. Fig.161, p.90

Plant forming a compact cluster, small or large. Leaf-pairs small, contiguous but deeply fissured, round in outline, convex to truncate in side-view, firm in texture, apex smooth but often slightly keeled, olive-green to bluish-green or greyish-pink, always well-windowed, window fingernail-like, usually (very) sparsely spotted, rarely streaked or immaculate. Flowers appearing very late in the season, yellow with a white centre, long-lasting; fruits 5-locular.

L. olivacea var. *nebrownii* Cole (1988)

Named for N[icholas] E[dward] Brown, author of *Lithops*; he originated the modern concept of Mesembryanthemaceae as a family with manifold generic divisions. The specific epithet "*nebrownii*" had been used earlier, by Arthur Tischer, when he published *Gibbaeum nebrownii* as a surrogate for Brown's *Imitaria muirii*. Fig.162, p.90

Distinguished by its more robust bodies, by the greater divergence of its leaf-pairs, and by its somewhat more reddish coloration.

Distribution

The natural range of *L. olivacea* involves a puzzle: it hasn't been seen in recent years around its type locality, the Kakamas area, despite the apparently reliable original record, yet W. Giess has reported it from nearby Keimoes, even further east! All other modern collections come from the vicinities of Pofadder, Namies, and Aggeneys, 100–200 kilometres west of Kakamas. (I might note that several other Kakamas records have not been confirmed, notably those for *Conophytum fulleri*, which is also known only from points far west of its reliably reported TL. Have the succulents been razed for grapes?) Around Namies, var. *olivacea* is common on white or brownish quartzite, on level sites (quartz-strewn plateaux) or on ridges, barnacled in semi-shade. Near Aggeneys, var. *nebrownii* (Cole 162B), occurs on red-stained quartzite. It is interesting that this variety lies right at the south-westernmost end of the distribution area, bringing it relatively close to *L. naureeniae*. *L. helmutii* lies almost equally close, to the north-west, not the south-west.

Notes

Another of the indestructibles, *L. olivacea s.l.* is excellent for beginners, while old hands can hunt for seedlings which lack all spotting or which have radically unlike patterns on each half of a leaf-pair. With age — one decade or more — the plants form beautiful, tightly knit, dome-like structures. The frequently seen misspelling, "*olivaceae*", seems to derive from a mythic dedicatress, Olivace, evidently related to the immortal Mrs. Parks of Haworthian fame.

Cultivars

L. olivacea var. *nebrownii* 'Red Olive' (fig.163, p.90) has a permanent cherry-red blush. The seedlings I've raised have been abnormally slow but are well worth the wait, since their colour is strikingly clear. The cultivar originated in a batch of seed collected by Bruce Bayer near Aggeneys. Several seedlings were deeply pinkish, but one was outstanding. (It is not clear how close Bayer's population was to Cole 162B, so the identification with var. *nebrownii* is tentative.) A "Minor form" of var. *olivacea* was reported by the Coles early on (ex Cole 109, the northernmost population), but they never made much of it, and my efforts to up or down the ante have not been quite successful. That is a pity, as I recall some uniformly and charmingly minute clusters which Naureen Cole donated to Kirstenbosch in 1985. *L. olivacea* × *L. marmorata*, a hybrid I made a decade ago, is represented by many very strong little plants which look like stubby marmoratas. They produce mostly yellow flowers; in some cases white dominates all but the tips of the petals. The plants have little horticultural merit, belonging to the instructive, rather than the attractive, camp, but they are awfully vigourous!

L. optica (Marloth) N.E.Br. (1910)

Named for the Latin for "eye-like". Fig.164, p.91

Plant double-to-quadruple-headed or forming a substantial cluster, often branching quickly from side-axils. Leaf-pairs smallish to large, often radically unequal on one plant, deeply fissured, oval in outline, strongly convex in side-view, rather soft in texture, smooth, never roughened or grooved, pale whitish-green to bluish-green or greyish-pink, rarely empurpled, usually well-windowed, window often clear, sometimes heavily spotted or streaked, especially in the southern "Maculate forms" (fig.164). Flowers small, appearing mid-autumn (southern forms) to late in winter (northernmost forms), white, sometimes with a pinkish flush, petals short, often insubstantial, malformed (in hort.) and nearly hyaline; fruits 5–4-locular, soft.

Distribution

This Namibian is native to fog-belts near the Atlantic coast, from slightly north of Lüderitz to a point some 60 kilometres north-west of Oranjemund, always within 35 kilometres of the coast. It does not cross the Orange River unless one argues that it changed its name and became *L. herrei* at Alexander Bay. It occurs mostly on dark gneiss and quartzite, with some calcrete, often amongst patches of blown sand. The coastal winds are often severe, and the plants can be badly stunted and wind-whipped. The distribution of the white-flowered *Fenestraria rhopalophylla* subsp. *rhopalophylla* parallels that of *L. optica*; the distribution of *L. herrei* parallels that of the yellow-flowered *Fenestraria rhopalophylla* subsp. *aurantiaca*, though the latter manages to reach Kleinzee, a point much further south.

Notes

L. optica is the autumn-thirstiest of the lithops and the last to flower. Indeed it behaves like no other species (apart from its jaundiced twin). It is very slow to absorb its old leaves and probably grows best when given frequent mistings rather than sporadic deep soakings. It is, however, a bit sensitive during hot humid periods and is prone to swift and total rotting. The southernmost opticas, the so-called "Maculate forms", are very attractively patterned with opaque white patches. It is notable that the various populations behave strictly according to the solar clock, flowering over a two-to-three-month period, from south to north. The southernmost populations flower along with *L. herrei*. (I write this based on my experiences in the northern hemisphere.) The basally sprouting habit of *L. optica*, most obvious in northern plants, is otherwise very rare in the genus. In cultivation, *L. optica* is prone to small brownish depressed lesions which might be bacterial in origin. Usually they are not present on newly emerged heads, but they appear as the season wears on. They do not seem to spread from one plant to another.

Cultivars

L. optica 'Rubra' (figs.29 & 32, p.28; figs.165 & 166, p.91) is the oldest and most renowned of the cultivars; a colour (!) photograph of it was published in Germany some 75 years ago. (It is noteworthy that similar mutations have now been seen in *Tanquana*, *Pleiospilos*, and especially *Conophytum*). A good 'Rubra' has a fine, ruby-red intensity, and it is always a bit shocking, when unpotting a seedling, to note that this Popo's private bottom is pure, non-blushing green. But it is a very peculiar 'cultivar', as it also exists in nature! I have seen little stands of it — ten to twenty plants huddled together in the road — near Lüderitz. I have never seen photographic evidence (optica illusions?) of the "large stands" reputed to exist around that town, but I wonder if they have any connection with the Dutch-made Rubras supposedly repatriated in the 1950's, life imitating artifice. Of the various horticultured Rubras, my fifth generation Cole 81A seedlings are probably the darkest and certainly the most stable; Cole 287 is paler and still throws *ca.* 10% grey plants. Seeds I collected on the road just mentioned gave me *ca.* 50% reds, with a good but not superb colour. Most Rubras flower very late; so do the grey plants they grow with and derive from. A yellow-flowered 'Rubra', once reported by me on the basis of a photograph, was actually 'Rubra' × *L. geyeri* or *L. herrei*. *L. optica* (a normal grey one) × *L. herrei* "*translucens*" yielded many strong plants and no weaklings (see fig.33, p.29 for seedlings of *herrei* × *optica*). These are predominately yellow-flowered, but a few have white or canary flowers.

Figure 170. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella*, Cole 67

Figure 171. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella*, SW of Windhoek, ex R. Hoffman

Figure 172. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella* "Pallid form", Cole 264

Figure 173. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella* "*alpina*", Cole 68

Figure 174. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella* "*mundtii*", Cole 100

Figure 175. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *pseudotruncatella* "*malpina*" ("*mundtii*" × "*alpina*")

Figure 176. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *elisabethiae*, Cole 187

Figure 177. *L. pseudotruncatella* subsp. *pseudotruncatella* var. *riehmerae*, Cole 97

Figure 178. *L. pseudotruncatella* subsp. *archerae*, Cole 104

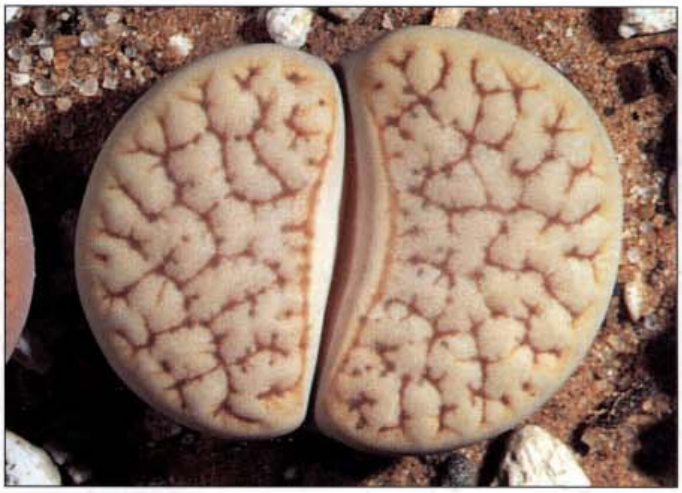


Figure 179. *L. pseudotruncatella* subsp. *dentritica*, Cole 71

Figure 180. *L. pseudotruncatella* subsp. *dentritica* "*farinosa*", Cole 245

Photo: John Trager

Figure 181. *L. pseudotruncatella* subsp. *dentritica* "*pulmonuncula*", Cole 72

L. otzeniana Nel (1937)

Named for M. Otzen, secretary for the Consolidated Diamond Mines (he worked at Lüderitz) and collector of this fissured gem.

Figs.11–12, p.13; Figs.167–168, p.91

Plant slowly forming a substantial cluster. Leaf-pairs large, deeply fissured, oval in outline, convex in side-view, face pale greyish-green to bluish-green or greyish-brown violet, rarely orange tan, well-windowed, margins scalloped, with a similar bas-relief often adorning the central window; fissure zone obvious and puffy. Flowers appearing mid-season, large, yellow with white centres; fruits 5-locular.

Distribution

This is best known from Brakfontein farm (there is no point in hiding that light under a windowed bushel) north-west of Loeriesfontein. At Brakfontein one can actually follow the movement of the plants as they wend along the obvious watercourse, not that it rains much there. The farm has other interesting mesembs: *Cylindrophyllum hallii*, *Conophytum concordans* [= *Ophthalmophyllum villetii**], and *Conophytum lithopsoides* subsp. *arturolfago* [= *C. "rawei"* Tischer n.n.]. Both conophytums are related to taxa occurring to the west and north-west, at Kliprand and Gamoep, and they do not grow with the lithops, which prefers slopes and hillocks of gneiss (they prefer quartzite ridges or quartzite-gneiss "vlaktes" [plains]. There are other *L. otzeniana* populations around this area, over a fifteen-kilometre strip, but the population which really intrigues me is the disjunct, unnumbered one seen on Cole's map, some 20 kilometres north of Kliprand and nearly 100 kilometres apart from the classic habitats. What is it like?

Notes

In habitat *L. otzeniana* looks magnificent; it can also be one of the most beautiful species under cultivation. It overinflates too readily, and deflates too slowly, to be called "easy", but one can usually select out some tractable clones — or this will happen anyway, by default. *L. otzeniana* behaves and looks somewhat like *L. comptonii* var. *weberi*, though that occurs far to the south. (The tendency to assume that closeness on the map equates with closeness of lineage is hard to resist, but one has to remember that we are only seeing present-day patterns, and fragments at that.) The only other possible relative would be *L. viridis*, closer in miles, more distant in pattern.

Cultivars

L. otzeniana 'Aquamarine' (fig.169, p.91) is much sought-after but little seen. The original plant has a vivid turquoise shade not noted in any of its lacklustre descendents; those tend merely to be kermit-green. I once tried to breed an "islandless" form (as seen in Nel's *Lithops*), and succeeded, but the plants are quite dull. What makes this species so very delightful is precisely the cartoonish exaggeration of its bold patterning.

* A name which I foolishly subsumed under *C. caroli* before my second trip to Brakfontein. While *C. concordans* (one of Gov. Rowley's renominations) is certainly related to *C. caroli*, it lacks the peculiarly colourless and doubled flowers of that Kliprandish taxon, and it has narrower greener bodies which are convex on top. *C. concordans* occurs not only at Brakfontein but also on a gneiss patch some 40 kilometres south-east of Springbok.

L. pseudotruncatella (Berger) N.E.Br. subsp. *pseudotruncatella* var. *pseudotruncatella* (1908)

Named for its history: it had been confused with *Mesembryanthemum truncatellum* Haw. (= *Conophytum truncatum* (Haw.) N.E.Br.); see Berger in Mesembrianthemen und Portulacaceen (1908). N.E. Brown: Why *do* the Germans choose such horrible names?

Fig.31, p.28; Figs.37–38, p.32; Figs.170–175, p.94; Fig.188, p.99; Fig.227, p.112

Plant double-headed or very slowly forming a substantial cluster. Leaf-pairs large, rarely very small, well-fused to almost completely fused (the fissure sometimes reduced to a pit), round in outline, sometimes reniform ("*mundtii*", fig.174), strictly truncate in side-view, face

Figure 182. *L. pseudotruncatella* subsp. *groendrayensis*, Cole 246

Figure 183. *L. pseudotruncatella* subsp. *volkii*, Cole 69

Figure 184. *L. pseudotruncatella* 'Split Pea', ex Cole 104

Figure 185. *L. vallis-mariae*, Cole 238

Figure 186. *L. vallis-mariae*, Cole 166

Photo: John Trager

Figure 187. *L. vallis-mariae* "var. *margarethae*", Cole 167

pale tan to brownish-orange or shiny bronze ("*alpina*", figs.37–38 & 173) to whitish-pink ("Pallid form", figs.31 & 172), appearing waxen, smooth, never grooved, windows present but often reduced to tiny grease spots which are sometimes serried into rows, margins vague, bevelled, fissure showing a "hymen" (the membranous proof of leaf-union). Flowers appearing early in the season (late spring to early summer!), large to huge, yellow; fruits 5–6-locular, rotund and fragile.

L. pseudotruncatella subsp. *pseudotruncatella* var. *elisabethiae* (Dinter) de Boer & Boom (1933)

Named for Elisabeth [not Elizabeth] Schneider, who collected the plants for Dinter the year before he described it. Nel sank the species; Triebner and Schwantes defended it.

Fig.176, p.95

Plants robust but rarely having more than two fat heads, face reddish-pink to coppery (Triebner: "bright brick red"), red-lined, semi-glossy, windows sometimes appearing as vague blue shadows.

L. pseudotruncatella subsp. *pseudotruncatella* var. *riehmerae* Cole (1987)

Named for its discover, Edith Riehmer, who shared her first name with N.E. Brown's daughter. The name *L. edithiae* (named for E. Brown) was erroneously but coincidentally applied to this variant.

Fig.177, p.95

Plants small, often slow to recrudesce and rarely more than two-headed; apex faded in colour, grey-pinkish to bluish-pink, subtly spotted, very smooth.

L. pseudotruncatella subsp. *archerae* (de Boer) Cole (1967)

Named for Jacoba Archer, who found it on an unusual formation.

Fig.178, p.95

Plants slowly clustering. Leaf-pairs softer than in var. *pseudotruncatella*, slightly puffy and tender, robust in size, very pale brown to grey-green to pistachio-greenish, patterns often nebulous, more striped than spotted; flowers appearing later, and rot appearing sooner, than in var. *pseudotruncatella*. The tannin patterns of subsp. *archerae* match those of its southern neighbour, *L. schwantesii* var. *urikosensis*, but they also match those of subsp. *dendritica* to the north.

L. pseudotruncatella subsp. *dendritica* (Nel) Cole (1946)

Named for its well-branched, tree-like patterns.

Fig.2, p.8; Figs.179–181, p.95; Fig.189, p.99

Plants usually single, rarely double. Apex somewhat duller or "grittier" than in var. *pseudotruncatella*, pinkish to yellowish-bronze, strongly lined with reddish or brownish branching patterns which are slightly impressed and sometimes broad; some forms are finely patterned and pale greyish-tan, often with small white mottles ("*farinosa*", fig.180), grease spots generally absent. Flowers appearing a few weeks later than those of var. *pseudotruncatella*.

L. pseudotruncatella subsp. *groendrayensis* (Jacobsen) Cole (1961)

Named for the farm Groendraai (green bend) which, like many Afrikaans names, has a number of variant spellings in active use. Triebner found the plants there in the year of his death, 1957.

Fig.182, p.97

Plants single-bodied; apex flat, pale greyish-white with a granular, sometimes wrinkled, texture and no sheen; patterned with dark, very fine dots and lines, or quite blank.

L. pseudotruncatella subsp. *volkii* (Schwantes ex de Boer & Boom) Cole (1961)

Named for Dr. Otto Volk, specialist in the flora of Namibia, where he was interned (no, not that kind of intern) during the Second World War.

Fig.183, p.97

Plants sparsely clustering. Apex slightly convex, milk-white to bluish-white, "as if varnished" (Schwantes), patterns vague or nearly absent; fruits with a slight tendency to exceed the normal locularity, as first noted by Schwantes.

Distribution

L. pseudotruncatella s.l. is headquartered around Windhoek, which is ringed by it for some 200 kilometres, from Steinhausen in the north-east to Klein Aub in the south-west. Var. *pseudotruncatella* occupies the upper half of this area. South and south-east of Windhoek there are two similar outliers close together, both on white quartzite: var. *riehmerae* and subsp. *volkii*. South of these three taxa, there is a great drift of subsp. *dendritica*, with subsp. *groendrayensis* on its eastern flank and subsp. *archerae* to its south. Remarkably, var. *elisabethiae* lies some 150 kilometres to the north of any other *pseudotruncatella* variant (and even further from any other species!). Splendidly isolated, it occupies a unique habitat on the Great Waterberg, where it receives some 600mm of rain per year. Triebner: "The plants stand directly on the little gneiss bank, in a bed of gneiss less than 2cm thick, on a slope so that surplus rainwater can run off. When I collected there two years ago, the water from the mountain flowed over the plants without harming them." Only one small population is known, paralleling the cases of *riehmerae*, *volkii*, and, especially, *L. werneri* (q.v.). Quartzite is the dominant rock for the whole complex, with some additions: gneiss plus quartzite for *elisabethiae*, quartzite plus calcite for *volkii*. The big surprise is *archerae*, which nestles in dolomite and limestone. This is unique for a *pseudotruncatella* variant, though not for the related taxon, *L. schwantesii* var. *urikosensis*.

Notes

L. pseudotruncatella is one of the most satisfactory species for cultivation, easy to grow and florally reliable. It has proved its potted worth for more than a century. It does, however, take some years to flower, because it passes through a series of juvenile stages; the fissure lengthens with each successive moulting and is only fully developed after the fourth or fifth moult, making it the slowest to mature of all

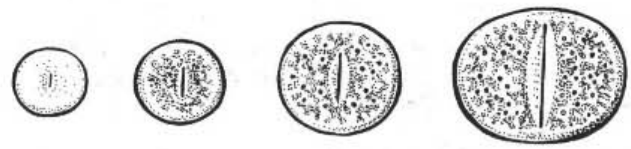


Figure 188.
Fissure development in *L. pseudotruncatella* (from left to right); six months; 1 year; 2 years; 3 years

lithops (fig.188). (It is possible for it to flower while still short-fissured, say, at three years old; it is also possible for it never to develop a long fissure at all.) Only in this species are hymens fully renewable; these little vestigial membranes are also seen in other species, particularly in *L. gracilidelineata*, but not as readily (fig.189).

Some of the lapsed taxa deserve horticultural (and taxonomic?) attention: subsp. *dendritica "pulmonuncula"* (Cole 71), wonderfully named from the Latin for "little lung", has a vivid pink color and a slight convexity, standing halfway between subspp. *dendritica* and *pseudotruncatella*, while *dendritica "farinosa"* (Cole 245) has a fascinating paleness, almost suggesting that of its neighbour, subsp. *groendrayensis*. Var. *pseudotruncatella "mundtii"* (Cole 99 and 100) is very large and has a nice brown to

Figure 189.
L. pseudotruncatella subsp. *dendritica*; note the inner membrane.

Figure 190. *L. verruculosa* var. *verruculosa*, Cole 159

Figure 191. *L. verruculosa* var. *verruculosa*, Cole 95

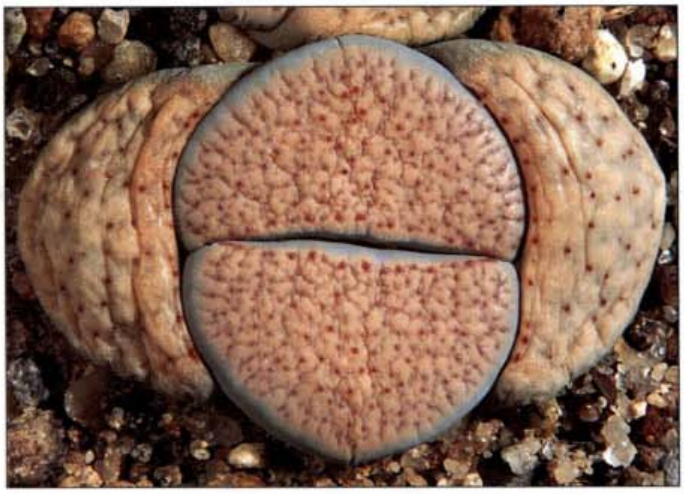


Figure 192. *L. verruculosa* var. *glabra*, Cole 160

Figure 193. *L. verruculosa* var. *glabra*, Cole 160

Figure 194. *L. verruculosa* 'Rose of Texas'

Figure 195. *L. verruculosa* 'Verdigris', ex Cole 159

yellow-brown polish, while *"alpina"* can be tiny, especially the plants derived from Cole 68. The "Pallid form" (Cole 264) has never received a formal name. It seems as distinctive as the other pale-skinned pseudotruncatellas, subsp. *volkii* and var. *riehmerae*, and neatly links up with them, geographically, occurring a bit further to the west. Cole 264 can be distinguished by its extreme truncation; the Flat Earth Society could use it as a model. It makes a beautiful plant when grown on the hard side. Var. *elisabethiae* is large and beautifully coloured. It is also extremely tolerant — or even fond — of copious watering. "I saw *L. Elizabethae* [sic] at Waterberg flooded for weeks by the water flowing down from the mountains, yet when the dry weather returned only *one* plant had suffered." (Triebner, quoted in Flowering Stones, p.243.)

Cultivars

L. pseudotruncatella 'Albiflora' has only been reported once, and then as a single specimen. Some plants of Cole 68 have very pale flowers; backcrossing of these should yield white ones. It is also possible to breed *"alpina"* for a consistently dwarf habit. I once crossed it with *"mundtii"* and got a range of large and small plants (fig.175), though *"mundtii"* was the more influential parent. Subsp. *archerae* 'Split Pea' (fig.184, p.97) has the colour of the well-known potage. When the plants crack out in spring they have a very pale and delicate colour which darkens slightly by summer.

L. ruschiorum (Dinter & Schwantes) N.E.Br. var. *ruschiorum* (1925)

Fig.28, p.25; Figs.196–197, p.102

Named for the Rusch family; they lived near Windhoek and all took a keen interest in their flora. The Rusches — especially Ernst and his daughter Angelika (*Conophytum angelicae*) — were extremely helpful to both Dinter and Schwantes. It was Ernst who first noticed the correlation between flower colour and juvenile fissure structure in *Lithops*, and his daughter Marga who "invented the method, when looking for Lithops, of sitting on a rock and staring at the nearest bit of ground, thus letting herself be hypnotised." (Schwantes 1957: 190.)

Plants small to large, slowly clustering, some forms (*"nelii"*, fig.197) forming considerable mats in age. Leaf-pairs oval or round seen from above, convex from the side, slightly gaping and subtly keeled, chalky whitish (*"stiepelmannii"*) to pale tan. Apex opaque but with a few windowed patches, these sometimes surprisingly large, as if a chink had fallen out of the internal armour, and sometimes marked with interrupted or complete brownish lines or dashes. Flowers golden yellow, highly scented appearing in mid-autumn; fruits 5–6-locular.

L. ruschiorum var. *lineata* (Nel) Cole (1946)

Figs.198–199, p.102

Named for its striped (lineate) quality.

Leaf-pairs pale whitish-orange to yellowish orange-brown, puffy, with thin orange lines cutting into the convex surface and resembling a tautly inflated old-fashioned balloon. Flowers erratically produced, small; fruits likewise small.

Distribution

This species occupies the northernmost niche in the genus. It occurs in northern Namibia, in a narrow, coast-hugging band from Swakopmund up to the area beyond Cape Fria. The lower half of this band belongs to var. *ruschiorum*, the upper third to var. *lineata*, and the middle remains unknown. My guess is that the varieties meet somewhere. Certainly *L. gracilidelineata* and *L. ruschiorum* var. *ruschiorum* meet at the south-eastern edge of the latter's territory. At least one natural *"gracilidelorum"* hybrid is in cultivation and it is an obvious and attractive intermediate. Var. *ruschiorum* grows on many kinds of pale rocks including quartz, pegmatite, and calcite. Var. *lineata* favours darker rocks: gneiss, and orange quartzite.

Notes

This is one of the more awkward lithops in humid climates; sponge-like and thick-skinned, it readily absorbs more water than it needs, programmed as it is to store whatever pittance it can get! To wring it out is difficult; the old leaves

Figure 196. *L. ruschiorum* var. *ruschiorum*, ex M. Kimnach, Rössing Mine

Figure 197. *L. ruschiorum* var. *ruschiorum* "*nelii*", Cole 316

Figure 198. *L. ruschiorum* var. *lineata*, Cole 380

Figure 199. *L. ruschiorum* var. *lineata*, Cole 380

Figure 200. *L. salicola*

Photo: John Trager

Figure 201. *L. salicola* "Maculate form" Cole 86

Figure 202. *L. villetii* subsp. *villetii*, Loeriesfontein

Figure 203. *L. villetii* subsp. *deboeri*, Cole 231

Figure 204. *L. villetii* subsp. *kennedyi*, Cole 123

Figure 205. *L. villetii* subsp. *kennedyi*, Cole 197

Figure 206. *L. salicola* 'Malachite'

Figure 207. *L. salicola* 'Bacchus'

can persist well beyond their expiry date. The driest and brightest position in the greenhouse will help, as will restrained watering, though a few thorough soakings are necessary each summer, lest root and flower development suffer. The small *"nelii"* forms (Cole 316, Cole 102, Cole 240) are the easiest to manage; their dwarfhood is charming and they change bodies rather readily. Var. *lineata* is particularly difficult to grow well. As a half-year-old seedling it looks very odd, with flattened leaves so dark that one would hardly guess at their later metamorphosis. At this stage it has no lines, only spots and pits, suggesting the adult texture of *L. vallis-mariae*. Full maturity takes four or five years.

Schwantes gives a nice account of the flowering of var. *ruschiorum*. W. Schutzbach, a highly skilled Swiss grower, was forced to keep his plants quite dry one exceptionally dour summer and was later rewarded by a fine display of flowers from the species for which he had had the fewest hopes, *L. ruschiorum*! Schwantes' exegesis is that the cool dry summer promoted bud formation rather than excessive leaf growth. Certainly, buds often abort in early autumn. One can see their tiny brownish vestiges when the leaf-pair opens up the subsequent spring.

Cultivars

I am currently trying to stabilize the fantastic and rare pattern seen in figs.28 & 196, a plant raised from seed collected by M. Kimnach near Rössing Mine. This is not, as one might think, var. *lineata*, but it certainly beats that taxon for good lineaments.

L. salicola L. Bolus (1936)

From the Latin for salt-dweller.

Fig.25, p.24; Figs.200–201, p.102; Fig.226, p.112

Plant medium to ample to hydra-headed. Leaf-pairs oval as seen from above, truncate to slightly convex from the side. Apex smooth or faintly bumpy, usually dull greyish to greyish-green or blue-green, sometimes flushed with pink or taupe, flecked with whitish islands, these sometimes abundant, rubrications present, usually minute, margins pale, scalloped. Flowers large, appearing in late autumn, white, often pink-tipped; fruits 5-locular.

Distribution

The easternmost of the "white" lithops, *L. salicola* has a concentrated distribution between Koffiefontein (= Coffee Spring!), Petrusville, and Hopetown, bisected by the Orange River. It is in direct contact with *L. hallii* around Hopetown. Brack pans and low calcrete slopes — they look like the dire mud-flats of the American Southwest — are common niches for *L. salicola*. *Nananthus* spp. enjoy the same sort of environment. It is interesting to note that *L. salicola* and *L. julii* subsp. *fulleri*, seemingly so close morphologically, are separated by *L. hallii*'s swath, which perhaps acts as barrier between them. However, *L. salicola* and *L. hallii* share tannin patterns, and the main differences between them may involve colouration and texture.

Notes

This indestructible species is the most rot-proof of the lot. It is subject to periodic floodings in its "saline" habitats, which has perhaps given it a special resistance. Many populations are represented in cultivation, of these, the well-marked "Maculate form" (Cole 86; fig.201, p.102) is perhaps the finest, though Cole 351 has a most attractive brownish flush. A long-cultivated *L. salicola* can be monster-big: Fritz's famous giant plant filled a tray the size of a trencherman's plate.

Cultivars

'Malachite' (fig.206, p.103) has a fine pale yellow-green colour and is quite robust to boot. It was bred from Cole 351A but it has also been stabilized via my old ex-Karoo Garden material, which has a slightly more overt shade. A new cultivar, 'Bacchus' (fig.207, p.103), named for the Greek god of wine, has the beautiful shade of ripe grapes; it emerged in Japan, quite recently (see further notes on p.132).

L. schwantesii Dinter subsp. *schwantesii* var. *schwantesii* (1928)

Named for Gustav Schwantes, the German prehistorian and botanist whose wide-ranging observations and speculations continue to resonate through the mesemb world. "In many species we have thus before us a 'population' ... and when we breed thousands of individuals, probably not two of them will be entirely alike or with the same heritable characters. It is therefore hardly possible to describe such species, *whose characters are only fully disclosed in a swarm of members* [emphasis mine], from a single specimen." (Flowering Stones, p.196.)

Figs.208–209, p.106

Plants medium to large, slowly clustering. Leaf-pairs oval as seen above, truncate from the side; apex smooth somewhat coarsely bumpy, variable in colour, usually muted, from reddish-orange (*"gulielmi"*) to Dijon mustardy (*"triebneri"*) to greenish-brown or pale greyish-brown, sometimes shiny-waxy, flecked with reddish to brown lines and green or bluish, slightly raised dots (not quite warts!), margins pale orange to greyish. Flowers appearing in early autumn, yellow to tawny yellow, with reflexed petals; fruits 5-locular.

L. schwantesii subsp. *schwantesii* var. *marthae* (Loesch & Tischer) Cole (1936)

Named for Martha Erni, wife of Franz Erni, who owned a farm near Aus, Namibia. Franz was also honoured by Loesch and Tischer (*L. ernianum*); he was sunk, she wasn't.

Figs.210–211, p.106

Plant often rather dainty; apex smoothly modelled, greyish-green to pale tan, subtly shiny, markings sparse, linear, often dulled, margins wide and pale; flowers small.

L. schwantesii subsp. *schwantesii* var. *rugosa* (Dinter) de Boer & Boom (1928)

Named for its dimpled wrinkles.

Fig.212, p.106

Theoretically, this is slightly rougher than var. *schwantesii*, but in practice it is virtually the same in macro-texture (though slightly duller) and is mostly distinguished by its dark pink, bluish-pink, or greyish colours, which fade toward the vague margins. It is often quite a bit larger than the other varieties and tends very much to bloat. Schwantes mentions its characteristic bluish colouring (see below, under Cultivars).

L. schwantesii subsp. *schwantesii* var. *urikosensis* (Dinter) de Boer & Boom (1928)

Named for its type locality, the farm Urikos, north-west of Maltahöhe.

Figs.213–215, p.106–7

Apex the colour of concrete, clay, or pale yellowish vomit, lobes often asymmetrically rough, lines brownish to reddish, sometimes conspicuous (*"nutupsdriftensis"*), margins often with a hazy paleness and slightly raised.

L. schwantesii subsp. *gebseri* (de Boer) Cole (1964)

Named after Walter Gebser, who collected the plants in 1960.

Fig.216, p.107

In facial texture this is a condensed or enriched version of var. *schwantesii*, with more humplets per cheek and narrower margins. The dingy greyish-lilac or wonderfully rich purplish-brown colour is peculiar and must surely be linked with its unique rock type (see below).

Distribution

Var. *schwantesii* occupies a long and narrow zone — from south of Aus to west of Maltahöhe — interlacing with var. *urikosensis*, which exceeds its range to the north and dovetails with it to the south. The much scarcer var. *rugosa* lies in the middle, surrounded by var. *schwantesii*, while var. *marthae* has a discrete distribution

Figure 208. *L. schwantesii* subsp. *schwantesii* var. *schwantesii*, Helmeringhausen

Figure 209. *L. schwantesii* subsp. *schwantesii* var. *schwantesii*, Cole 143B

Figure 210. *L. schwantesii* subsp. *schwantesii* var. *marthae* ex R. Kraatz

Figure 211. *L. schwantesii* subsp. *schwantesii* var. *marthae* ex D. Hardy

Figure 212. *L. schwantesii* subsp. *schwantesii* var. *rugosa*, Cole 247

Figure 213. *L. schwantesii* subsp. *schwantesii* var. *urikosensis*, ex P.V. Bruyns, Urikos

Figure 214. *L. schwantesii* subsp. *schwantesii* var. *urikosensis*, Cole 75

Figure 215. *L. schwantesii* subsp. *schwantesii* var. *urikosensis*, Cole 75

Figure 216. *L. schwantesii* subsp. *gebseri*, Cole 165

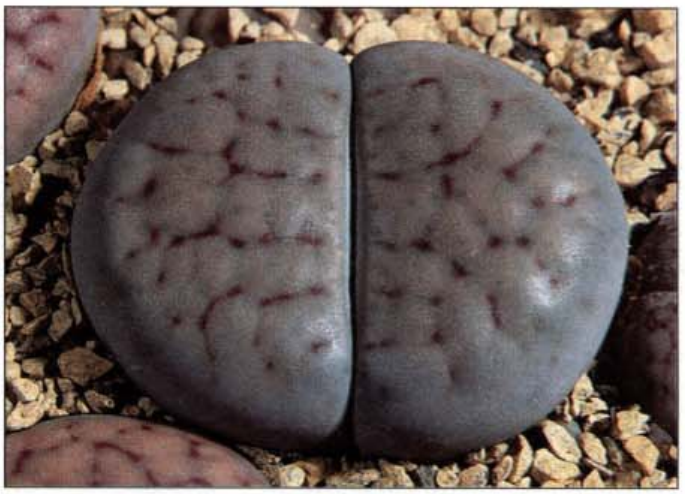


Figure 217. *L. schwantesii* 'Blue Moon'

Figure 218. *L. viridis*, Cole 127

Figure 219. *L. werneri*, Cole 188

well to the south (but still far closer to var. *schwantesii* than to *L. dinteri* var. *brevis*, its apparent look-alike). Var. *gebseri* occurs on the eastern fringe of distribution, south of Maltahöhe. Cole's map shows three populations scattered over some 40 kilometres, only one of which is represented by a Cole number (the other two must have been reliably reported to Cole). Var. *schwantesii* indulges in a varied diet — sandstone, quartzite, gneiss, even calcrete; var. *marthae* is hardly less omnivorous (quartzite and gneiss, calcrete and limestone). Vars. *rugosa* and *urikosensis* fancy calcrete and sandstone, while subsp. *gebseri* — reflecting, again, the factor of increasing specialization? — enjoys a dark iron-bearing sandstone.

Notes

According to Tolstoy, happy families are all alike. And overfed plants in this complex are very much alike, as they all fade and bloat equally badly. Even when plants are raised in a severe style, their differences — which mostly involve gradations of texture and hue — are relatively slight. Not only do individuals within each taxon lose their distinctions; so do whole taxa. Nonetheless, this is good group for melancholics, who will be attracted to the sombre greyed colours, and for masochists, who will enjoy the frequency of spontaneous rottings (i.e., rot not obviously or guiltily linked to a previous Water Event). Var. *schwantesii* also has a peculiar mode of burning, it first turns an attractive pale blue, which looks "natural" until one realizes that the tissue has actually suffered damage. It can be difficult to separate some forms of *L. schwantesii* from *L. fulviceps* (they share tannin patterns), though the latter usually has far larger warts. Hybrids between these species have appeared in the European seed trade as "*Lithops* sp. nov." New, they were, species they were not.

Having said all that, I should mention that many of the *L. schwantesii* variants are beautifully coloured, especially the "*gulielmi*" form (Cole 184), which can have wide blood-red lines and orange borders. The "*triebneri*" forms (Cole 79, Cole 143B) have considerably more yellow in them, and can be very striking. In Cole's 1988 locality list this name was dropped, but it was still used in the 1981 list, and certainly plants of Cole 79 matched my old Triebner/Johnson's material. The "Grey forms" have always confused me. Cole 144, from north-east of Aus, is a lumpy, slightly greyed var. *schwantesii*, verging on *urikosensis*, but Cole 250, from deep to the south of Aus, lands up smack in *marthae*'s country, resembles *marthae* (but is greyer and duller), and does not appear on Cole's map as var. *schwantesii*. Probably it is simply an ambiguous form.

Cultivars

'Blue Moon' (fig.217, p.107) is a selection from var. *rugosa* which has bluish tints and sometimes — once in a — has a strikingly pale powder blue colour. 'Nutwerk' is a well-lined, often intensely reticulate, selection from var. *urikosensis* Cole 75, the former var. *nutupsdriftensis*.

L. ×*steineckeana* Tischer (1951)

The plant was named for Herr Steinecke, nurseryman near Stuttgart, Germany. **Fig.222, p.109**

Plant slowly clustering. Leaf-pairs round in outline, lingamesque in side-view, apex convex or, in alternate years, truncate, pale flesh colour to creamy buff, dotted or dotless, sometimes faintly streaked with red, subtly or strongly windowed, fissure reduced to a short meatus or — again alternately! — extensive; preputial feature present annually. Flowers appearing in early summer, large, golden yellow, stigmas abnormally abundant (6–10); fruits 6–10-locular, mostly 7 per Cole.

Notes

This unstable "chimaeric" oddity appeared in a batch of seedlings in a German nursery. Its exact parentage is unrecorded and unknown, though *L. pseudotruncatella* must have been involved, probably in a maternal role, given the strong female dominance seen in most *Lithops* hybrids. The unknown partner or partneress evidently possessed smooth, more-or-less fused pale leaves, few or no markings, summer-borne yellow or white flowers. Given these parameters, only *Lithops*, *Argyroderma*, *Vanheerdea*, and *Conophytum* have the proper qualifications. I have attempted to pollinate *L. pseudotruncatella* with pollen from several species in all four genera, and have so far only induced selfing (see fig.224, p.109; the plant's

Figure 220. *Dinterops* F_1
(*Lithops leslei* × *Dinteranthus vanzylii*)

Figure 221. *Dinterops* F_2

Figure 222. *L.* ×*steineckeana*, Cole 388

Figure 223. ×*Argyrops*
(*Argyroderma delaetii* × *L. meyeri* 'Hammeruby')

Figure 224. *L. pseudotruncatella*
× *Conophytum bilobum*?

"father" — godfather might be more like it — was *C. bilobum*). I have yet to test an ingenious suggestion that *C. calculus* was involved in this famous mélange. But it is quite possible that the parents of *L. steineckeana* were themselves of hybrid origin. My guess is that they were born in a Namibian hatchery/snatchery. Fritz spent years trying to purge the hybrid "element" from *L. steineckeana*, which in effect would have meant eliminating *L. pseudotruncatella*, thus unmasking the unknown, but surely convex, incubus/succubus. Fig.222 shows plants bred from convex and essentially unmarked steineckeanas; note how *L. pseudotruncatella* still rears its spotted level head! The Cole number (388) was given by Cole to material he'd received from E. Fritz, whose search for this "species" involved transcontinental trading, and the raising of thousands of seedlings later rejected.

L. vallis-mariae (Dinter & Schwantes) N.E.Br. (1925)

The name is a Latinisation of Mariental ("Maria's Valley"), near which farm the species was first collected.

Figs.185–187, p.97

Plant 1–2 headed, often (very) slowly clustering to 4–6 or more. Leaf-pairs large, round in outline, apex truncate, pale flesh colour to chalky white or ivory-yellow, notably opaque and firm, covered with deep pits or nicks and roughened by hundreds of tiny pits, fissure extending over the whole top, often parting prematurely to reveal a deep grey-green cleavage. Flowers appearing in early autumn, small to medium, tawny to pinkish yellow; fruits 5–6-locular.

Distribution

This species, like *L. pseudotruncatella*, its very distant cousin, fills a large and completely discrete territory, bordered by Mariental [sic], Stampriet, Berseba, and Aroab, thus south-east of its relative. It occurs on quartzite, sandstone, and calcrete. I have walked over it without seeing it; its pitted biscuity texture matches that of the rocks which protect it. The area I visited was flat and subject to flooding (rarely!).

Notes

This is one of the stoniest-looking species. It presents the same cultural difficulties as *L. ruschiorum* var. *lineata*, and it is interesting to note that seedlings of these two taxa are similar. Adult plants of *L. vallis-mariae* are often reluctant to renew their leaves; three-year-old leaves tend to yellowish discolorations and the "horrid age spots" warned about in the back pages of wholesome American magazines. *L. vallis-mariae* and *L. pseudotruncatella* may be linked via *L. pseudotruncatella* subsp. *groendrayensis*, which de Boer placed in *L. vallis-mariae*. The two share tannin patterns, but *L. vallis-mariae* has peculiar flowers, long-stalked, with unique, enormous sepals. *L. vallis-mariae* var. *margarethae* de Boer (fig.187, p.97) was distinguished by the presence of little brown epidermal furrows, an inconstant character at best. It is often mispelled var. *margaretae*, possibly by false analogy with *Lapidaria margaretae*?

Cultivars

'Valley Girl' is indistinguishable from the normal form until she opens her mouth and gives herself away — not by any spoon-gagging Zappa-like accent, but rather by her totally white petals. It originated amongst seedlings of Cole 281 reared by Jane Evans.

L. verruculosa Nel var. *verruculosa* (1943)

Named for its epidermal warts.

Fig.3, p.8; Fig.19, p.15; Fig.30 (left), p.28; Figs.190–191, p.100

Plant slowly clustering. Leaf-pairs kidney-shaped to boomerangiform in outline, apex truncate, face pale grey to blue-grey or bronze with reddish tints, well-windowed or opaque, usually bedecked with dozens of tiny hard red resinous-looking warts and often roughened by larger undulations. Flowers appearing in mid-autumn, bronze, pink, white, silvery-peach, apricot, dull lemon yellow, often with rosy or violet striations, rarely wholly rose-violet; fruits 5–6-locular, seeds very small.

L. verruculosa var. *glabra* de Boer (1966)

Named for its non-warted smoothness.

Figs.192–193, p.100

Plant often (much) smaller than var. *verruculosa*, often slightly narrower, face smoother, pale bluish-grey to whitish-pink, often glazed-looking, as if melted, red pimples sparse or completely absent.

Distribution

Var. *verruculosa* has a wide turf, ranging from a point near Gamoep in the west (where I saw a single (!) plant in 1988) to Vosburg in the east, reaching Prieska to the north. This area is well-separated from the northern territory allotted to var. *glabra*, which is only known from points near Kenhardt. The apparent gap could well be artificial. Var. *glabra* occurs on pegmatite and calcrete, while var. *verruculosa* is more adventurous: quartzitic sandstone, lavas, ironstone, jasper, and calcrete are all in its repertoire. Indeed, my habitat impressions are that it usually occupies a jumble of diverse rocks, strewn over the flats.

Notes

One of the great mysteries of *Lithops* (both the book and the genus) is that Nel's description of *L. verruculosa* indicates only greyish warts, not the shiny reddish pimples familiar to all lithopsarians. Furthermore, his description of the nearly synonymous *L. inae does* indicate such pimples, while his illustrations (and his internally contradictory, cloudy statements regarding localities) suggest that his material of both "species" was collected near Kenhardt, and by the same collector, Dr. van der Westhuizen. My guess is that the good doctor collected at or near a spot (Cole 25) where *L. verruculosa* var. *verruculosa*, and nearly typical var. *glabra*, co-exist; probably Nel's sortings-out involved an accidental conflation of data and/or plants. Var. *glabra* is currently associated only with Kenhardt, near which town var. *verruculosa* is supposed to be absent. Another mystery: why does figure 52, the second photograph of *L. inae* in Nel's book, look so much like a typical var. *glabra*? Did Nel's "Kenhardt" mean the town or the district? In any case, this complex is a lovely one for specialists; the very range that confused Nel delights us, and the floral palette is the richest in the genus. The plants are not difficult to flower, though if they are chronically underwatered they will eventually vanish; the roots resent parsimony.

Cultivars

L. verruculosa var. *verruculosa* 'Rose of Texas' (fig.5, p.9 & fig.194, p.100) arose in the US from a brood of Cole 159 seedlings, and it was originally noted by Ed Storms of Azle, Texas; had he lived longer he would undoubtedly have worked on it further. As of 1987 (he died in May of that year) he had already selected a group of four plants, and it was from these that I stabilized the wonderful colour, such a refreshing cherry shock amongst a sea of yellow and white. As an unintended benefit of this work I obtained some greenlings as well. I've named them 'Verdigris' (fig.195, p.100), for the oxidation process that turns bronzes green, and also for the composer, whose luminous music gave voice to such characters as Violetta, the suspiring heroine of La Traviata. Other potential cultivars could be devised by isolating the various petal pigments, the honeyed oranges being as desirable as the lemon yellows. I've also been working with a few plants whose warts coalesce into raised veins.

L. villetii L. Bolus subsp. *villetii* (1950)

Named for Dr. C.T. Villet, grandson of Carolus "Jean" Villet, flower painter at Cape Town. C.T. Villet was part of Louisa Bolus' "small army of collectors"; she thanked them with her liberal honourifics.

Fig.202, p.103

Plant slowly clustering. Leaf-pairs long, round or oval in outline, softish in texture, apex convex, pale greenish-grey, violet grey, to deep grey-green, well-windowed, often glossy or silken, sometimes with pale scattered flecks, rubrications absent, margins faintly scalloped. Fissure often slightly gaping, lips often swollen and slightly pinkish. Flowers appearing in mid-autumn, grey-white; fruits 6–5-locular.

Photo: John Trager

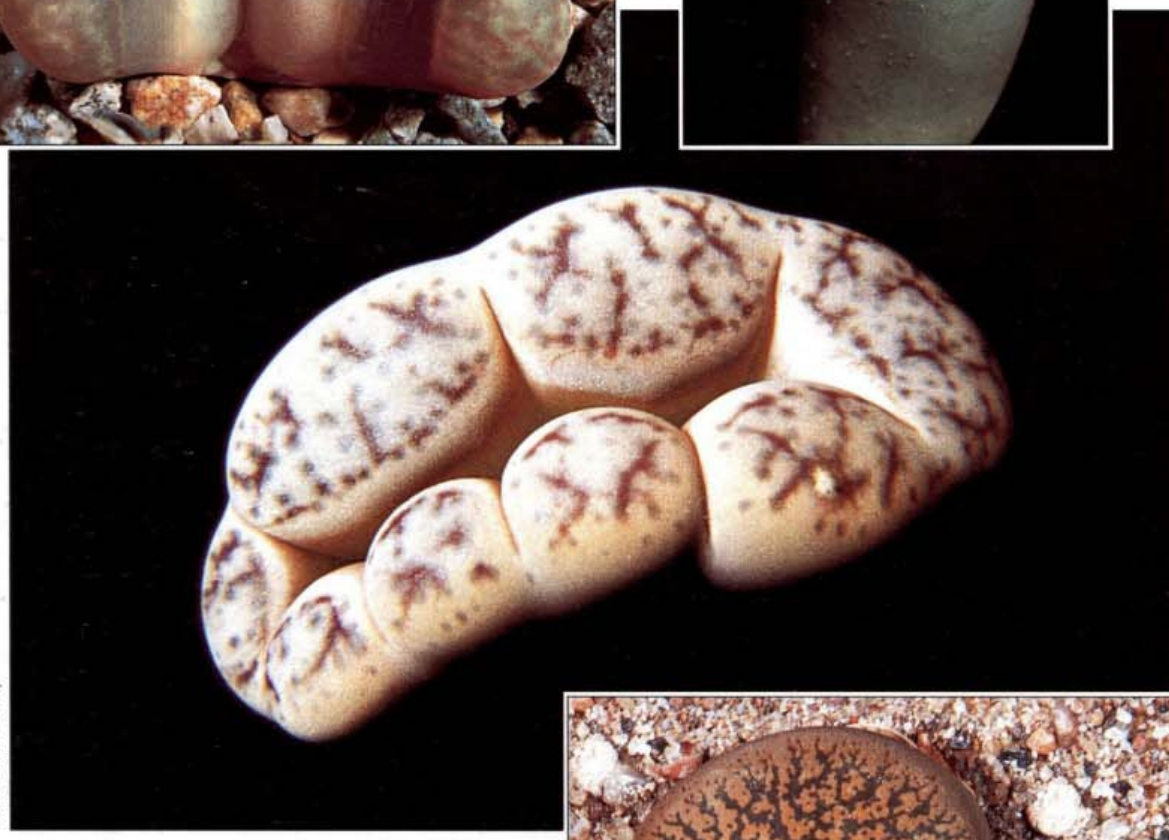


Photo: Gordon Rowley

Photo: John Trager

Figure 225 (Top left). *L. divergens* var. *amethystina* — "Tri-vergens"

Figure 226 (Top right). *L. salicola* (?) — a blind monstrose individual in the collection of B. Medford

Figure 227 (Centre). *L. pseudotruncatella* — an eight-lobed gastro-intestinal cristate

Figure 228 (Right). *L. lesliei,* Cole 28 — Verging on "Tri-vergens"

L. villetii subsp. *deboeri* (Schwantes) Cole (1952)

Fig.203, p.103

Named for Dr. de Boer, who "discovered" it in a shipment of *L. verruculosa* and recognized A) that it was certainly not *L. verruculosa*, and B) that it was certainly undescribed. From the fact that the shipment was a mixed one, Cole deduced that the two species probably grew together.

Leaf-pairs more nearly truncate than in subsp. *villetii*, face pale lilac or greyish, windows always marked with numerous jagged and sometimes prominently floating islands, lacking rubrications; fissure usually slightly white or pinkish (especially in de Boer's original material).

L. villetii subsp. *kennedyi* (de Boer) Cole (1967)

Figs.204–205, p.103

Named for Mias Kennedy, outstanding grower of lithops, conophytums, gethyllis, cycads, and asclepiads, and discoverer/uncoverer/detector of several novel taxa.

Leaf-pairs truncate, hard in texture, often large, faces broad, maroon to lively olive green, patterned with subtle traceries, sans rubrications, margins raised and ornately crimped (as in *L. julii* subsp. *fulleri*, with which this taxon was originally associated, but more firmly incised).

Distribution

The distribution of this complex is still expanding or, to put it more accurately, our knowledge is being expanded. (Let us hope that the plants are expanding as well.) The area relevant to the complex is still not well-explored. It is awkward of access, desolate and seemingly barren, and part of it is now a gigantic tomb for nuclear waste. Scattered calcrete drifts whiten the landscape; these drifts are breeding grounds for lithops, vanheerdeas, aloinopsis, and other compact mesembs. The wide-scattered range of subsp. *villetii* — from north-west of Kliprand to north-east of Loeriesfontein — is oddly parallel to that of the similar-looking *L. ozteniana*. Subsp. *deboeri* occurs in a more concentrated zone north and north-east of Kliprand, well apart from var. *villetii* but nearly merging with subsp. *kennedyi*, which occurs slightly further south-east and east. Subsp. *villetii* occurs on shale and calcrete; subsp. *deboeri*, on calcrete with quartzite; subsp. *kennedyi*, on reddish sandstone or pinkish calcrete. Subsp. *kennedyi*, *L. julii* subsp. *fulleri*, and *L. verruculosa* all occur together on a unique formation east of Gamoep.

Notes

L. villetii subsp. *villetii* has a likeness to other white-flowered lithops — *L. marmorata*, *L. salicola* — but is usually distinguished by its dull blank faces and its dark-heartedness. In cultivation it tends to stretch out unattractively. Subsp. *deboeri* was for many years known from material derived from two plants of unknown (but certainly wild) origin which, having found shelter in de Boer's greenhouse, multiplied a thousandfold. It is easily confused with *L. comptonii* var. *weberi*, which is flatter and more delicate (and differently flowered). Cole's material (from three populations; Cole 230A, 231, and 258) provided a better balanced picture of this taxon. Cole 258, which is well-removed from the others, is a surprise, being larger and more red, and occurring closest to one of the reddest *L. julii* subsp. *fulleri* haunts, Cole 259. Subsp. *kennedyi* has a fascinatingly woody and finely carved quality. Mias Kennedy himself prefers Cole 197 (south of Pofadder) to the population he originally found, Cole 123 (further south-south-east); Cole 197 has a far greater percentage of rich reddish tops. The whole complex is slow in cultivation and a bit more sensitive than most.

Cultivars

Emile Heunis has come up with some quite green seedlings from a population of *L. villetii* subsp. *villetii*. The windows are dark, as is characteristic of this subspecies, but the sides are greyish-green, and it is a most promising combination. *L. villetii* subsp. *kennedyi* could be bred to intensify its attractive maroon tendencies.

L. viridis H. Lückhoff (1958)

Named for its greenness.

Fig.218, p.107

Plant small, slowly clustering. Leaf-pairs long and skinny, round in outline, softish in texture, apex strongly convex, dull green to slightly violet grey-green, rarely plum-coloured, wholly windowed, often slightly glossy, sometimes with scattered whitish cataract flecks. Fissure gaping, lips not swollen, walls often wrinkled. Flowers appearing in mid-autumn, yellow with white centres, hardly projecting beyond the deep fissure.

Distribution

This occurs in a tiny desolate area south of Loeriesfontein on chert and shale. It was "discovered" by Leslie Hill, growing in a pot on a porch garden; he soon learned that the farmers had potted up a part of their very local flora. It sinks deep into pits of layered shale and is known from only one small area though its close companion, *Stomatium pyrodorum*, has managed toeholds throughout the Calvinistic parts of Bushmanland.

Notes

The name seems rather unimaginative until one reflects that this is really one of the greenest species and the plainest of them all. Is it a primitively simple survivor, is it a deeply atavistic reversal, or is it actually advanced, as its very narrow niche-adaptation might suggest? It is not easy to raise from seed; if overstimulated by fertilizer it puffs up and loses (strangles?) its tiny meristem. Make haste slowly.

L. werneri Schwantes & Jacobsen (1951)

Named for Werner Triebner, son of Wilhelm and a keen collector as well.

Fig.27, p.25;
Fig.219, p.107

Plants very small. Leaf-pairs stubby, round as seen from above, convex as seen from the side, shiny, irregularly lumpy like cooked oatmeal, apex very pale tan-grey-green, ornamented with greenish, reddish, or bronze lines and dots, these varying in complexity, often feathery, windows wide or narrow. Flowers appearing in early autumn, sharply scented, deep yellow, small, sparsely petalled, sometimes self-fertile; fruits 6–5-locular.

Distribution

Apparently, this species has hardly managed to distribute itself at all, though *Homo sapiens* has done his best to "help": "... I visited the locality and collected several hundred." (Triebner to Schwantes, quoted in Flowering Stones, p.221.) No-one has expanded the population's sinecure since then. Harry Hall to Steven Hammer, 1981: "I was once taken to see the type locality for *L. werneri* in the Erongo Mountains. A patch of grit no larger than a living room. A few yards away on the bald granite is a similar patch of grit & no *Lithops*. Old man Triebner told me that after the discovery he spent days searching the Erongos for more werneris & drew blanks all the time. Now, why could this tiny sp. not travel a distance of 10 yards to an identical garden & become established during the thousands of years required for this species to evolve?" Good question. The relevant niche in the Erongos lies about twenty kilometres north of a locality for *L. gracilidelineata*; no other species are nearby, though that might not trouble a bird. Perhaps this neat dwarf can be understood as a vagrant *L. gracilidelineata* gone minute and divisionary. How many other such desert islanders remain to be found?

Notes

Triebner regarded *L. werneri* as the smallest species in the genus, ("bodies the size of a pea"), a distinction now shared with *L. coleorum* and *L. dinteri* subsp. *frederici*. Curiously, all these taxa are mono-colonial and while they have the simplest needs, a little extra water keeps them in better condition.

Appendix 1

Mysteries and Fantasies of the Lithosphere

There are always rumours and speculations about a popular genus. Stories about the plants, about eccentric plant people (Mabel Grande, Frai N. Burn, and Vadulia Larvason), about fabulous Edenic collections and habitats where plants never die. Stories that cannot be verified — or which could be verified, if someone had the elastic time to do so; clues that, if neatly cracked, might lead to others (e.g., assuming that it was Dr. *Kate* van der Westhuizen who found *L. verruculosa*, did she leave a diary?), distribution tales that remain tantalizingly unchecked. Four small stories will be recounted here. Perhaps they have more human than botanic interest, but botany is a human construct, after all.

1. Mrs. Jossie Brandt, a natural naturalist from Griekwastad, lives on a farm near that town ("near", in this case, implies a dirt road with less than nineteen gates and no major boulders). Her father had the farm before Jossie inherited it, and father and daughter had another thing in common, namely, an interest in *Lithops*. *L. aucampiae* is common on this farm, and is a relatively easy thing to spot, but Jossie's father used to tell her of a second species on the farm, a "green beeskloutjie", and indicated a certain path along which he had seen it. This has always intrigued Jossie; she has walked many miles on the farm and has turned up ... nothing but *L. aucampiae*, brown-faced or red, but never green. What could the elusive plant have been? Was it actually a green mutation of *L. aucampiae*? Was it an outlier of a species common elsewhere, say, *L. salicola*, which lies 100 kilometres to the south-east, or *L. hookeri* var. *dabneri*, 50 kilometres eastwards? Neither of those is quite green. Have the "green cattle-hooves" trampled themselves out?

2. Mias Kennedy, my friend in Paarl, had a wonderful lithops collection until his recent retirement from active beauty. I have often admired his trays of lithops, full of old specimens, each with its pedigree. But off in a corner he had a few strange, greyish, truncate plants which I couldn't place. I asked him about these, and he explained their vexing history. He'd obtained them in Bushmanland from a farmer who had grown them on his porch (shades of *L. viridis*!). Were they local? Yes. How local? The farmer wasn't sure, and all attempts at verification failed. So there the plants sat, useless without the data that might have confirmed that here we had another, undescribed, variant of *L. villetii* (for that was what they suggested). Oddly enough, the plants looked very much like some *L. villetii* hybrids given to me by Chester Dugdale in 1978. Were Kennedy's plants also hybrid? Tangentially related to this puzzle: Ronnie Uijs has told me of some recent sightings, at new-found, non-Coleoran populations, of robust and surprising plants which have the mingled traits of *L. villetii* subspp. *kennedyi* and *deboeri*.

3. Stephanus (Fanie) Venter, the expert on Transvaal flora, has twice told me of an odd lithops in the Northern Province. It was found by a farmer who knows *L. lesliei* and who insists that it is not that species. It might, of course, be *L. coleorum*, the locality of which has been well-concealed, but it was apparently found much further east. The certain presence of two species in the Northern Province somehow makes it less surprising that there might be three. Admittedly, I have often been escorted to see "lithops" which were actually anacampseros or pleiospilos or argyrodermas, but in the present case the farmer does know the genus. And to be fair to the veld, there are many farmers who take a keen interest in their plants and they have been extraordinarily helpful to those strangers who take a similar, non-aggressive, interest.

4. I often dream about lithops. In one dream I was offered crystallized lithops as a cannibalistic sweetmeat; horrified, I declined. In a later series of dreams, running over a one-week period, my lithops grew progressively flatter each night until they achieved the thickness of postage stamps. In the final dream they actually *were* stamps, finely etched, brightly coloured, and fashionably named. Each stamp had its separate labelled drawer in a 36-partite wood cabinet! I don't know if

Cole dreams about lithops, but to read his account of the rediscovery of *Lithops* [*villetii* subsp.] *deboeri* (Cole 1972) is to encounter just a touch of the mystic; he speaks of the courting of hunches. And Emile Heunis, the excellent grower from Cape Town, is forever fantasising that I'll find a hairy lithops with black flowers. If I do, I will certainly dub it *L. "heunisii"*. And by the way, fresh lithops taste just as nasty as you might imagine.

Appendix 2

Agony Column, or, Ask Mabel

These questions were asked during some of my talks in 1998 and I have adapted and purged my answers to fit a less casual format. The questions gathered here bring up points not directly touched in the main text.

Q: Why do certain lithops fail to flower? In some of my pots four plants will flower merrily while the fifth never obliges. They are all equally old and healthy, and share the same Cole number, etc.

A: Non-flowering stones are found in most collections. Some plants skip a year; some plants never flower and those, of course, won't pass on their shyness. It might be overcrowding or the manifestation of some subtler imbalance. One of my best *L. salicola* 'Malachite' specimens took eight years to flower. It wasn't lack of girth that held it back — it was large at three years old — but once it began to flower, it hasn't skipped a year. And every year, it flowers a fortnight ahead of its companions, which makes me wonder exactly how these plants gauge time!

Q: What are the vernacular names for lithops?

A: Beeskloutjies (little beast's hooves); oogies (little eyes; halfway to the Greek Lith + ops: stone + eye!); Hottentottenpopos (German for "Hottentot" + "backsides", inspired by the steatopygia popularly associated with some Khoisan tribes); jelly plants (though this applies more to the softer conophytums — some lumping farmers group these genera into one sphaeroid "genus"); living stones (obvious); living stone cactus (from the popular assumption that all succulent plants are "cacti", which is like assuming that all fish are sharks or all crooks are nurserymen).

Q: Can one lithops head divide into three?

A: Yes, but it is rare, two being the usual mode, one on each side of the superannuated flower.

Q: Why do some lithops grow so tall? Most of mine are compact but a few loom over the others.

A: This is fairly common and it's not easy to solve. You can replant a towering stone further down in the soil, but it may pop right back up, like toast from a toaster, or you can behead it part way down, which will certainly depress it by reducing the bulk available for the next season's transfer. Some species tend toward a natural verticality — it is hard to keep a good *L. helmutii* down, for example.

Q: My lithops have such lopsided leaves, is this normal?

A: Human faces are quite asymmetric too, we just tend not to notice.

Q: Should I feed my lithops? Is it dangerous?

A: Unless they live in a completely food-free medium, in which case they will hardly live long anyway, you are always feeding your lithops. The real question is: whether of not you will supplement the food which your plants will in any case extract from their compost. And the short answer is: yes, feed away. If you give them enough light, they will accept food without exceeding a desirable *embonpoint*, as the figure-conscious French say of a healthy rotundity. You may well waste your money on food, as lithops are not demanding, but you just might improve the flowering of your plants. I mist mine with dilute fertilizer once every two weeks or so, it makes me feel better. Some of the new plant supplements include silica, for which convincing

arguments have been made.

Q: Some of my plants have alarming green pimples on their sides, visible when I repot them. Is this contagious?

A: No, though such pimples can often be seen on the sides of lithops. They are harmless, and their unsightliness is masked if one avoids the elevated planting mode recommended by some older books. Overfeeding coupled with overwatering is probably the culprit; this cocktail can produce a kind of edema, which is most often seen in the soft-skinned mesembs like glottiphyllums.

Q: What is that white crud I see on some lithops roots?

A: If you mean a kind of powdery deposit with a pungent odour, that is a fungus which seems to be harmless. If you mean the white shrouds of mealy-bugs, you should worry! You can quickly wash the beasts off with hot water (70°C; 158°F) and then dip the roots in alcohol — but be careful about alcohol, the roots and skin of dry plants can absorb it, leading to a fatal corrosion. After I dip plants in alcohol, I soak them briefly in warm water.

Q: My lithops suffer from premature evacuation: the new heads rip through the lower sides in winter.

A: These painful eruptions are embarrassing — imagine how Zeus felt when a queen-sized goddess popped out of his forehead — but not life-threatening. They often indicate an excess of watering or humidity; sometimes, however, the new heads "decide" to expand suddenly, and I don't know what triggers this exuberance. The old leaves will in any case be absorbed eventually, but you should avoid feeding a plant which tends to split, as the problem is often chronic.

Q: Do some lithops flower biennially?

A: Yes. A few lithops sometimes go on sabbatical. They will grow in spring, look fine in summer, but they do not flower in autumn and do not change their bodies in winter. The following spring they seem to perk up again, and they flower normally in fall. This is invariably followed by the appearance of new leaves. Biannual flowers are also possible, i.e., lithops can flower in early summer and again in winter, but that mostly occurs if you don't respect their cyclic nature and/or keep them in too tropical a house. Face-lifts should be annual.

Q: What can I do about salt-stains on my lithops? They mar my appreciation of the patterns!

A: This is difficult, as some plants, and some composts, seem to act as salt-wicks. However, you can try to mist them off with distilled water (or rainwater), or you can use a surfactant in your water; this tends to break up the deposits. It also helps to water the plants from the bottom now and then. This is, of course, rather time-consuming, but if you want a really intimate look at your plants — and why grow them if you don't? — it is a good idea.

Q: A few of my lithops flower twice in a row, or they will even produce twinned flowers simultaneously. Why do people say that this cannot happen?

A: People say lots of things, but lithops bouquets are indeed uncommon. Sometimes they result from a second body's getting ahead of itself and flowering hot on the keels of the first, operating out of the same fissure zone, as it were. Some doubled flowers really are twinned — two pedicels side by side — originating from the same pair of bracts, which is, in effect, the whole head itself.

Q: My lithops have different shades this year!

A: They can indeed change from year to year, triggered by factors unknown to me. Some must involve temperature, because Norm Dennis' lithops, which often experience some frost in winter, have a much better colour than mine, growing 400 warmer miles to the south. In the same way, *L. optica* 'Rubra' tends to have a better colour in the UK than in southern California, though ours flower better. If I have a particularly warm or cool year, I expect some changes the *following* year. In any case, the colours seen in spring are not those of autumn; spring is the freshest and most brilliant time, summer the dullest. In autumn the colours regain a bit of life — some even intensify — and the annual floral show compensates for any fading. In winter the plants frankly look bad, tired, half-decayed, colourless. I avoid looking at them then; I inspect them just often enough to guard against disasters.

Q: Some of my plants refuse to re-root after I transplant them. They just sit there.

A: Well, they always just "sit" here, but the kind of absolute stasis you imply is dangerous. It happens fairly often. You can try a rooting hormone powder, or one of the many thiamine elixirs (which do help), or a rooting bed, as suggested to me recently by Jane Evans. She dismembers a clump and tucks the several heads into a bed of pumice which is automatically misted once or twice daily. In two weeks the plants have rooted! She lives in Tucson, which is not a chilly place, of course; in other climes a heated mist-bed might be more effective.

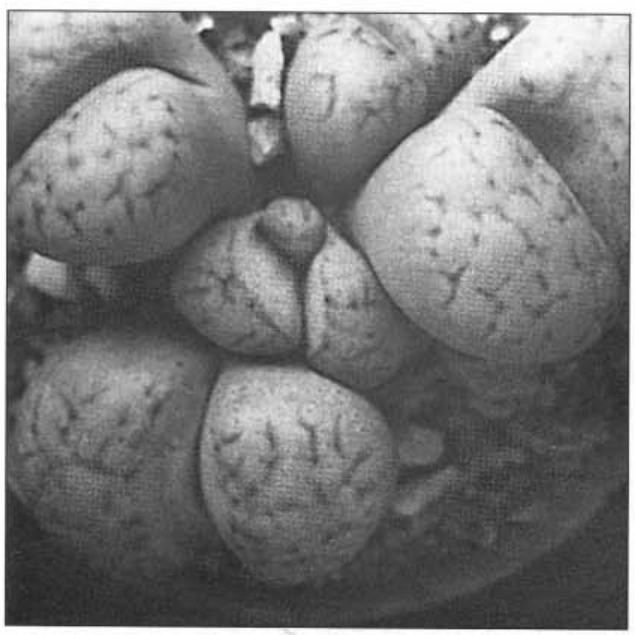
Q: What attracts people to lithops? My husband says they all look boringly alike, while I find them wonderful.

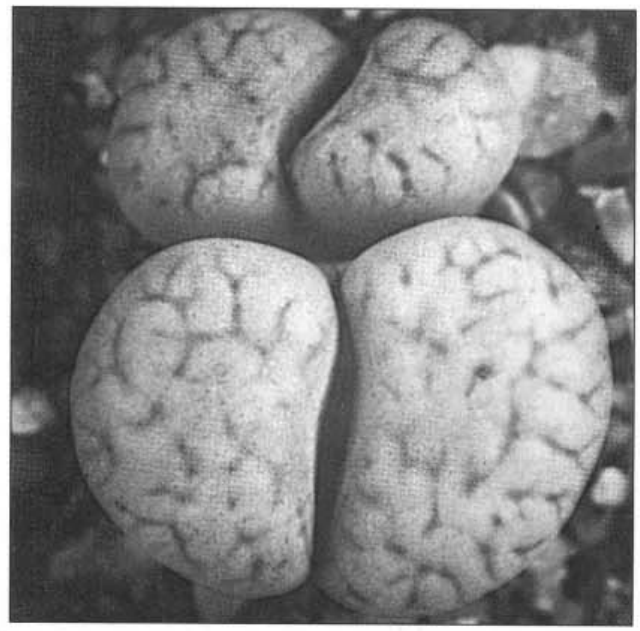
A: Your mate may not be as interested in colour and texture as you are. What does he wear? The vagaries of taste are infinite. Think of Dr. Lückhoff's statement that the difference between the species of *Lithops* "is and cannot be great" — by "cannot", perhaps he implied that they cannot get beyond a certain sameness of shape and shade because their "canvas" is so restricted. They are such small creatures, with such a limited architecture. But within that, they have the most marvellous range of hues and fine detail, and that is what attracts me. As Ms. Breckenridge tells us: desire takes as many shapes as there are containers!

Appendix 3

The Brief Case of *Lithops halenbergensis* Tischer

L. halenbergensis Tischer (1932) has been placed in the synonymy of *L. francisci* (Dinter & Schwantes) N.E.Br.; Nel proposed this reduction on account of its similar provenance and its floral colour, but Cole (1988) indicated strong reservations about this "solution". Tischer's species sported the sort of fine lines one sees in *L. karasmontana* subsp. *eberlanzii*, which grows with *L. francisci*, but without doubt it had yellow flowers — and while a few yellow-flowered lithops have occasionally lost pigments (e.g., *L. lesliei* 'Albinica'), no white-flowered one has been known to have the Midas touch. I would venture therefore that Tischer described a natural hybrid: *L. karasmontana* subsp. *eberlanzii* ♀ × *L. francisci* ♂ — the yellow floral pigments of the father having dominated the





Figures 229 & 230. *L. halenbergense* Bates' L.66; Tischer's so-called "type"

white ones of the mother. I would also venture that these taxa have produced a viable hybrid swarm, because Eberlanz collected the aberrant plants at least twice. Figs.229 and 230 show *L. halenbergensis* as it looked in the collection of J.T. Bates; it is clear that this is not pure *L. francisci*!

According to Wilhelm Triebner, *L. francisci* and *L. karasmontana* subsp. *eberlanzii* grow together on the Kovisbergen and Ha[a]llenbergen (as noted in Schwantes 1957, p.227). I have not seen them actually engaging in "midnight contiguities" (to borrow Thomas Hardy's wonderfully expressive euphemism) though the colonies I know are close, just a few kilometres apart. Triebner's far more extensive examinations sound trustworthy. The Coles also have not seen *L. halenbergensis*, and it never appeared on their seed list.

I have tried to recreate this putative hybrid. *L. francisci* ♀ × *L. karasmontana* subsp. *eberlanzii* ♂ has given me a curious brood of flat (!), hardly spotted, unlined, very pale seedlings — not quite what I'd hoped for, but certainly not ordinary *L. francisci*. I have had trouble persuading *L. karasmontana* subsp. *eberlanzii* to accept *L. francisci* pollen at all, but that failure may have more to do with the fact that the intended groom often flowers rather late in the season, leading to a general weakening of fertility. Further attempts should be made when the opportunities arise. (As for that flatness: mesemb-breeding very frequently gives one the opposite of what one expects, a kind of negative addition.)

Appendix 4.1

A Bare Bones Species List

It is instructive to see the taxa lined up in this way. The names form small or large agglomerations, from the size of which one can usually deduce which species are widespread or localised. *L. optica*, *L. hallii*, *L. salicola*, and *L. vallis-mariae* are major exceptions to that tendency.

L. aucampiae subsp. *aucampiae* var. *aucampiae*
L. aucampiae subsp. *aucampiae* var. *koelemanii*
L. aucampiae subsp. *euniceae* var. *euniceae*
L. aucampiae subsp. *euniceae* var. *fluminalis*

L. bromfieldii var. *bromfieldii*
L. bromfieldii var. *glaudinae*
L. bromfieldii var. *insularis*
L. bromfieldii var. *mennellii*

L. coleorum

L. comptonii var. *comptonii*
L. comptonii var. *weberi*

L. dinteri subsp. *dinteri* var. *dinteri*
L. dinteri subsp. *dinteri* var. *brevis*
L. dinteri subsp. *frederici*
L. dinteri subsp. *multipunctata*

L. divergens var. *divergens*
L. divergens var. *amethystina*

L. dorotheae

L. francisci

L. fulviceps var. *fulviceps*

L. fulviceps var. *lactinea*

L. gesineae var. *gesineae*
L. gesineae var. *annae*

L. geyeri

L. gracilidelineata subsp. *gracilidelineata* var. *gracilidelineata*
L. gracilidelineata subsp. *gracilidelineata* var. *waldroniae*
L. gracilidelineata subsp. *brandbergensis*

L. hallii var. *hallii*
L. hallii var. *ochracea*

L. helmutii

L. herrei

L. hookeri var. *hookeri*
L. hookeri var. *dabneri*
L. hookeri var. *elephina*
L. hookeri var. *lutea*
L. hookeri var. *marginata*
L. hookeri var. *subfenestrata*
L. hookeri var. *susannae*

L. julii subsp. *julii*
L. julii subsp. *fulleri* var. *fulleri*
L. julii subsp. *fulleri* var. *brunnea*
L. julii subsp. *fulleri* var. *rouxii*

L. karasmontana subsp. *karasmontana* var. *karasmontana*
L. karasmontana subsp. *karasmontana* var. *aiaisensis*
L. karasmontana subsp. *karasmontana* var. *lericheana*
L. karasmontana subsp. *karasmontana* var. *tischeri*
L. karasmontana subsp. *bella*
L. karasmontana subsp. *eberlanzii*

L. lesliei subsp. *lesliei* var. *lesliei*
L. lesliei subsp. *lesliei* var. *hornii*
L. lesliei subsp. *lesliei* var. *mariae*
L. lesliei subsp. *lesliei* var. *minor*
L. lesliei subsp. *lesliei* var. *rubrobrunnea*
L. lesliei subsp. *lesliei* var. *venteri*
L. lesliei subsp. *burchellii*

L. localis

L. marmorata var. *marmorata*
L. marmorata var. *elisae*

L. meyeri

L. naureeniae

L. olivacea var. *olivacea*
L. olivacea var. *nebrownii*

L. optica

L. otzeniana

L. pseudotruncatella subsp. *pseudotruncatella* var. *pseudotruncatella*
L. pseudotruncatella subsp. *pseudotruncatella* var. *elisabethiae*
L. pseudotruncatella subsp. *pseudotruncatella* var. *riehmerae*
L. pseudotruncatella subsp. *archerae*
L. pseudotruncatella subsp. *dendritica*
L. pseudotruncatella subsp. *groendrayensis*
L. pseudotruncatella subsp. *volkii*

L. ruschiorum var. *ruschiorum*
L. ruschiorum var. *lineata*

L. salicola

L. schwantesii subsp. *schwantesii* var. *schwantesii*
L. schwantesii subsp. *schwantesii* var. *marthae*
L. schwantesii subsp. *schwantesii* var. *rugosa*
L. schwantesii subsp. *schwantesii* var. *urikosensis*
L. schwantesii subsp. *gebseri*

L. vallis-mariae

L. verruculosa var. *verruculosa*
L. verruculosa var. *glabra*

L. villetii subsp. *villetii*
L. villetii subsp. *deboeri*
L. villetii subsp. *kennedyi*

L. viridis

L. werneri

Appendix 4.2

A Pruned Synonymy

Some of the names seen here never achieved wide circulation, e.g., *L. pillansii* L. Bolus = *L. ruschiorum*; such names are purely historical curiosities. Others gained currency because the name denoted populations with recognizable colour or pattern tendencies — e.g., *L. schwantesii* "*triebneri*", *L. lesliei* var. *venteri* "*maraisii*" — or because the facts of synonymy were not widely known. There are, indeed, relatively few synonyms. Most of the valid taxa have been described only once, but many of them have repeatedly shifted positions, and the presence of parentheses gives a clue as to the true elasticity of status. Compare this sparse synonymy with the enormous, multi-layered synonymy of *Conophytum*; that genus was more subject to attention from busy cooks in many kitchens, though the authors are mostly the familiar ones: Brown, Bolus, Schwantes, and Tischer. I have not listed all the synonymous combinations and orthographic variants, e.g., *L. karasmontana* var. *summitata* de Boer & Boom; for full details see Cole 1988. Similarly, there are many unpublished and mangled names cited in Cole 1988, which one should see for such miracles as *L. erniana* "*wetgutensis*", a transmogrified "*witputzensis*".

nomen nudum = a naked name, i.e., one which has not been decently cloaked in Latin finery.

L. aucampiae **L. Bolus subsp.** ***aucampiae*** **var.** ***aucampiae***
L. aucampiae **subsp.** ***aucampiae*** **var.** ***koelemanii*** **(de Boer) Cole**
= *L. koelemanii* de Boer
L. aucampiae **subsp.** ***euniceae*** **(de Boer) Cole var.** ***euniceae***
= *L. aucampiae* var. *euniceae* de Boer
L. aucampiae **subsp.** ***euniceae*** **var.** ***fluminalis*** **Cole**
= *L. aucampiae* var. *fluminalis* Cole

L. bromfieldii **L. Bolus var.** ***bromfieldii***
L. bromfieldii **var.** ***glaudinae*** **(de Boer) Cole**
= *L. glaudinae* de Boer
L. bromfieldii **var.** ***insularis*** **(L. Bolus) Fearn**
= *L. insularis* L. Bolus
L. bromfieldii **var.** ***mennellii*** **(L. Bolus) Fearn**
= *L. mennellii* L. Bolus

L. coleorum **S.A. Hammer & R. Uijs**

L. comptonii **L. Bolus var.** ***comptonii***
L. comptonii **var.** ***weberi*** **(Nel) Cole**
= *L. weberi* Nel

L. dinteri **Schwantes subsp.** ***dinteri*** **var.** ***dinteri***
L. dinteri **subsp.** ***dinteri*** **var.** ***brevis*** **(L. Bolus) Cole**
= *L. brevis* L. Bolus
L. dinteri **subsp.** ***frederici*** **(Cole) Cole**
= *L. dinteri* var. *frederici* Cole
L. dinteri **subsp.** ***multipunctata*** **(de Boer) Cole**
= *L. dinteri* var. *multipunctata* de Boer

L. divergens **var.** ***divergens*** **L. Bolus**
L. divergens **var.** ***amethystina*** **de Boer**

L. dorotheae **Nel**
= *L. eksteeniae* L. Bolus

L. francisci **(Dinter & Schwantes) N.E.Br.**
= *M. francisci* Dinter & Schwantes

L. fulviceps **(N.E.Br.) N.E.Br. var.** ***fulviceps***
= *M. fulviceps* N.E.Br.
= *L. lydiae* Jacobsen n.n.
L. fulviceps **var.** ***lactinea*** **Cole**

L. gesineae **de Boer var.** ***gesineae***
L. gesineae **var.** ***annae*** **(de Boer) Cole**
= *L. annae* de Boer

L. geyeri **Nel**
= *L. hillii* L. Bolus

L. gracilidelineata **Dinter subsp.** ***gracilidelineata*** **var.** ***gracilidelineata***
= *L. streyi* Schwantes
L. gracilidelineata **subsp.** ***gracilidelineata*** **var.** ***waldroniae*** **de Boer**
L. gracilidelineata **subsp.** ***brandbergensis*** **(Schwantes ex de Boer) Cole**
= *L. pseudotruncatella* var. *brandbergensis* Schwantes ex de Boer

L. hallii **de Boer var.** ***hallii***
= *L. salicola* var. *reticulata* de Boer
L. hallii **var.** ***ochracea*** **(de Boer) Cole**

L. helmutii **L. Bolus**

L. herrei **L. Bolus**
= *L. herrei* var. *plena* L. Bolus
= *L. translucens* L. Bolus

L. hookeri **(Berger) Schwantes var.** ***hookeri***
= *M. hookeri* Berger
= *M. truncatellum* sensu Hook. fils non Haw.
= *L. aurantiaca* L. Bolus
= *L. turbiniformis* sensu N.E.Br. non Haw., non Burchell
L. hookeri **var.** ***dabneri*** **(L. Bolus) Cole**
= *L. dabneri* L. Bolus
L. hookeri **var.** ***elephina*** **(Cole) Cole**
= *L. turbiniformis* var. *elephina* (Cole) Cole
L. hookeri **var.** ***lutea*** **(de Boer) Cole**
= *L. hookeri* var. *lutea* de Boer
L. hookeri **var.** ***marginata*** **(Nel) Cole**
= *L. marginata* Nel
L. hookeri **var.** ***subfenestrata*** **(de Boer) Cole**
= *L. turbiniformis* var. *subfenestrata* de Boer
= *L. turbiniformis* var. *brunneo-violacea* de Boer
L. hookeri **var.** ***susannae*** **(Cole) Cole**
= *L. turbiniformis* var. *susannae* Cole

L. julii **(Dinter & Schwantes) N.E.Br. subsp.** ***julii***
= *M. julii* Dinter & Schwantes
= *L. chrysocephala* Nel
= *L. julii* var. *littlewoodii* de Boer
= *L. julii* var. *pallida* Tischer n.n.
= *L. julii* var. *reticulata* Tischer ex de Boer
= *L. lactea* Schick & Tischer
L. julii **subsp.** ***fulleri*** **(N.E.Br) Fearn var.** ***fulleri***
= *L. fulleri* N.E.Br.
= *L. fulleri* var. *tapscottii* L. Bolus
= *L. maughanii* N.E.Br.

***L. julii* subsp. *fulleri* var. *brunnea* de Boer**
= *L. fulleri* var. *brunnea* de Boer

***L. julii* subsp. *fulleri* var. *rouxii* (de Boer) Cole**
= *L. julii* var. *rouxii* de Boer

L. karasmontana* (Dinter & Schwantes) N.E.Br. subsp. *karasmontana* var. *karasmontana
= *M. karasmontanum* Dinter & Schwantes
= *M. damaranum* N.E.Br.
= *L. damarana* (N.E.Br.) N.E.Br.
= *L. jacobseniana* Schwantes n.n.
= *L. lateritia* Dinter
= *L. mickbergensis* Dinter
= *L. opalina* Dinter
= *L. summitatum* Dinter

***L. karasmontana* subsp. *karasmontana* var. *aiaisensis* (de Boer) Cole**
= *L. erniana* var. *aiaisensis* de Boer

***L. karasmontana* subsp. *karasmontana* var. *tischeri* Cole**
= *L. fossulifera* Tischer n.n.

***L. karasmontana* subsp. *karasmontana* var. *lericheana* (Dinter & Schwantes) Cole**
= *M. lericheanum* Dinter & Schwantes

***L. karasmontana* subsp. *bella* (N.E.Br.) Cole**
= *M. bellum* (N.E.Br.) Dinter
[This retrograde action was proposed a year after Brown had established the genus *Lithops*]
= *L. bella* N.E.Br.

***L. karasmonana* subsp. *eberlanzii* (Dinter & Schwantes) Cole**
= *M. eberlanzii* Dinter & Schwantes
= *L. eberlanzii* (Dinter & Schwantes) N.E.Br.
= *L. bella* var. *eberlanzii* (Dinter & Schwantes) de Boer & Boom
= *L. edithiae* N.E.Br.
= *L. erniana* Tischer ex Jacobsen
= *L. erniana* var. *witputzensis* de Boer

L. lesliei* (N.E.Br.) N.E.Br. subsp. *lesliei* var. *lesliei
= *M. lesliei* N.E.Br.
= *M. ferrugineum* Schwantes
= *L. lesliei* var. *luteoviridis* de Boer

***L. lesliei* subsp. *lesliei* var. *hornii* de Boer**

***L. lesliei* subsp. *lesliei* var. *mariae* Cole**

***L. lesliei* subsp. *lesliei* var. *minor* de Boer**

***L. lesliei* subsp. *lesliei* var. *rubrobrunnea* de Boer**

***L. lesliei* subsp. *lesliei* var. *venteri* (Nel) de Boer & Boom**
= *L. venteri* Nel
= *L. lesliei* var. *maraisii* de Boer

***L. lesliei* subsp. *burchellii* Cole**

***L. localis* (N.E.Br.) Schwantes**
= *M. localis* N.E.Br.
= *L. peersii* L. Bolus
= *L. terricolor* N.E.Br.

L. marmorata* (N.E.Br.) N.E.Br. var. *marmorata
= *M. marmoratum* N.E.Br.
= *L. diutina* L. Bolus
= *L. framesii* L. Bolus
= *L. umdausensis* L. Bolus

***L. marmorata* var. *elisae* (de Boer) Cole**
= *L. elisae* de Boer

***L. meyeri* L. Bolus**

***L. naureeniae* Cole**

L. olivacea* L. Bolus var. *olivacea

***L. olivacea* var. *nebrownii* Cole**

***L. optica* (Marloth) N.E.Br.**
= *M. opticum* Marloth
= *L. elevata* L. Bolus
= *L. rubra* (Tischer) N.E.Br.
[if considered as a species!]

***L. otzeniana* Nel**

L. pseudotruncatella* (Berger) N.E.Br. subsp. *pseudotruncatella* var. *pseudotruncatella
= *M. pseudotruncatellum* Berger
= *L. alpina* Dinter
= *L. mundtii* Tischer
= *L. pseudotruncatella* var. *alta* Tischer

***L. pseudotruncatella* subsp. *pseudotruncatella* var. *elisabethiae* (Dinter) de Boer & Boom**
= *L. elisabethiae* Dinter

***L. pseudotruncatella* subsp. *pseudotruncatella* var. *riehmerae* Cole**
= *L. edithiae* N.E.Br. sensu Schwantes

***L. pseudotruncatella* subsp. *archerae* (de Boer) Cole**
= *L. archerae* de Boer

***L. pseudotruncatella* subsp. *dendritica* (Nel) Cole**
= *L. dendritica* Nel
= *L. farinosa* Dinter n.n.
= *L. pseudotruncatella* [var.] *pulmonuncula* Dinter n.n.
[This was published by Dinter as a rankless trinomial; perhaps he was inspired by the priceless, hyper-slippery, German Mark of late 1923; later Schwantes stepped in and invalidly gave the taxon subspecies rank under *L. pseudotruncatella*. Indeed, it does suggest the latter *and* subsp. *dendritica*,

and lies between them, both on the map and in its characters.]

L. pseudotruncatella **subsp. *groendrayensis* (Jacobsen) Cole**
= *L. pseudotruncatella* var. *groendrayensis* Jacobsen
= *L. vallis-mariae* var. *groendraaiensis* (Jacobsen) de Boer

L. pseudotruncatella **subsp. *volkii* (Schwantes ex de Boer & Boom) Cole**
= *L. volkii* Schwantes n.n.
= *L. pseudotruncatella* var. *volkii* Schwantes ex de Boer & Boom

L. ruschiorum **(Dinter & Schwantes) N.E.Br. var. *ruschiorum***
= *M. ruschiorum* Dinter & Schwantes
= *L. nelii* Schwantes
= *L. pillansii* L. Bolus
= *L. ruschiorum* subsp. *stiepelmannii* Schwantes

L. ruschiorum **var. *lineata* (Nel) Cole**
= *L. lineata* Nel

L. salicola **L. Bolus**

L. schwantesii **Dinter subsp. *schwantesii* var. *schwantesii***
= *L. gulielmi* L. Bolus
= *L. kuibisensis* Dinter ex Jacobsen
= *L. triebneri* L. Bolus

L. schwantesii **subsp. *schwantesii* var. *marthae* (Loesch & Tischer) Cole**
= *L. marthae* Loesch & Tischer
= *L. inornata* Dinter n.n.

L. schwantesii **subsp. *schwantesii* var. *rugosa* (Dinter) de Boer & Boom**
= *L. rugosa* Dinter

L. schwantesii **subsp. *schwantesii* var. *urikosensis* (Dinter) de Boer & Boom**
= *L. urikosensis* Dinter
= *L. christinae* de Boer
= *L. kunjasensis* Dinter
= *L. schwantesii* var. *nutupsdriftensis* de Boer

L. schwantesii **subsp. *gebseri* (de Boer) Cole**
= *L. schwantesii* var. *gebseri* de Boer

L. vallis-mariae **(Dinter & Schwantes) N.E.Br.**
= *M. vallis-mariae* Dinter & Schwantes
= *L. vallis-mariae* var. *margarethae* de Boer

L. verruculosa **Nel var. *verruculosa***
= *L. inae* Nel

L. verruculosa **var. *glabra* de Boer**

L. villetii **L. Bolus subsp. *villetii***

L. villetii **subsp. *deboeri* (Schwantes) Cole**
= *L. deboeri* Schwantes

L. villetii **subsp. *kennedyi* (de Boer) Cole**
= *L. fulleri* var. *kennedyi* de Boer

L. viridis **H. Lückhoff**

L. werneri **Schwantes & Jacobsen**

Appendix 4.3

A Chronology

It is interesting to see the taxa in their order of publication. This reflects approximately the order of discovery as well, since the amount of time that elapses between a lithops' discovery and its appearance in print is often quite short! The species which were found early on, pre-1925, have generally turned out to be widespread; *rarae aves* have mostly been recent discoveries of limited natural distribution. One can also note waves of national periods; the 1940's were South African, the 1950's and 1960's, Dutch, the 1970's and 1980's, South African again.

Taxa believed to be rare are marked: *

1821

Mesembryanthemum turbiniforme Haw.
[= *M. turbiniforme* Burchell (1822)]

N.B. These names are based on the same Burchell collection. This might have been what we now know as *L. aucampiae*, which is currently unknown from the area south-east of Prieska where Burchell collected his material. Somehow, the parted fissure seen in Burchell's drawing makes me think of *L. aucampiae*, and as Cole notes, the depicted pattern is suggestive of that species as well. It is in any case impressive that Burchell immediately

recognized that the species had to belong to Mesembryanthemaceae! If he saw flowers or fruits he did not record that fact; being Burchell, he *would* have recorded that fact. In any case he encountered the species on 14 Sept. 1811, by which date flowers would long have been gone.

1874
M. hookeri (1874–1908)

1908
M. pseudotruncatellum

1910
M. opticum

1912
M. lesliei

1914
M. fulviceps (June)

1920
M. karasmontanum (March)
M. localis (July)
M. marmoratum (July)

1922
L. bella (February)

1925
M. (*L.*) *francisci* (January)
M. (*L.*) *julii* (March)
M. (*L.*) *eberlanzii* (March)
M. (*L.*) *lericheanum* (March)
M. (*L.*) *ruschiorum* (March)
M. (*L.*) *vallis-mariae* (March)
N.B. All of the 1925 taxa were published under the strange formula: Dinter & Schwantes *Mesembryanthemum* (*Lithops*); this confusing indeterminacy resulted from the authors' having been (temporarily) two-minded about the status of *Mesembryanthemum* L.

1927
L. fulleri (January)
L. dinteri (October)

1928
L. gracilidelineata
L. rugosa *
L. schwantesii
L. urikosensis

1929
L. olivacea (June)

1930
L. comptonii (July)

1932
L. meyeri (April)
L. brevis (June)
L. herrei (June)
L. vanzylii (June) [= *Dinteranthus vanzylii* (L. Bolus) Schwantes]
L. aucampiae (November)

1933
L. elisabethiae (March) *
L. helmutii (September) *

1934
L. bromfieldii (May)
L. divergens (May)

1936
L. marthae (May)
L. salicola (July)

1937
L. insularis (January)
L. mennellii (January) *
L. otzeniana (August)

1939
L. dorotheae (July) *

1940
L. venteri (January)
L. weberi (February)

1943
L. geyeri
L. verruculosa

1946
L. marginata
L. dendritica
L. lineata

1950
L. villetii (August)

1951
L. werneri (July) *

1952
L. deboeri (September)

1955
L. gesineae (January–February) *

1955
L. annae (November–December) *

1957
L. hallii (July)

1958
L. viridis (September) *

1960
L. koelemanii (March)
L. glaudinae (December)

Post-1960, there is a tendency for taxa to start out public life at lesser ranks, rather than descending to these at a later date.

1961
L. divergens var. *amethystina* (April)
L. lesliei var. *minor* (May) *
L. pseudotruncatella var. *volkii* (June) *
L. elisae (October)
L. pseudotruncatella var. *groendrayensis* (November)

1962
L. fulleri var. *ochracea* (June)
L. fulleri var. *brunnea* (June)
L. lesliei var. *rubrobrunnea* (July) *

1963
L. gracilidelineata var. *waldroniae* (February) *
L. pseudotruncatella var. *brandbergensis* (April)

1964
L. erniana var. *aiaisensis* (January)
L. turbiniformis var. *lutea* (April) *
L. turbiniformis var. *subfenestrata* (April)
L. schwantesii var. *gebseri* (August)
L. julii var. *rouxii* (October)

1965
L. dabneri (July)

1966
L. dinteri var. *multipunctata* (February)
L. lesliei var. *hornii* (March) *
L. aucampiae var. *euniceae* (April) *
L. verruculosa var. *glabra* (July) *

1967
L. fulleri var. *kennedyi* (July)
L. archerae (August) *

1970
The deaths of de Boer and Bolus, and the discovery and description of localized fringe taxa.
L. aucampiae var. *fluminalis* (March) *
L. turbiniformis var. *elephina* (March) *
L. turbiniformis var. *susannae* (March) *
L. lesliei var. *mariae* (March) *

1973
L. dinteri var. *frederici* *
L. fulviceps var. *lactinea* *
L. karasmontana var. *tischeri* *

1980
L. naureeniae (September) *

1987
L. pseudotruncatella var. *riehmerae* (July) *

1988
L. lesliei subsp. *burchellii* *
L. olivacea var. *nebrownii* *

1995
L. coleorum **

???

Appendix 5

N.E. Brown's *Lithops* Collection

After N.E. Brown died, on 25 November 1934 at the age of 85, a list of his plants was drawn up. I possess a carbon copy of the original preserved by Harry Hall, who had received the copy as a prospectus; he always regretted that he hadn't had the funds to purchase the collection intact. The list, which was carbonised onto paper with a royal watermark, has never been reproduced. As it has historical significance, part of it, one page of the nine, is reproduced here. Though the list mostly is dominated by mesembs, there are some other succulents, including *Anhalonium williamsii* at 4/-. The modern equivalent of the prices is hard for me to calculate, but many of the plants were expensive. Note, however, that in 1934, lithops were worth far more than muirias! It will be seen that Brown collected new material until his death. *L. helmutii*, for example, was only published in September 1933!

My guess is that Brown's daughter Edith typed up the list, but whoever it was had to deal with Brown's minute writing and, I daresay, with fragile labels. It would seem that like many of us, Brown changed his infrequently. I have left the orthography largely untouched. The capitalisation of

honourifics — e.g., *L. Lesliei* — was still in fashion in 1934. "K" presumably means Kew; I have explained a few other abbreviations in brackets.

— [page 8] —

Lapidaria morlarethea [*margaretae*]	2/-	
Lithops Fulleri	2/-	
Lithops olivacea	1/6	
Lithops turbiniformis	3/-	
Lithops terricolor 133 V.D.B [Van der Bijl]	2/6	K
Lithops olivacea 711 M.B. [Maughan Brown]	2/-	K
Lithops turbiniformis 6442 P. Evans	4/-	
Lithops turbiniformis 3 Fuller	3/-	
Lithops kuibisensis Tischer	1/-	K
Lithops Friedrichiae [*Conophytum friedrichiae*]	2/6	K
Lithops Fulleri 10372 Herre	4/-	K
Lithops marmorata Pillans	1/6	
Lithops bella type	2/6	K
Lithops Lericheana — L. bella Tischer	1/-	K
Lithops turbiniformis 6441 P. Evans	2/-	
Lithops turbiniformis P. Evans	1/6	
Lithops olivacea 9 Fuller	4/-	
Lithops Lesliei type J. Burtt Davey & " " 10354 Herre	1/6	
Lithops Lesliei & *Schwantesii* Bate[s]	2/-	K
Lithops Mundtii	1/-	
Lithops alpina [Edward] Taylor	1/-	K
Lithops Helmutii Bolus 10106 Herre	3/-	K
Lithops nilaris N.E.Br. 9946 Herre [*hilaris*?]*	2/-	K
Lithops sp. 9947	3/-	
Lithops pseudotruncatella	9d	
Lithops terricolor H.50	1/6	
Lithops Mughani [*maughanii*] 708 M. Brown	1/6	K
Lithops umdausensis L. Bolus 0780 [8780]	3/-	K
Lithops Herrei L. Bolus 9176	2/-	K
Lithops erniana Dobbertson	6d	K
Lithops terricolor	9d	
Lithops terricolor 6923 P. Evans	2/-	
Lithops Marlothii type 6903 Marloth [*Conophytum pellucidum*]	2/-	K
Lithops sp. ? *turbiniformis*	1/-	
Diplosoma retroversum Hon. Mrs. Ryder	3d	K
Fenestraria rhopalophylla	1/6	
Fenestraria sp.	3d	
Muiria Hortenseae 3885 Muir	9d	
Muiria[-]*Gibbaeum* Herre	1/6	
Imitaria Muirii	1/-	

*A portrait of what was probably the same plant appears in Brown's Album at Kew, as the unpublished *L. "hilaris"* N.E.Br. — the "cheerful" or "gay" lithops. Perhaps it had amusingly fissured lips? At any rate it was probably a white-flowered species. Cole 1988 (p.222): "Not clearly identifiable, but probably a form of *L. karasmontana*." From the Stellenbosch University Gardens records, I have two other numbers which are close in sequence: 9941, Herre, *Mitrophyllum tenuifolium*, from "Hangpaal near [north-west of] Steinkopf", and 9950, Herre, *Aridaria recurva*, from "between Steinkopf and Goodhouse". So it would seem likely that Herre collected 9946 (and 9947, the very next item on the sale list!) near Steinkopf, en route to Goodhouse; thus 9946 was probably a form of *L. marmorata*. Note that the old S.U.G. numbers are often "Herre" numbers, but he shared the sequence with other collectors, for example, Gert Nel, so one cannot assume that S.U.G. = Herre.

Imitaria Muirii 4021 Muir	2/-	
Rimaria heathii 6926 P. Evans	1/-	
Rimaria heathii	9d	
Rimaria dubia type 14 Elisha	1/6	
Argyroderma testiculare 6033 Pillans	6d	
Argyroderma sp.	6d	
Argyroderma pretrensis [*Argeta = Gibbaeum*]	6d	
Argyroderma pretrensis 3622 Muir	6d	
Argyroderma pretrensis 3622 Muir	2/-	
Argyroderma necopinum	1/-	K
Argyroderma Lesliei 6040 Pillans	6d	
Argyroderma sp.	6d	
Argyroderma Lesliei	6d	
Argyroderma Lesliei 6040 Pillans	6d	
Argyroderma subalbum 4 R.A.	6d	K
Pleiospilos simulans V.D.B.	1/6	
Pleiospilos tricolor [*nelii*] V.D.B.	6d	
2 Pots *Diplosoma retroversum* M.B.	6d	
Metrocalyx Muirii 3892 Muir [*Mentocalyx*!]	6d	
Metrocalyx sp.	6d	
Cheiridopsis cigarettifera Muir	6d	
Cheiridopsis sp. Heath	3d	
Herreanthus Meyeri Bates	6d	
Cylindrophyllum Dyeri 2359 Dyer	9d	
Titanopsis sp. Verdoorn 1365	1/-	K
Bijlia cana	6d	
Nananthus sp.	1/-	

Photo courtesy of Gordon Rowley

Figure 231. N.E. Brown practising his minute handwriting

Appendix 6

The following is the account of a delightful lecture given by Dr. Albertus Geyer in 1951. It was originally published in *The Cactus and Succulent Journal of Great Britain*, April 1951: pp.28-31.

LITHOPS

A Lecture by Dr. A. L. GEYER, High Commissioner in London for the Union of South Africa. 20th March, 1951

I appear before you as an amateur. Several of you have, no doubt, cultivated succulents longer than I have; my experience goes back only about twenty years, but I do have this one advantage over most of you—I have got to know, and have hunted, our succulents in their natural surroundings. I use the word "hunt" advisedly; "collect" is far too prosaic a term, especially when one is after the very elusive *Lithops*.

With South Africa's great wealth and variety of succulents, it is hardly possible to go into the veld, in some parts, without finding, at least, a number of interesting plants. Let me give you one illustration; one day my wife and I drove a distance of seven miles from a sanatorium in the Little Karoo, stopping frequently. We never walked more than one hundred yards from the car, but, in the course of a few hours, we found thirty-seven different species deserving a place in an amateur's collection. In the same area there are several times that number of interest to the botanist.

This great wealth of succulents compels the serious amateur to specialise, or, at least, to concentrate mainly on certain genera. Perhaps from some hidden perverseness in my nature, I gradually came to concentrate on two of the most difficult to cultivate in the wet winters of Cape Town—*Lithops* and the *Stapeliae*, with the *Lithops* as my very special love, a love fully shared by my wife.

I shall, therefore, confine my remarks to the *Lithops*, but first let me, in passing, mention this: we think of succulents as desert or semi-desert plants, but there are remarkable exceptions. Thus, there is a large colony of *Stapelia hirsuta* in the Bainskloof Mountains, in the winter rainfall area and with an average annual rainfall of fifty-four inches. As remarkable is the fact that one species of *Lithops*, viz., *Lesliei*, is found in a district with an average rainfall of twenty-four inches and in another with a rainfall of thirty-two inches.

Some indication of distribution is given by the extreme points and distances covering, as the crow flies, the area of the habitats of *Lithops*,

Furthest north east	*Lesliei*
Furthest north west	*Nelii*
Furthest south west	*Comptonii*
Furthest south east	*terricolor*
From *Lesliei* to *Nelii*	One thousand miles
From *Nelii* to *Comptonii*	Nine hundred miles
From *Comptonii* to *terricolor*	One hundred and eighty miles
From *terricolor* to *Lesliei*	Six hundred miles

These are, of course, the most extreme points on the *Lithops* map, with *Nelii* a good deal further north than *Lesliei*.

If we take a central point, the village of Pofadder in the Cape Province, we find no fewer than seventeen species within a radius of two hundred miles. I should, however, explain that Pofadder is hundreds of miles from anywhere! Or, if we take Keetmanshoop in South West Africa as our starting point, we find fourteen other species, again within a radius of two hundred miles.

A few species have a very wide distribution, especially

terricolor *verruculosa* *Lesliei* *pseudotruncatella* *Fulleri*

Of these, *Fulleri* alone has the peculiarity that it is found in close proximity to several other species which are only found far from each other. These are

olivacea *insularis* *verruculosa*

Some species are found in groups, i.e., several species close to each other (as distances go in South Africa). Thus we find the groups

a. *Bromfieldii*
Mennellii
insularis

b. *Schwantesii*
kunjasensis
Gulielmi
Triebneri
rugosa

In the case of both these groups, the species are very closely related, as you know.

Then one finds one other geographic group of four totally distinct species, all growing within a few miles of each other. They are

van Zijlii *olivacea* *Fulleri* *Dorotheae*

(*van Zijlii*, as you know, is no longer a *Lithops*. Professor Schwantes has transferred it to the genus *Dinteranthus*, because its capsule has eleven seed compartments instead of the normal 5–6).

There is another geographic group, one that I would like to call the "baffling *karasmontana* group." They are

karasmontana *Lericheana* *summitata* *Jacobseniana* *lateritia* *opalina* *mickbergensis*

(with the totally different *fulviceps* close by). These are all found within a radius of not more than twenty miles. Some species are found less than a mile apart. They certainly differ markedly from each other, but—here is my difficulty; collect, say, fifty *karasmontana* at one spot and among them you are sure to find specimens that are typically *Jacobseniana*, *summitata*, etc. Or, collect a number of *opalina* in their habitat and among them you may find a few that are not *opalina* at all, but typically *karasmontana* or *mickbergensis*. And so on. For this reason, Professor Nel has thrown them all together under *karasmontana*.

I have mentioned the fact that a few species are found over a very wide area. On the other hand, some others are, as far as we now know, restricted to one very small locality. Such are

Mennellii *Dinteri* *Dorotheae* *Marthae* *brevis* *urikosensis*

I must mention one more species, *L. chrysocephala*. I do not think we shall ever see it again. In 1940, the late Professor Nel showed me a striking new *Lithops* that had been sent to him by a schoolmaster, Mr. Dry, from near Upington. It was undeniably a distinct species and he tried to get more specimens, but in vain. When, therefore, a year later he heard that I intended to visit the area, he gave me Mr. Dry's address and asked me to find more specimens of the new species. I found Mr. Dry and asked him to take me to the spot where he had discovered the original specimen. He remembered the spot and led me there without hesitation. Greatly excited, three of us began our hunt and, within a few minutes, we had found any number—of *L. Fulleri*. There were hundreds of them, but no *chrysocephala*, and yet Mr. Dry was quite positive the plant sent to Professor Nel had been found at that spot. I am afraid that *chrysocephala* was a beautiful *Fulleri* freak.

You will, I am sure, expect me to say something about the country in which the *Lithops* grow and about their habits.

With the exception of *Lesliei*, all the species are found in areas with an average annual rainfall of from two to ten inches. It is a country of perennial sunshine and very dry air. Most of it is flat country, great plains covered with grass or low shrub, with few trees except along the watercourses (which are usually dry) and with isolated, rocky kopjes here and there.

But not all of them grow in level country, *pseudotruncatella*, *dendritica* and *Werneri* grow on low mountains. Others like *marmorata*, *Helmutii*, *Geyeri*, *Herrei* and *Meyeri* are found in mountainous country.

The rains come late in summer over most of the area, but one part of it has winter rainfall. Yet, peculiarly enough, all the species flower in autumn. I should explain that the whole of this *Lithops* area of winter rainfall gets an average of from two to five inches. It is important to remember, however, that throughout the *Lithops* country the dew is very heavy, and especially so where the rainfall is lowest. Most species are found in heavy soil, which retains the little available moisture.

Many succulents seem to prefer partial shade, due, probably, to the fact that those in the open are eaten by animals. *Lithops*, however, prefer to grow in the open. They are mostly found on bare spots, where nothing else grows except perhaps some other small succulents and, after good rains, sparse, annual grasses. Many species are found almost exclusively in patches, usually on sloping ground, of white quartz pebbles. Possibly this is because the quartz reflects the rays of the sun and helps to keep

the soil cool.

On the other hand, several species are invariably found in the narrow fissures of rocky kopjes or rock outcrops. There they grow in a handful of soil and pressed quite flat. Among these are

Bromfieldii *brevis* *Mennellii* *Otzeniana* *Dorotheae* *kuibisensis* *turbiniformis*

Normally, the plants grow more or less level with the surface of the soil, rising, say, half an inch above the surface in the rainy season. Remember that, in the case of many species, the soil is covered with a layer of white quartz pebbles reflecting the rays of the sun and as big, or bigger, than the plants. At the best of times, therefore, except when they are in flower, it is no easy task to spot a plant. (Even the flowers of the white flowering species are hardly conspicuous among the white pebbles).

Where plants are scarce, it is a common experience to spend an hour searching an area of, say, twenty square yards, and at the end of the hour still to find a plant that had escaped one's eye. On one occasion three of us, all experienced collectors, spent two hours looking for *fulviceps*—and found three plants. No wonder that Dr. Lückhoff says that hunting for *Lithops* gives him the sensation of being on a treasure hunt!

When in flower, and especially in the afternoon when the flowers are open, it is, of course, comparatively easy to find the plants. However, neither my wife nor I liked to go *Lithops* hunting at that time of the year. It is almost like hunting game by searchlight, the poor animal has no chance of getting away. It is much more thrilling after a long, intense search, suddenly to discover the plant at your feet.

In summer it is far too hot to go *Lithops* hunting. It would, of course, in any case be futile to go in spring or in summer, as the plants are resting. Towards August the plants begin to shrivel. As it gets drier, they literally withdraw below the surface of the soil or of the rocks in whose fissures they are growing. At this time of the year we have more than once come across small circular holes in the ground. In the holes, a quarter of an inch, or even more, below the level of the ground, were shrivelled plants. As soon as the wind begins to blow, these small holes are filled with dust and sand, then your plants are safely covered, protected from the sun, from hungry animals and from greedy collectors. There they will rest for six, or for sixteen, months, until the rains come again. We once came upon *L. divergens* just as they were busy pushing their way out of the ground, forming, one could almost say, tiny molehills.

The best time, then, to go after *Lithops* is in winter, in June and July. Then the plants have not yet retired to rest, and the weather is at its very best. Outside the restricted winter rainfall area (where it seldom rains, in any case!) there is no danger of rain, and there is no wind. The nights are cold, often with sharp frost, but the days are superb. By ten o'clock in the morning one has discarded overcoat and gloves. By midday one is in one's shirt sleeves, having lunch in what little shade that is to be found beside the car. An area with such a low rainfall is naturally very thinly populated and given over to sheep farming or cattle ranching: ten thousand acres in many parts would be a small farm and some farms cover more than two hundred thousand acres.

In such country, with towns and villages few and far between, the roads are *not* good, even the main roads. What is more, the collector cannot keep to the main roads, he has often to follow farm roads and even cattle tracks. By far the heaviest item in the expense of a collecting trip is, therefore, the wear and tear of your car or van. Sometimes, where the ground is stony, it is impossible to proceed by car, but it is really remarkable where a modern car can take one, as long as the pace is that of a donkey and as long as the driver succeeds in having the biggest boulders taken by a front wheel, and not the sump!

All this—the large area, the scanty population and the bad roads—explains how it is that new species are still being discovered. These same factors, on the other hand, bring one very great advantage, it is ideal country for the collector who also loves the veld and the solitude of the great, open spaces, away from homo *in*sapiens. There one can travel for very many miles without ever meeting anybody. There you can pitch your camp undisturbed, wherever you happen to be when night falls. Quite the happiest days of our lives have been spent by my wife and myself on these collecting expeditions.

I must try, very briefly, to give you an idea of such an expedition which usually lasted from two to three weeks.

One learns from experience and, as time went on, we got to know exactly what to take with us. With the rear seat of an ordinary, large American car removed, we load the car with folding camp

beds, light folding table and stools, the essential cooking and eating utensils, a supply of canned foods, fruits, etc. For fresh bread, meat and milk we depend on the scattered villages and farmhouses.

An important item is a four-gallon demijohn of fresh water. This has to be used sparingly, as one is never quite sure when one will be able to refill it. Before retiring for the night, therefore, each of us gets a small basin of this precious water for a wash (and in the morning only a few cupfuls). My wife was a great adept at this tricky business. She would get inside the car for her "bath in a basin" and finish without spilling a drop. I had to have mine in the open air, because, by the time I had finished, most of the water was on the ground!

A number of stout, collapsible, cardboard boxes are taken, in which to pack the plants—not an easy task when it comes to thorny *Euphorbias* and *Hoodias*—and a supply of paper bags for use while collecting.

I should explain that, though almost all our expeditions were in search of *Lithops*, one naturally comes across a large variety of other succulents as well.

An important Item in our outfit is, naturally, our small but strong handpicks. Heavy soil, when stone dry, can be very hard.

As important is our sleeping kit; sleeping bags specially made to our own design, with small hoods to keep the dew off our faces, and also a plentiful supply of warm blankets. (We never used a tent.) As I have said, the nights can be very cold. Often we woke in the morning to find our sleeping bags white with frost and frozen hard. Then it cost quite an effort to jump out of bed in order to start a fire for the morning tea.

In course of time, one almost instinctively recognises the spots where succulents are likely to be found. This means that we seldom know how far we will travel in a day. One may travel for fifty miles without stopping, or one may be stopping almost every mile. I remember one particular day on which, between eight and five, we travelled exactly thirty-eight miles.

In good country, therefore, one gets a good deal of exercise in the course of a day. Every time a promising kopje or patch of quartz pebbles is spotted, the car is stopped and off we go with pick and paper bag. Our object may be close to the road or two miles away. If far off, we simply turn the car into the veld to drive as close as possible. Not every likely spot lives up to its promise. If one's luck is out, the haul by the end of a strenuous day may be very small indeed, or one may come across the same species at one locality after the other for many miles. I remember one day. We searched dozens of quartz patches and, after a time, every search ended with an exclamation "Oh! these wretched *microspermum*." We were finding nothing but the comparatively rare *Dinteranthus microspermum* in hundreds and, of course, we wanted no more than a small number of each species. (By small number I mean, in the case of *Lithops*, say fifty or sixty specimens!)

Remember that, in the middle of the day, it is quite hot. Remember, too, that searching for *Lithops* means walking with a bent back. You will then realise that towards five o'clock one is pretty tired. It is time to select a camping site. If possible, camp is pitched near some trees where dry wood can be gathered for the camp fire. This is always a task for both of us and I think you would have enjoyed the sight of my wife marching back to camp with a load of firewood in her arms!

After such a day in the open, with plenty of exercise and only a light lunch, you can imagine what our appetite is like. The meat consumed each evening, preferably lamb chops roasted over the coals, would equal, I am afraid, more than a month's English ration.

Usually we are in bed not long after eight o'clock. Those last few minutes at the end of a perfect day, pleasantly tired, but with a feeling of utter contentment, alone in the silent veld, with perhaps the distant cry of a jackal now and then, warm and comfortable inside one's sleeping bag, with the clear sky high above studded with myriads of bright stars—that indeed is bliss!

In conclusion I must say only a few words about our collection.

Cape Town, with its wet winter, with its air in summer so much more humid than the very dry air of the interior, is anything but ideal for succulents. Some genera cannot be grown in the open at all, therefore, along with *Dinteranthus* and a few others, our *Lithops* were kept in pots under celoglass, with the sides of the house open.

The rest we planted in the open. One part of the garden was reserved for indigenous wild flowers and shrubs and was studded with a number of rockeries. I built these myself, in fact, the gardener was not allowed to share in the succulent cultivation at all! Self propagating wild annuals provided

the necessary shade in the rockeries in summer. Each rockery had a name. One was called Mount Finger, because, in building it, I had a finger crushed under a rock.

I could never answer the frequent query as to how many genera and species there were in the garden. I do know that at one time we had one hundred and fifty species of *Stapeliae*, some of them huge clumps. During the flowering season it was a great game to look for fresh flowers. This was the more exciting since, as you know, *Stapeliae* can only be identified by their flowers. One, therefore, never knew what species one had brought back from an expedition until they flowered. I must add, that, on a hot afternoon, with no breeze and with numbers of open *Stapeliae* blooms, work in a rockery was not exactly a nasal delight.

Our special pride and our greatest joy, however, were the *Lithops*, some raised from seed, some received from other collectors, but most collected by ourselves. When we left, there were something like fourteen hundred specimens. Except for a small number given to the Kirstenbosch Botanic Gardens, this collection was presented to the University of Stellenbosch.

And now my wife and I are looking forward to the day when we shall be able to resume those wonderful *Lithops* hunting expeditions and to build up a new collection, this time, I hope, on our farm.

At the conclusion of the lecture, Dr. Geyer invited and dealt with numerous questions, all of them of value, but space prevents an account of them. The meeting was a packed one. The visit of Dr. Geyer was an extremely pleasant experience. There was nothing of the High Commissioner about the genial Doctor, whose face was warm with smiles throughout the evening and, as he said in one of his asides during the lecture, he felt pleasure that for once he could drop the official and become one of a number whose interest clustered around a common, interesting object, in this case, of course, *Lithops*. It was indeed a great privilege to have Dr. Geyer with us and to hear at first hand of experiences with our plants in their native habitats. Captain H. J. Dunne Cooke introduced Dr. Geyer and moved a vote of thanks at the conclusion of the lecture, a vote that was unanimously applauded.

Finally, Mr. A. J. Edwards, our Chairman, asked Dr. Geyer to accept, on behalf of the Council and members of the Society, a Vice-Presidency and Mrs. Geyer an honorary membership. Dr. Geyer, on behalf of his wife and himself, thanked Mr. Edwards and stated that they would consider it a great honour to accept.

Appendix 7

Notes on Two New Cultivars

L. salicola 'Bacchus' — Fig.207, p.103

This Japanese model import arrived in the Occident in 1998, via the publisher Tony Sato; its purple colour startled and delighted me. I wanted to name it 'Teletubby', after the ephemeral television beastie whose empurpled purse so threatened the Reverend Falwell's, but several friends pointed out that Bacchus, and the wine he symbolizes, have long since proven their immortality. 'Bacchus' differs from a normal *L. salicola* only in colouration; in patterning it is an average, murkily windowed, exemplar of the species.

L. schwantesii var. *urikosensis* 'Nutwerk'

The former *L. schwantesii* var. *nutupsdriftensis* (Cole 75) gave rise to this cultivar, reared from two outstandingly well-patterned plants, the one obtained from New Mexico Cactus Research, which had much Cole material in the 1970's, the other from Ed Storms, whose Cole material dated from the same period. Progeny of the two plants have an unusual concentration of brown netting — more

warp than woof — and I decided to attempt a total browning, via a series of backcrosses. This was one of the first "pattern-cultivars" and can easily be distinguished from the average Cole 75 by its consistent intensity.

N.B. Orthodoxically, cultivar names are not "supposed" to be attached to the varieties of a species but rather to the species itself, e.g., to *L. schwantesii* in the broad sense, thus *L. schwantesii* 'Nutwerk'. In the narrow sense, however, 'Nutwerk' is surely a cultivar of var. *urikosensis*. In an even stricter sense it would be a cultivar of "*nutupsdriftensis*" if that taxon were ever recognizable, an impossibility, given its highly variable streakiness. In any case, I've adopted a double standard in this book: the captions for the photographs follow the Code, while the main text "improperly" but usefully alludes to the localised, varietal or subspecific origins of cultivars.

Appendix 8

Seed Size in Lithops

The following measurements of seed length, given in millimetres, are quoted from Rob Wallace's 1988 Ph.D. thesis: Biosystematic investigation of the genus *Lithops* N.E.Br. (Mesembryanthemaceae). Rutgers University, New Brunswick, New Jersey. The measurements are used by permission of Dr. Wallace, who in turn obtained the data from John A. Jump, whose 1981 paper on the subject was, so to speak, seminal (Jump, J.A. 1981. The seed as a criterion in *Lithops* classification. *CSJ(US)* **53**: 197–200).

This is a table of averages. When one notes the extremes, certain of the odder cases seem less odd, e.g., *L. villetii* subsp. *deboeri* is markedly smaller than subsp. *villetii*, but the latter taxon has a range of two-tenths of a millimetre, among the greatest in the genus, and its lowest measurement puts it within a twentieth of a millimetre of the highest figure for subsp. *deboeri*. I have noted some other interesting comparisons in brackets.

N.B. The effects of plant health, and watering regimes, on seed size (and especially on seed weight!) have yet to be studied.

L. aucampiae subsp. *aucampiae* var. *aucampiae* ..... 0.95 [→1.12]
L. aucampiae subsp. *aucampiae* var. *koelemanii* 0.94
L. aucampiae subsp. *euniceae* var. *euniceae* 0.95
L. aucampiae subsp. *euniceae* var. *fluminalis* ... 1.00

L. bromfieldii var. *bromfieldii* 0.75
L. bromfieldii var. *glaudinae* 0.74
L. bromfieldii var. *insularis* 0.80
L. bromfieldii var. *mennellii* 0.75

L. coleorum 0.68

L. comptonii var. *comptonii* 0.57
L. comptonii var. *weberi* 0.56

L. dinteri subsp. *dinteri* var. *dinteri* 0.53
L. dinteri subsp. *dinteri* var. *brevis* 0.53
L. dinteri subsp. *frederici* 0.53
L. dinteri subsp. *multipunctata* 0.50

L. divergens var. *divergens* 0.57
L. divergens var. *amethystina* 0.63

L. dorotheae 0.53
[cf. *L. dinteri*!]

L. francisci 0.61

L. fulviceps var. *fulviceps* 0.74
L. fulviceps var. *lactinea* 0.77

L. gesineae var. *gesineae* 0.74
[SH2003 — 0.68]
L. gesineae var. *annae* 0.73

L. geyeri 0.62

L. gracilidelineata subsp. *gracilidelineata* var. *gracilidelineata* 0.60
L. gracilidelineata subsp. *gracilidelineata* var. *waldroniae* 0.72
L. gracilidelineata subsp. *brandbergensis* 0.74

L. hallii var. *hallii* 0.54
["*salicola* var. *reticulata*" — 0.61]
L. hallii var. *ochracea* 0.52

L. helmutii 0.53

L. herrei 0.58

L. hookeri var. *hookeri* 0.89
L. hookeri var. *dabneri* 1.00
L. hookeri var. *elephina* 0.95
L. hookeri var. *lutea* 0.85
L. hookeri var. *marginata* 0.92
L. hookeri var. *subfenestrata* 0.90
L. hookeri var. *susannae* 0.85

L. julii subsp. *julii* 0.54
L. julii subsp. *fulleri* var. *fulleri* 0.53
L. julii subsp. *fulleri* var. *brunnea* 0.52
L. julii subsp. *fulleri* var. *rouxii* 0.50

L. karasmontana subsp. *karasmontana* var. *karasmontana* 0.53
L. karasmontana subsp. *karasmontana* var. *aiaisensis* 0.57
L. karasmontana subsp. *karasmontana* var. *lericheana* 0.54
L. karasmontana subsp. *karasmontana* var. *tischeri* 0.54
L. karasmontana subsp. *bella* 0.64
L. karasmontana subsp. *eberlanzii* 0.61

L. lesliei subsp. *lesliei* var. *lesliei* ..... 1.14 [→1.27]
L. lesliei subsp. *lesliei* var. *hornii* 0.96
[cf. *L. aucampiae*!]
L. lesliei subsp. *lesliei* var. *mariae* 1.06
L. lesliei subsp. *lesliei* var. *minor* ..... 1.13 [→1.18]
L. lesliei subsp. *lesliei* var. *rubrobrunnea* 1.14
L. lesliei subsp. *lesliei* var. *venteri* 1.06
L. lesliei subsp. *burchellii* 0.95

L. localis 0.63
["Prince Albert form" — 0.51]

L. marmorata 0.46
["*diutina*" — 0.40–0.47]
L. marmorata var. *elisae* 0.49

L. meyeri 0.46

L. naureeniae 0.50

L. olivacea var. *olivacea* 0.50
L. olivacea var. *nebrownii* 0.54

L. optica 0.62
["Maculate form" — 0.55]

L. otzeniana 0.55

L. pseudotruncatella subsp. *pseudotruncatella* var. *pseudotruncatella* 0.87
["*mundtii*" — 0.93]
L. pseudotruncatella subsp. *pseudotruncatella* var. *elisabethiae* 0.91
L. pseudotruncatella subsp. *pseudotruncatella* var. *riehmerae* 0.88
L. pseudotruncatella subsp. *archerae* 0.80
[cf. *L. schwantesii*]
L. pseudotruncatella subsp. *dendritica* 0.65
["*farinosa*" — 0.61; cf. *L. gracilidelineata*!]
L. pseudotruncatella subsp. *groendrayensis* ..... 0.61 [→0.57]
L. pseudotruncatella subsp. *volkii* 0.89

L. ruschiorum var. *ruschiorum* 0.61
L. ruschiorum var. *lineata* 0.78

L. salicola 0.71

L. schwantesii subsp. *schwantesii* var. *schwantesii* 0.78
L. schwantesii subsp. *schwantesii* var. *marthae* 0.78
[cf. *L. dinteri*]
L. schwantesii subsp. *schwantesii* var. *rugosa* 0.83
L. schwantesii subsp. *schwantesii* var. *urikosensis* 0.81
L. schwantesii subsp. *gebseri* 0.74

L. ×*steineckeana* 0.86
[but quite variable in size and often irregularly shaped]

L. vallis-mariae 0.74

L. verruculosa var. *verruculosa* ..... 0.46 [→0.40]
L. verruculosa var. *glabra* 0.50

L. villetii subsp. *villetii* ..... 0.66 [0.57–0.77]
L. villetii subsp. *deboeri* ..... 0.49 [0.46–0.52]
L. villetii subsp. *kennedyi* 0.56

L. viridis ..... 0.79 [!]

L. werneri 0.64
[cf. *L. gracilidelineata*]

Dinteranthus vanzylii 0.32

included it in his monograph. The newest taxon, *L. coleorum* Hammer & Uijs (1994), is now also included. The various aberrant green forms e.g. *Lithops lesliei* 'Albinica', cannot be practically covered here. If the reader is attempting to identify a bright green *Lithops* plant, it is best determined by reference to Cole's book, rather than attempting to use this key. It is also impractical to include the freak white-flowered forms of normally yellow-flowered taxa. If these are also bright-green bodied, then the problem is even worse.

The species concepts used in this paper do not necessarily reflect the taxonomic views of the author. The intention here is simply to follow Cole's (1988) system. Not all of the characters described by Cole are used in this key. A small subset is chosen for consistency of use in separation of taxa and their relatively low ambiguity of meaning and interpretation. It should be noted that all existing keys to the genus (alas, including this one) will sometimes fail for an individual plant. This is because of the extreme variability of characters within species, and indeed within a pan of seed-raised siblings. In this genus, there are usually exceptions to every rule!

Usage of Characters

As the intention has been to produce a key to the taxa at the rank of species (plus *L. steineckeana*) according to Cole (1988), many of the characters used here directly relate to those described by him. Others have been added where necessary to aid identification. A number of characters are defined here in the glossary, for the benefit of those without access to Cole's work, and to provide a more detailed explanation of the character states as used in the analytical key. The main purpose here is merely to provide details sufficient for identification. Further details are available in Cole's book regarding variation of character states.

Note that the key has been designed to be used to identify mature specimens, ie. of flowering age and size. Also, descriptions refer to turgid, not shrivelled leaves. Note also that dimensions of the top surface, where given, should not include the young new leaves, when more than one pair are present. This kind of measurement is unreliable if the new leaves are relatively young and small, and the old leaves are too shrivelled. Also, whilst an effort has been made to use easily discernible characters, ideally ample material from all parts of the life cycle should be available. This is not unreasonable in the case of a highly specialised group of plants such as these, where there are few reliable and consistent characters available.

The number of sepals in the calyx is equal to the number of segments, 'cells' or loculi of the fruit (capsule) and also equal to the number of stigma lobes. Even if a capsule is not available, a dead flower carefully dissected can often reveal this character state. If the merosity varies over different flowers or fruits, the usual case should be used for identification. Flower diameter is measured when the flower is fully open. A flower is said to have a white centre if the base of each petal is clearly whitish. The base of the stamen filaments are often whitish, but these should not be considered to form a 'white centre'. Fissure depth is measured from the base of the cleft (as viewed from the side) to the top of the leaves, except in the case of *L. steineckeana* where the fissure is typically a shallow groove < 3mm deep extending over the whole width of the strongly convex face. Where there is a difference between the two sides, or when measuring different bodies in the same clump, or any other measurements for that matter, the average should be used. Unless otherwise indicated, seed length measurements apply to the longest dimension, and should include the rostrum.

The Key

1. Top or shoulders ± greenish, grey-green, or greenish-white **39**
1. Neither top nor shoulders greenish **2**

2. Profile distinctly ovate-cordate; fissure a shallow groove < 3 mm deep, extending in an arc over the curve of the face; top smooth, very strongly convex, with a distinctly bilobed appearance ..... ***steineckeana***
2. Combination of characters not as above **3**

3. Body distinctly reddish-purple in colour ..... ***optica* ('Rubra')**
3. Body not as above **4**

4. Rubrications present, even if sparse or faint and/or restricted to window and/or fissure margins (use x10 lens) 5
4. Rubrications completely absent 22

5. Dusky dots clearly visible, large (~0.4 mm Ø or more), very conspicuous and numerous, usually slightly convex (x10 lens to detect curvature) ..... *fulviceps*
5. Dusky dots not visible (even with a x10 lens), or if visible then ± indistinct or inconspicuous, < 0.4 mm Ø, and flat or rarely concave 6

6. Small dusky dots visible in reflected light (use x10 lens) 13
6. Small dusky dots not visible, or only with great difficulty, even with a lens 7

7. Flowers white 9
7. Flowers yellow, or orange 8

8. Top very strongly convex, often subtly keeled; fissure depth usually >10 mm; profile cordate. ..... *ruschiorum*
8. Top flat to ± convex rarely keeled; fissure depth usually < 10 mm; profile truncate or truncate-cordate 16

9. Window area clearly defined, even if ± occluded; margins distinct, sinuate or dentate, contrasting strongly with shoulders; rubrications often restricted to window margins 10
9. Window area not clearly defined; margins ± indistinct, not strongly contrasting with shoulders; rubrications usually present as lines in channels and/or fissure margins 12

10. Fruit, calyx or stigma 6-merous ..... *hallii*
10. Fruit, calyx or stigma 5-merous 11

11. Top ± smooth, usually convex; seeds >= 0.5 mm long ..... *salicola*
11. Top usually somewhat rugose, ± flat; seeds < 0.5 mm long ..... *julii* **(ssp. *fulleri*)**

12. Top near fissure edge often with rubrications forming a 'lip smear' (can be faint or broken); pollen usually pale yellow ..... *julii* **(ssp. *julii*)**
12. Top margins near fissure edge completely lacking rubrications; pollen usually deep yellow .... *karasmontana*

13. Flower < 22 mm Ø; top of leaves usually strongly convex, mostly < 18 mm across (longest dimension); profile cordate-truncate ..... *werneri*
13. Flower >= 22 mm Ø; top of leaves flat to slightly convex, mostly > 18 mm across (longest dimension); profile truncate 14

14. Fruit, calyx or stigma 6-merous or more ..... *pseudotruncatella*
14. Fruit, calyx or stigma 5-merous 15

15. Face margins lighter in colour than sides or top; seeds ± spherical (ignoring rostrum) .... *schwantesii*
15. Face margins ± similar in colour to sides; seeds longer than broad (ignoring rostrum) .... *bromfieldii*

16. Small raised red dots present; shoulders often with bluish tinge; fissure deeper on one side.... ..... *verruculosa*
16. Red dots absent, or if present not raised; shoulders not bluish; fissure depth usually ± equal on both sides 17

17. Fruit, calyx or stigma 6-merous or more 20
17. Fruit, calyx or stigma 5-merous 18

18. Top ± rugose, depressed channels present ..... *bromfieldii*
18. Top smooth, depressed channels not present 19

19. Rubrications present as dots; top flat to slightly convex; flower usually 20–25 mm Ø ...*dinteri*
19. Rubrications mostly present as lines or dashes; top convex; flower usually 25–30 mm Ø..... ..... *dorotheae*

20. Top smooth, depressed channels not present ..... *pseudotruncatella*
20. Top ± rugose, depressed channels present 21

21. Bodies whitish to pale pink, sometimes feathered with brown, usually solitary; seeds < 0.75 mm ..... *gracilidelineata*
21. Bodies brownish, forming clumps of 2 or more; seeds >= 0.85 mm ..... *hookeri*

22. Dusky dots very clearly visible to the naked eye 35
22. Dusky dots absent, or difficult to see without a lens 23

23. Shoulders pinkish/whitish/yellowish/very light brown in colour 24
23. Shoulders medium to dark brown/greyish in colour 29

24. Window ± completely open with ± distinct margins, smooth, brownish, ± glassy, with few (if any) islands; angle between top and fissure sharply defined ..... *olivacea*
24. Combination of characters not as above 25

25. Flowers white ..... *karasmontana*
25. Flowers yellow 26

26. Profile cordate; top very strongly and distinctly convex; seeds light brown to brown .... *ruschiorum*
26. Profile truncate; top flat to ± convex; seeds yellow-brown 27

27. Top surface very finely wrinkled (use x10 lens); fruit, calyx or stigma 5-merous .... *vallis-mariae*
27. Top surface coarsely rugose, but clearly not finely wrinkled; fruit, calyx or stigma 6-merous or more 28

28. Bodies whitish to pale pink, sometimes feathered with brown, usually solitary; seeds < 0.75 mm ..... *gracilidelineata*
28. Bodies brownish, forming clumps of 2 or more; seeds >= 0.85 mm ..... *hookeri*

29. Flower white 30
29. Flower yellow, or yellow with a white centre 31

30. Top slightly rugose; fruit, calyx or stigma usually 6-merous; flower usually < 25 mm Ø; seeds < 0.5 mm long ..... *villetii*
30. Top ± smooth; fruit, calyx or stigma usually 5-merous; flower usually >= 25 mm Ø; seeds >= 0.5 mm long ..... *salicola*

31. Flower with a very conspicuous white centre; fissure depth > 8 mm; seeds small, < 0.6 mm long 32
31. Flower with all yellow petals, or an inconspicuous white centre; fissure depth <= 7.5 mm; seeds large, >= 0.6 mm long 33

32. Top distinctly convex; window margins forming distinctive scalloped erose (gnawed) pattern ..... *otzeniana*
32. Combination of characters not as above ..... *comptonii*

33. Top rugose, depressed channels clearly visible ..... *hookeri*
33. Top ± smooth, or if channels present, then these only depressed very slightly 34

34. Fruit, calyx or stigma 6-merous ..... *aucampiae*
34. Fruit, calyx or stigma 5-merous ..... *lesliei*

35. Flower usually < 25 mm Ø; fruit, calyx or stigma 5-merous **37**
35. Flower usually >= 25 mm Ø; fruit, calyx or stigma at least 6-merous **36**

36. Top flat to slightly convex; profile truncate; usually forming clumps of at least 3 bodies; fissure shallow (3–8 mm) ..... ***pseudotruncatella***
36. Top distinctly convex; profile cordate-truncate; usually forming clumps of no more than 2 bodies; fissure deep (6–12 mm) ..... ***gesineae***

37. Dusky dots not arranged in lines or channels, sometimes more concentrated in the centre, thus forming a partial window; shoulders grey, olive grey, greenish or yellowish ..... ***localis***
37. Dusky dots arranged ± in channels or branching lines, but otherwise evenly distributed; shoulders whitish **38**

38. Shoulders whitish, top irregularly lumpy, not shiny ..... ***francisci***
38. Shoulders pinkish to tan, top extremely smooth, often with a slight sheen ..... ***coleorum***

39. Flower yellow, or yellow with a white centre **42**
39. Flower white **40**

40. Flower < 22 mm Ø; seeds brown ..... ***optica***
40. Flower >= 22 mm Ø; seeds yellow-brown **41**

41. Fissure depth < 10 mm; fruit, calyx or stigma 5-merous; seed surface smooth to slightly rugose (x50 mag.) ..... ***salicola***
41. Fissure depth >=10 mm; fruit, calyx or stigma 6-merous; seed surface tuberculate (x50 mag.).. ..... ***marmorata***

42. Leaves with large conspicuous green open window with few (if any) islands **43**
42. Leaves lacking conspicuous green open window, or if present then islands very numerous **45**

43. Leaves convex, ± grey-green; window margins forming distinctive scalloped erose (gnawed) pattern ..... ***otzeniana***
43. Combination of characters not as above **44**

44. Profile truncate-cordate, usually forming clumps of >= 4 bodies, fissure depth 6–12 mm; seeds yellow-brown, < 0.5 mm long; angle between top and fissure sharply defined, the window extending slightly down the fissure (x10 lens); hypocotyl of young seedlings (~ 2 months old) not distinctly reddish ..... ***olivacea***
44. Profile cordate or bicuneate, forming clumps of < 4 bodies, fissure depth 10–20 mm; seeds light brown to brown, > 0.5 mm long; angle between top and fissure ± rounded, the window not extending down the fissure (x10 lens); hypocotyl of young seedlings (~ 2 months old) suffused with red ..... ***viridis***

45. Profile truncate; fruit, calyx or stigma usually 6-merous or more; fruit > 8.5 mm Ø (largest dimension); face large, leaf width usually > 20 mm (at widest point) ..... ***pseudotruncatella* (ssp. *archerae*)**
45. Profile truncate-cordate, cordate or bicuneate; fruit, calyx or stigma usually 5-merous; fruit < 8.5 mm Ø; face small to medium, leaf width usually < 20 mm (at widest point) **46**

46. Windows large and open, but with milky appearance, indistinct, usually without islands; window margins not extending over shoulders; leaves milky-green to cream, often with bluish tinge; top flat to ± convex; profile bicuneate ..... ***meyeri***
46. Combination of characters not as above **47**

47. Profile bicuneate; leaves very strongly divergent; window large, ± indistinct, usually bluish-grey, or purplish-grey, with many small indistinct islands and distinctive 'frosted glass' appearance ..... ***divergens***
47. Combination of characters not as above **48**

48. Profile cordate-truncate; fissure depth 7–15 mm 49
48. Profile bicuneate or cordate-bicuneate; fissure depth 10–18 mm 50

49. Flower usually < 24 mm Ø; top of leaves usually distinctly convex ..... *herrei*
49. Flower usually > 24 mm Ø ; top of leaves convex to flat ..... *geyeri*

50. Shoulders, sides and islands green with yellowish tinge; window dark green or brown; top ± convex; fruit mostly > 7.5mm across (longest dimension) ..... *naureeniae*
50. Shoulders, sides and islands light grey-green, lacking yellowish tinge; window light glassy-green; top usually strongly convex; fruit mostly <= 7.5 mm across (longest dimension) ..... *helmutii*

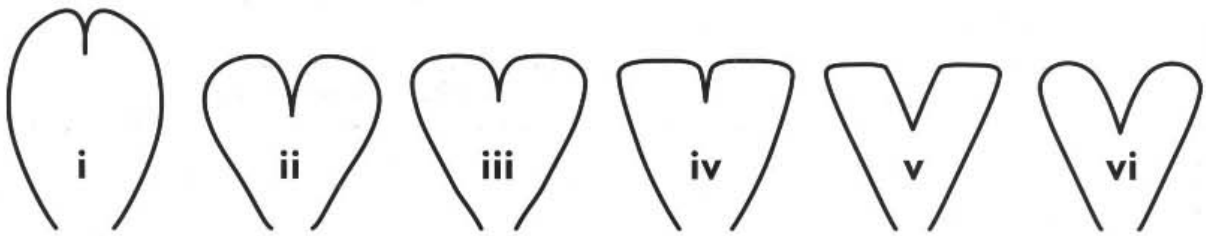


Figure 1. Profiles (upper profile sensu Cole, 1988)
(i). Ovate-cordate (e.g. *L. steineckeana*); (ii). Cordate (e.g. *L. ruschiorum*); (iii). Truncate with convex top (e.g. *L. gracilidelineata*); (iv). Truncate with flat top (e.g. *L. hookeri*); (v). Bicuneate with flat top (e.g. *L. divergens*); (vi). Bicuneate with convex top (e.g. *L. divergens*). Adapted and modified from Cole (1988)

Conclusions

The key provided in this paper, whilst not infallible, will hopefully be useful for general growers, as well as of interest to serious students of the genus. The resultant diagnosis from an attempt at identification can be easily checked against the pictures provided here, and also in Cole's book for confirmation. As is always the case in a work of this kind, some taxa are particularly well delimited, whereas others can scarcely be consistently distinguished from their allies.

Finally, with regard to further work in progress, a computer-based key to the genus, which can provide levels of confidence of correct identification, is in preparation by the author. Details of this will be released in the near future.

Acknowledgements

Thanks are due to Alice Davies for help with testing of the key, and for reference to her collection of *Lithops*. Also, I wish to thank Gordon Rowley for the use of his library and constant encouragement regarding this venture. In addition I would like to thank Steven Hammer for help with updating this paper. Last, but not least, thanks must also go to Desmond Cole for producing his monograph, which has acted as a constant reminder of the fascination of this genus, as well as an invaluable source of data, and the inspiration for this paper.

Glossary

<	less than
<=	less than or equal to
>	greater than
>=	greater than or equal to
±	more or less
Ø	diameter
body	leaf pair
dusky dots	(pellucid dots) greyish dots
face	surface of body as seen from above
fissure	dividing cleft between leaves
margins	extreme edge of window

merosity	number of flower or fruit parts in a whorl; adj. -merous
profile	side view (see Figure 1)
rostrum	horn-like projection on seed
rubrications	red or brownish lines and/or dots
shoulders	rounded edges of top)
top	top of leaves
window	translucent/coloured top

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JACOBSEN, H. (1974): *Lexicon of Succulent Plants*. English Edition, Blandford Press, London.

NEL, G.C. (1946): *Lithops*. Stellenbosch University, South Africa.

SCHWANTES, G. (1951): The Lithopinae. *Nat. Cact. Succ. J.* **6**(2): 23–24.

SPRECHMAN, D.L. (1970): *Lithops*. Associated Univ. Presses, New Jersey, USA.

Bibliography and References

The following is a list of works referred to in the text; most were involved in its gestation.

BROWN, N.E., TISCHER, ARTHUR & KARSTEN, MIA (1931). *Mesembryanthema*. L. Reeve, Ashford.

A fascinating look at period lithops. The Frankensteinian stretch marks on freshly imported plants were generated by the shock of Eurohumidity. By far the best-looking plants are the seedlings of *L. hookeri* raised by Brown (see his fig. 137, a pot full of 10-year-olds).

CLARK, JONATHAN Y. (1996): A Key to *Lithops* N.E.Brown (Aizoaceae). *Bradleya* **14**: 1–9.

COLE, DESMOND (1972). Lost and found — *Lithops deboeri* Schwant. *Excelsa* **2**: 23–29.

COLE, DESMOND (1973). *Lithops*: A Checklist and Index. *Excelsa* **3**: 37–71.

Modern lithography begins with this most thorough piece of work, which incorporates some interesting historical details not repeated in Cole's book.

COLE, D.T. (1986): *Lithops Locality Data*. Desmond T. Cole: Swakaroo, South Africa.

COLE, DESMOND (1988). *Lithops: Flowering Stones*. Acorn Books, Randburg.

The indispensable product of half-a-lifetime's research.

DE BOER, H.W. & BOOM, B.K. (1964): An analytical key for the genus *Lithops*. *Nat. Cact. Succ. J.* **19**(3): 34–37 & 19 (4): 51–55.

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GOLDBLATT, PETER & MANNING, JOHN (1998). *Gladiolus in Southern Africa*. Fernwood Press, Cape Town.

This can serve as a comparison (a taxonomic outer-than-outgroup, as it were) between *Lithops* and another complex genus. Sometimes I think that problems leap from one genus to another — or from mind to mind, being quite irrelevant elsewhere.

HAMMER, STEVEN (1995). Notes on the Taxonomic Position of *Mesembryanthemum locale* N.E. Br. *Haseltonia* **3**: 89–91.

Clearly the "position" was uncomfortable. A demonstration that *M. locale* (preserved at Kew) matches the species better known as *L. terricolor*, fitting both its locality and its SEM'd seed-type.

HAMMER, STEVEN (1996). New Cultivars in *Lithops*. *Piante Grasse Speciale* **1995**: 46–50.

Brief notes on new cultivars, one of which, *L. marmorata* 'Chartreuse', was apparently tautologous at birth, since it was actually published in 1996 (5th January). *L. marmorata* 'Polepský Smaragd' was also published in January 1996 and in any case it was appropriate for Pavelka, its first disseminator, to have had the authorial *droit du seigneur*.

JACOBSEN, HERMANN (1960). *A Handbook of Succulent Plants, Vol. 3*. Blandford Press, London.

The section on *Lithops* (pp. 1217-1251) was revised by de Boer and contains many curious photographs and comments, many of which must represent Triebner's views as filtered through de Boer and compressed by Jacobsen.

NEL, GERT (1946). *Lithops*. University Press, Stellenbosch.

A fascinating book written by a man who was more at home in the veld than in his library. The book is undated but the (presumably) latest photo in the book is dated "Sept. 1946" — and Nel's friend, Prof. Jordaan, gave 1946 as the date, which accords with the June 1946 at the end of Nel's preface. Despite all this, several citations give 1947.

NORDENSTAM, BERTIL (1974). The Flora of the Brandberg. *Dinteria* **11**.

L. gracilidelineata subsp. *brandbergensis* keeps such diverse company!

SCHWANTES, GUSTAV (1957). *Flowering stones and mid-day flowers*. Ernest Benn, London.

The friendliest and wisest of treatments. It can take as many re-readings as Ms. Austen's Pride and Prejudice, which would be an excellent title for certain botanic tomelettes.

WALLACE, ROBERT (1988): *Biosystematic investigation of the genus Lithops N.E.Br. (Mesembryanthemaceae)*. PhD Thesis. Rutgers University, New Brunswick, New Jersey.

WALLACE, ROBERT S. (1988). Tanniniferous idioblasts as taxonomic characters in the genus *Lithops* N.E. Br. (Mesembryanthemaceae). *Monogr.Syst.Bot.Missouri Bot. Gard.* **25**: 295–303.

Wallace's research on internal characters — rather than the external and shifting symbols of presumed differences — has given him fundamental insights which largely reinforce Cole's concepts.

Index

General Index of People, Places and other Phenomena

A *Lithops* Index

Not Indexed here are: Type Locality Map (pp.20–21); Appendix 4.1, 4.2, 4.3, 5, 6, 8 and 9 (pp.119–132, 132–141). Page number(s) underlined indicate the main descriptive reference; page number(s) in **bold** type indicate illustrations.

A Cross-reference list of cultivars, forms, etc.

Index of Plant Names (excluding inter-generic hybrids)

Not Indexed here are: Appendix 5 and 6 (pp.125–132). Page number(s) in **bold** type indicate illustrations.

Sources of Lithops

Commercial sources can speak for themselves — the British Cactus and Succulent Journal has a raft of back-page adverts — but special mention should be made of the Mesemb Study Group, which has an annual seed distribution including many lithops and their relatives. The MSG also issues a fine quarterly bulletin; it can be counted on for the latest news. Contact: Suzanne Mace, Brenfield, Bolney Road, Ansty, West Sussex, RH17 5AW United Kingdom; eMail: msg@mace.demon.co.uk; telephone: 01444 441193. I might note that one of the best sources of lithops plants is the circle of growing friends with which one can readily intersect by joining the MSG and the BCSS. Indeed, so good are these amateur growers, and so modest are their prices (when they charge at all) that they have permanently deflated the lithops market. At the same time they have enriched it, since private growers can work with a care and discernment which are elusive on a large-scale commercial basis. Still, I often wonder what a fair market price for a lithops would be. I can think of no intrinsic reason why a new daffodil cultivar should sell for five pounds, or an orchidaceous hyper-hybrid for fifteen, and an equally lovely five-year-old lithops for 40 pence! In the US, wholesale lithops sell for as little as 17 cents per head (!), retailing for 2–5 dollars. If there is any rational justification for price, it would be based on rarity and recalcitrance, in which case *L. meyeri* 'Hammeruby' would be the popo of great price. But in fact all the lithops can be grown without real difficulty, and rarity is becoming rare — and low prices have the great merit of giving the genus a wide accessibility. Furthermore, high prices could certainly reinvigorate the shadow market for collected plants, as has lately happened with *Haworthia*.

Happily Ever Afterword

My favourite photograph in Nel's book (p. 8) shows Dr. de Boer sitting in an unseen chair, peacefully and left-handedly pollinating a tray of perfect lithops. A look of rapt and benign watchfulness suffuses his face. Another of de Boers' auto-photographs, reproduced in Jacobsen's Handbook (fig. 1428) shows him smiling subtly, the Mona Lithops of quiet pride. Wearing a three-piece suit and tie in his implausibly neat greenhouse-temple, he is poised, relaxed, agelessly spry. Both portraits are late expressions of the long Dutch tradition of psychological self-portraiture. De Boer, a great plant artist, felt that lithops were worthy of lifelong devotion and chose to record that fact. For him, there was nothing odd about a passion for plants so small and obscure.

Lithops have not always brought such secure tranquillity to their keepers. For some people they are stones of contention, major or minor munitions in the perennial battles of an acid nomenclatural war or an awkwardly skew domesticity (loving stones as the Other Woman). Fortunately, for most of us such strife lies in the realm of distant fantasy. Lithops have brought together many strange and wonderful people; they have divided only a few. Around the world there are many hundreds of lithops-lovers and most of them have a readily kindled, generous, and touching enthusiasm. It has been my pleasure to have given at least a few novelties to this group; many more are on the way.

Collections of lithops do pose the brutally inevitable reality of death and taxa. Famous collections decline and die along with the person(s) who assembled and animated them, and if someone else inherits such a collection within a year or two it is transformed into theirs. This is rarely accomplished without major shock, though I do know of successful transfers of *parts* of a collection. For example, Suzanne Mace has often showed me some fantastically beautiful specimens of *L. julii* which she acquired from the estate of Douglas Huth, who clearly had great taste. As the cliché has it, no two lithops look alike, but Huth's looked more unlike than most. "His" plants now function as his remembrance and as exemplars of Suzanne's unique style.

Do our long-cherished cultivated collections have any importance for wild populations? Yes, insofar as they constantly remind us of the necessity of preserving those populations. Also, they contribute to that preservation, because their supreme cultivated fecundity renders further field-collecting unnecessary. Viewed in one light, lithops are fragile, lovely, and loveable treasures, imbued with the subtlest and most colourful whimsy. In another, harsher light, they are bits of matter as rottably disposable as old lettuce, but then, so are we, judged equally. A sincere respect for Nature can hardly be partial.

The British Cactus & Succulent Society

The objects of the BCSS are to advance the education of the public by the study, culture and propagation of cacti and other succulent plants and to promote the conservation of such plants both in cultivation and in the wild. Membership of the BCSS is open to all.

It arranges meetings, shows, lectures, exhibitions and visits to collections. It publishes a quarterly journal and an annual yearbook — *Bradleya* which contains longer or more technical articles; each publication is lavishly illustrated with colour. There is an annual seed distribution.

The Society was formed in 1983 by the amalgamation of the two major cactus and succulent societies in the UK — The National Cactus & Succulent Society and the Cactus & Succulent Society of Great Britain — both of which had long histories.

Membership of the BCSS is currently in the region of 4,000 and includes the whole range from novice windowsill growers to experts. The Society has nearly 100 branches in the UK and Republic of Ireland which organise programmes of events every year. In addition to those residing in the British Isles there are members in many foreign countries.

This is one of several booklets prepared by members of the British Cactus & Succulent Society, sharing their expertise in growing and collecting succulents — the common species, and some less well known.

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Steven Hammer and Chris Barnhill near Bulletrap, Namaqualand
— They never found that contact lens …

Steven Hammer was born in Indianapolis, Indiana in 1951 and was raised in southern California. By the age of 13 he was tending a substantial collection of succulent plants, including lithops and conophytums. This early interest led to his first major publication: *The Genus Conophytum – A Conograph* published in 1993. The only Occidental book dedicated to the genus, it has had a considerable influence on the hobby. Steven has visited southern Africa eighteen times and has discovered a number of odd species. As concerned with propagation and conservation as he is with description, he has made many novelties available to the Mesemb Study Group in the form of seed. After a decade in New Mexico, he now lives in Vista, California where he manages his Sphaeroid Institute.

His articles enliven many journals and are the flexible backbone of the *MSG Bulletin*. A major contributor to: *Mesembs of the World* (1998), Steven is currently working on *Mabel's Big Mesemb Book* along with his photographic collaborator, Chris Barnhill.

He was honoured with a Fellowship of the Cactus & Succulent Society of America in 1997.

Chris Barnhill was born in Los Angeles, California in 1969 and grew up in Pittsburgh, Pennsylvania. He managed the desert plant collection at Pittsburgh's Phipps Conservatory before working with Steven Hammer at Mesa Garden in Belen, New Mexico, where he specialised in accelerated seed-raising and anti-inertia. Being at the right place at the right time, he began to work on the excellent photographs seen in the present book; he also took many of the photographs seen in *Mesembs of the World*. He currently manages the nursery at the Fullerton Arboretum in southern California. When not horticulturally engaged, he flies a small plane. In 1996 Chris took a long field trip to South Africa during which he discovered *Conophytum chrisocruxum* and several other novelties.