

Some Old and New Stories About Lithops and Small Geophytes in the Namib Dessert

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Abstract

We report on several small geophytes we photographed in the Namib desert during the austral summer while we were (successfully) trying to identify the elusive *Lithops halenbergensis*, which had not been recognized in the wild for almost a century. In particular, we photographed the two spiraling dainty beauties *Albuca namaquensis* and *Dipcadi crispum*. We also encountered the one-leaved *Eriospermum halenbergensis*, which had probably not been photographed since its original discovery in 1929. Finally, we report seeing the two yellow flowering *Oxalis luederitzii* var. *luederitzii* and *O. luederitzii* var. *olivacea* and the most beautifully flowering *O. moutonii* with its pure white and yellow flower with a dark-red lipstick border. The latter two taxa are a new variety and a new species, respectively, we encountered during our visit.

I. Introduction

Geophytes are plants that possess an underground storage organ, such as a bulb, corm, or tuber, in order to survive adverse climatic conditions. In a desert environment, geophytes usually disappear during the dry months, and they reappear after a good rainfall at the appropriate time of the year. A discussion of small and not so small geophytes was given recently by Graham Williamson (2020).

In the following we report on several small geophytes we photographed in the Namib desert in the middle of the austral winter. The Namib desert (Fig. 1) is located between the towns of Aus in the east and the coast town of Lüderitz in the west. We explored in particular the area near the Haalenberg train station about 30 km inland from the Atlantic Coast, because our main goal was to find the elusive *Lithops halenbergensis* Tischer, which was originally found about a hundred

years ago near the train station (Tischer 1932), but which had not been seen since (Hammer 1991, 1992; Cole & Cole 2005).

All of our past visits fell into the austral spring (late October) through early fall (early April). Generally, there was no appreciable rainfall during these months, and geophytic plants were totally absent during our visits to the Haalenberg area.



Fig. 1. View of the Namib desert near the Haalenberg train station. For scale we show Hilde Mouton in search of *Lithops*.

In 2023 we made an exception to our usually pattern of visiting the Namib desert during the hottest and driest months of the year. That year we made a week-long visit in early July in the hope that we might catch the *Lithops*, whose populations we knew to exist from earlier trips (Beiersdorfer et al. 2023a,b), while flowering. According to Tischer (1932) *Lithops halenbergensis* looks like *L. eberlanzii* Dinter & Schwantes but unlike *L. eberlanzii*, which flowers white, *L. halenbergensis* is said to flower yellow, although Tischer himself did not see

the plant in bloom. Seeing flowering plants would be our final clue for identifying *L. haalenbergensis*.

We were lucky because there had been multiple rainfall events in June 2023 in the Haalenberg area. The rain was sufficient to wake up most of the plants from their summer dormancy, including *Lithops* and various geophytes.

While annuals were just beginning to sprout, showing their cotyledons and maybe signs of their first true leaves emerging, geophytes were fully leafed out. Compared to annuals, the geophytes clearly had a head start by relying on their subterranean storage organs for leave and flower growth. Similarly, the Aus and Haalenberg *Lithops* had gorged themselves with rain water and were already flowering.

II. A Mistaken Identification of a Darling Twister: *Albuca namaquensis* Baker

The German botanist Kurt Dinter visited the Haalenberg area on several occasions (for example, Dinter 1921, 1923b). He collected numerous plants, many of which he describe as new species. *Dipcadi ausense* Dinter (1923a) is one of the geophytes he found north of the train line at Aus. His description of the 1-2 inch tall bundle of leaves spiraling about half way up as they emerge from an underground bulb matched very well the spiral beauties we photographed north and south of the train line at Haalenberg, two of which are shown in Figs. 2 and 3. Dinter described the species to be very similar to *D. avisimontanum* Dinter, which he found in the Auasgebirge about 400 km to the north (Dinter 1923a). The differences include the size and shape of the bulb, the number of spiral windings, the number and length of the leave hairs, and the absence or presence of a shallow groove on the leaves.

An emerging inflorescence can be seen at the base of the plant in Fig. 3. However, during our visit we did not see a flowering plant. Dinter also did not observe flowers on either his *Dipcadi ausense* or on his *D. avisimontanum*.

Dinter (1923a) stated that the leaves were similar to that of another graceful species, *Dipcadi spirale* Baker (now *D. brevifolium* (Thumb.) Fourc.), and he took the three species to be in close relation. In other words, Dinter used leaf morphology to place his two new species in the genus *Dipcadi* Medik. Had Dinter seen either of his two bulbs in bloom, he would have not assigned them to the genus *Dipcadi*. Instead he would have accorded them status within the genus *Albuca* L., as the flowers of the members of each genus looked nothing alike. Indeed, both *D. ausense* and *D. avisimontanum* are now recognized as synonyms of *Albuca namaquensis* Baker. He also could have saved himself much work, because *A. namaquensis* had been described about 25 years earlier based on specimens found in South Africa. But this shows that *A. namaquensis* occurs a vast area in southern Africa, although at least at Haalenberg it was nowhere common.



Fig. 2. The thin, spiraling leaves of *Albuca namaquensis*.



Fig. 3. Top view of *Albuca namaquensis*. Note the emerging inflorescence on the right.

III. Here is Looking at You Curly: *Dipcadi crispum* Baker

In Figs. 4 and 5 we show *Dipcadi crispum* Baker, which we saw in locations throughout the Haalenberg area. This is a stunning small curly geophyte with ciliate leaves. The leaves are wound in a tight spiral no bigger than about 1 - 2 cm.

D. crispum has first been described more than 150 years ago (Baker 1870). Similar to the vast range of *Albuca namaquensis* it occurs in arid areas that range from the Western and Eastern Cape in South Africa to regions well north of Windhoek in Namibia.

From the herbarium specimen Dinter collected in Karibib, Namibia, (#6830) we can infer that *Dipcadi crispum* has a bulb that is about 1 cm in diameter. Our visit was too early to see open

flowers, but both pictures show an emerging inflorescence. Typically, the flowers are yellowish brown.



Fig. 4. The broad spiraling leaves of *Dipcadi crispum* with prominent hairs lining the leaf margins.



Fig. 5. *Dipcadi crispum* with fresh florescence emerging between the leaves.

IV. Hidden Away But Not Lost: *Eriospermum halenbergense* Dinter

An overview of the elusive and fascinating genus *Eriospermum* Jaqc. was presented in the Cactus & Succulent Journal by Opel and Hammer (2001). Typically, these plants show themselves in good years with a single leaf. In Fig. 6 we show another elusive member of this genus: *Eriospermum halenbergense* Dinter.

In contrast to the broad distributions of *Albuca namaquensis* and *Dipcadi crispum* it appears that *E. halenbergense* is localized to the Namib desert near Haalenberg. When Dinter (1932) first described the species, he mentioned that he found a mere 5 widely dispersed specimens in the area around Haalenberg.

It appears that this species has been seen rarely, if at all, since Dinter's original discovery. Our search of online herbarium specimens did not yield any new results, and so far there have been

no sightings of *E. halenbergense* reported on the iNaturalist biodiversity website. Indeed, the plant we show in Fig. 6 is the only such plant we saw during our visit, and it may be the first recorded sighting in almost a hundred years. Unfortunately, we saw no sign of any new or old inflorescence.



Fig. 6. A single leaf of *Eriospermum halenbergense* growing out of a rock cleft.

Dinter's description of *Eriospermum halenbergense* emphasizes that the peculiar distribution of hairs is diagnostic of the species. Dinter states that the leaf stem is densely covered with 1 mm long, short-tipped, colorless hairs that are flat and tape-like and protrude radially outward. He further states that 1.5-2 mm long, colorless, flat, tape-like hairs also sparsely cover the upper side of the leaf and densely cover the underside of the leaf. This description matches the distribution of hairs we saw on our plant, although the hairs on the upper side of the leaf on our plant were shorter than those on the stem. In addition, Dinter's description of the morphology of the leaf – he states that the edge is mostly very delicately notched and curled – is affirmed by the leaf shape of our plant.

V. Old Meets New - Dainty Varieties of *Oxalis luederitzii* Schinz

The Haalenberg area sported two yellow-flowering geophytes in the genus *Oxalis* L., and we were lucky enough to see both in bloom.

a. *Oxalis luederitzii* Schinz var. *luederitzii*

Dinter had collected a yellow-flowering *Oxalis* on Haalenberg gneiss hills on August 31, 1929. These are the locality and date he wrote onto his herbarium collection sheet No. 6609 together with the remark "*Oxalis halenbergensis* Dtr. sp. nov." Dinter did not describe *Oxalis halenbergensis*, nor did we find an entry about it in his travel logs. However, it was mentioned a few years later in Paul Range's compilation of the Namaland flora (Range 1934).

Looking at a digital image of Dinter No. 6609 we see flowers that form an umbel. The petals are yellow and about 2-3 times longer than the calyx. Flowers are pedicellate. The fairly large trifoliate leaves are difficult to disentangle visually. The petioles are long and glabrous, but shorter than the peduncles, and emerge from an acaulescent base. The three leaflets appear to be obreniform (broader than long) and more or less equilateral. At least one anterior leaf margin appears incised. The four specimens on Dinter's herbarium sheet, thus, are a very close match to the live plants we show in Figs. 7 and 8. Our plants, in turn, appear to be *Oxalis luederitzii* Schinz, when we compare them to Schinz's description (1908) of the species and to the expanded description of *O. luederitzii* by Knuth (1930a). Indeed, Dinter's herbarium sheet, which is now housed at the Royal Botanic Gardens Kew, is filed under *O. luederitzii*.

b. *Oxalis luederitzii* Schinz var. *olivacea* Beiersd. & Lepson **var. nov.**

In Figs. 9 - 11 we show photographs of the another yellow-flowering *Oxalis* we photographed in the Haalenberg area. Most characteristics that applied to *O. luederitzii* also fit to this plant, and the two plants are, therefore, closely related. However, the color of all parts of this plant is very different: Instead of a light green, the leaflets, the petioles, pedicels, and the peduncles are an olivaceous greenish-yellowish brown. Another distinguishing feature is the rufescent underside of the leaves (Fig. 10); by contrast, the underside of the leaves of *O. luederitzii* are the same light green color as their upper sides. However, the number of leaves appears to be smaller compared to *O. luederitzii* (fewer than about 15 compared to above 30), although this could be an age or environmental effect. Moreover, the color of the petals is a stronger yellow than the pale-yellow color of the petals of *O. luederitzii*. Because Knuth's description of *O. luederitzii* calls for green leaflets we think that the olivaceous-rufescent plant should be given variety status. We name the new variety *O. luederitzii* Schinz var. *olivacea* Beiersd. & Lepson **var. nov.** The name emphasizes the color that distinguishes it from *O. luederitzii* Schinz var. *luederitzii*.

We note that the leaflets in both varieties of *Oxalis luederitzii* are folded in such a way that the underside of one leaflet touches that of the adjacent leaflet, as we illustrate in Fig. 10. Knuth (1930b) refers to this leaf arrangement as its sleeping position. This is in sharp contrast to way the leaflets are held in the *Oxalis* we describe below.



Fig. 7. Bright green *Oxalis luederitzii* var. *luederitzii* with light yellow, umbellate flowers.



Fig. 8. Smaller version of *Oxalis luederitzii* var. *luederitzii*. The downward folding of the leaflets is prominently displayed. Notice also the light-green to yellow sepals and the light green stems holding up the leaves and the flowers.

Oxalis luederitzii var. *olivacea* **var. nov.** Beiersdorfer & Lepson

Differt a var. *luederitzii* colore brunneo-olivaceo foliolorum, petioli, pedunculi, pedicelli et calyce, nonnullis foliolis subtus purpureis; corolla flava paulo profundiore.

Small, stemless perennial. Multiple, basal, trifoliate, brownish-olive leaves (10-15) with 1-5 cm long, glabrous, brownish-olive, patulous petiols; leaflets 10-15 mm wide, 4-6 mm tall, obreniform, more or less equilateral and glabrous, often with rufous undersides. The leaflets are not held in a plane, but are often drawn down and folded so that the underside of the right lobe of the central leaflet touches underside of the left lobe of the right leaflet, while the underside of the left lobe of the central leaflet touches underside of the right lobe of the left leaflet. The 3-7 cm long, $\pm$ erect glabrous, brownish-olive peduncle rises above the leaves and typically supports up to 6 flower buds and typically 2 mature flowers on roughly 0-5 mm long, brownish-olive, glabrous pedicels. If visible, subulate, brownish-olive bracts are about 1 mm long. The brownish-olive lanceolate sepals are about 6 mm long. The cuneate-obovate, 15-20 mm long petals are yellow and about 6-8 mm wide at upper part with a broadly rounded tip.

Entymology: *olivacea* - olive colored ; The name emphasizes the color that distinguishes it from *O. luederitzii* var. *luederitzii*.



Fig. 9. Yellowish-brown *Oxalis luederitzii* var. *olivacea* with umbellate flowers with yellow petals and brownish sepals. The stems holding up the leaves and the flowers are somewhat darker than the leaves.

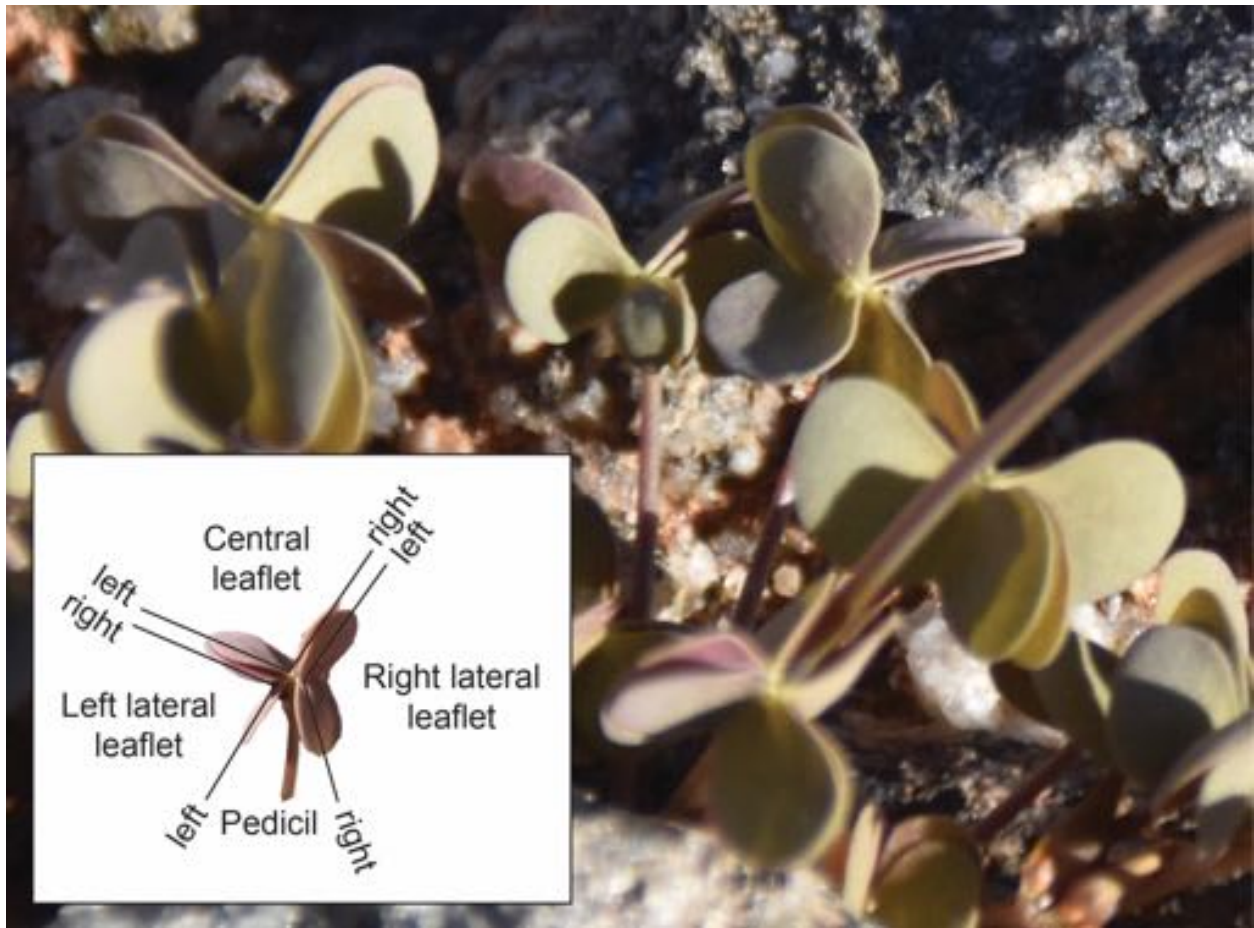


Fig. 10. Closeup of greenish-brown leaves of *Oxalis luederitzii* var. *olivacea* showing a rufus underside. The leaflets are folded back as illustrated in the inset.

The distribution of both varieties of *O. luederitzii* near the Haalenberg station is shown in Fig. 12. The two varieties were found as close as about 50 m apart, but in general plants of either variety are sparse and distributed far apart. Note that in Fig. 12 each marker represents on a single plant. In other words, we encountered merely about a half dozen plants of either variety. We did not observe a plant that would appear to be an intergrade.



Fig. 11. Closeup of the flower of *Oxalis luederitzii* var. *olivacea*. Two bracts visible highlighted by white circles in the inset.

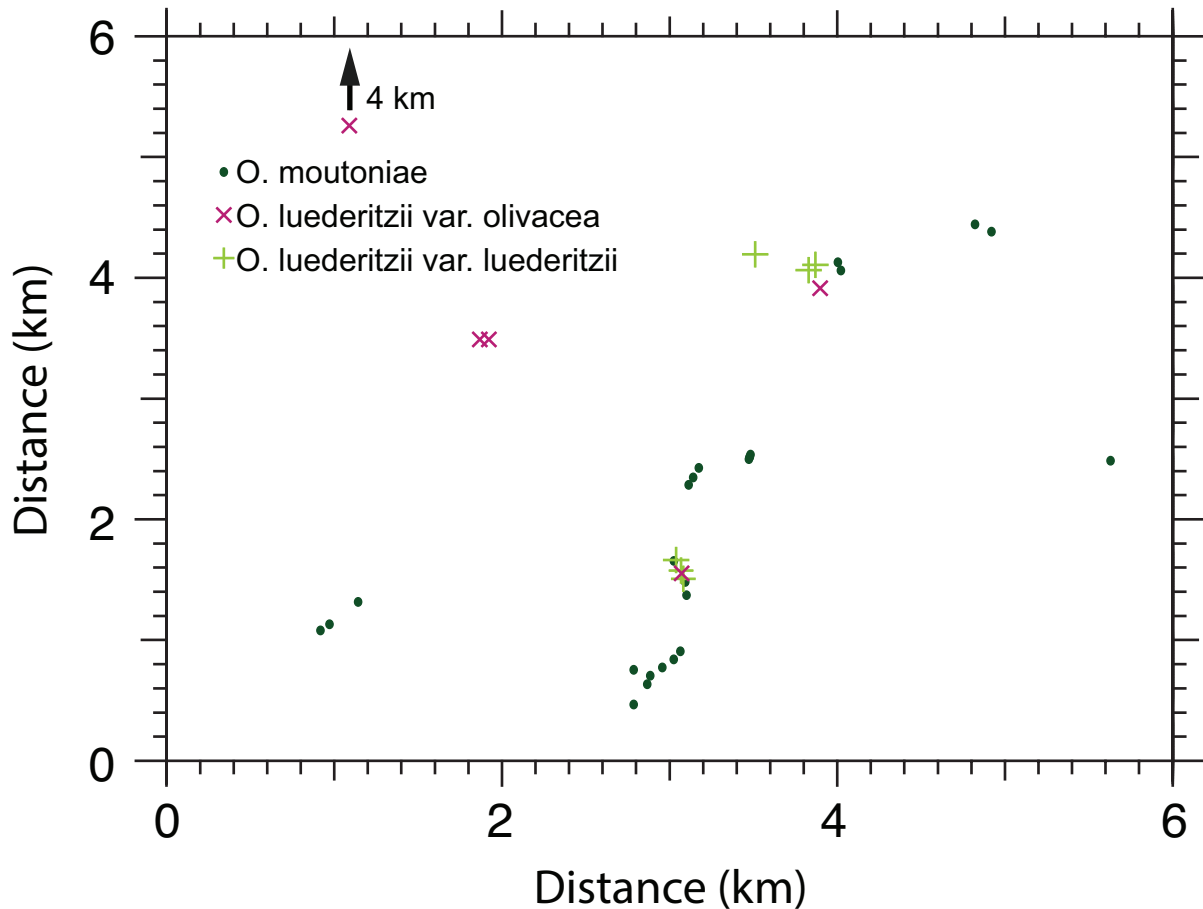


Fig. 12. Localities in the Haalenberg area at which we observed plants in the genus *Oxalis*. Each marker represents at most two plants in the case of *O. luederitzii* and at most three for *O. moutoniae*.

c. Another Variety of *Oxalis luederitzii* Schinz?

Several observations have been recorded on iNaturalist under the name *Oxalis luederitzii*. All but one of these observations are no further than about a 10 km radius from Aus and do not extend to Haalenberg, which is about 75 km to the west. All plants east and north of Aus have yellow flowers and bright green foliage and indeed appear to be *O. luederitzii* var. *luederitzii*. Interestingly, all plants recorded west of Aus have white flowers with yellow centers and dull gray-green olivaceous or rufescent leaves. Both Schinz's original (1908) and Knuth's subsequent (1930a) description of the species call for yellow flowers. It, thus, remains to be seen whether this is yet another variety of *O. luederitzii*. One lone iNaturalist observation is from a location about 100 km southwest of Aus and 60 km SSE from Haalenberg and shows yellow flowers and olivaceous-rufescent foliage typical of *O. luederitzii* var. *olivacea*.

During our very brief stop near Aus in July 2023 to photograph flowering *Lithops bella* N.E.Br. (Fig. 13) we failed to see any *Oxalis*. However, Dinter encountered white-flowering *Oxalis* near Aus. Looking at an image of Dinter's herbarium sheet No. 3568, on which he preserved the *Oxalis* he collected at Aus on June 4, 1922, we see that he remarked that the flower was pure white ("Bl. rein weiss"). He only labeled it *Oxalis* at the time, but in his trip report published a year later, he called the white-flowering *Oxalis* at Aus *O. albella* (Dinter 1923b), and Knuth provided a formal description four years later (Knuth 1927, Knuth 1930c).



Fig. 13. Flowering *Lithops bella* at Aus. Note that even the senescing petals on the lower left are white.

Strangely, *Oxalis albella* has since then been synonymized with *O. pseudocernua* R.Knuth, although the latter has an umbellate inflorescence with yellow flowers while *O. albella* has solitary flowers that are white. According to Schreiber (1967) the thinking was that first Dinter (1923) then Knuth (1927) was fooled by weak specimens of *O. pseudocernua*, which produced merely a single flower, so that neither Dinter nor Knuth realized that strong specimens would have produced multiple flowers in an umbel. This explanation is difficult to believe because Dinter (1923) writes "*Mesembryanthemum Derenbergianum* grew on a vast sandy plain numbering hundreds of thousands, together with the charming white-flowered *Oxalis albella*, *M. clausum*, ..." (or, in his words, "*M. Derenbergianum* stand hier unten auf dieser weitgedehnten Sandfläche zu Hunderttausenden, zusammen mit der reizenden weiß-blühenden *Oxalis albella*, *M. clausum*, *M. gymnocladum* und dem schönen in Vollblüte befindlichen, weißrindigen, mit eßbaren weißen in die drahtigen Wurzeln eingeschalteten Knollen versehenen *M. spinescens*"). This seems to imply that Dinter saw many *O. albella* near Aus, and we are supposed to believe that all were "weak" plants.

It would have been nice, if we could have associated Dinter's white-flowering *O. albella* with the co-located white-flowering *O. luederitzii* listed on iNaturalist. However, the later has umbellate flowers, while the former might not; moreover, its white flowers with yellow centers does not seem to be what Dinter meant with "pure white" flower. And if Dinter's collection No. 3568 truly shows two specimens of *O. albella*, then the form of the leaflets does not match either. Neither does Knuth's description of *O. albella* having hairy leaves like *O. pseudocernua*. This means that the plants a few kilometers west of Aus are possibly a new variety of *O. luederitzii*. More work will be needed to disentangle history and modern observations.

VI. The Red Lipstick *Oxalis moutoniae* Beiersd. & Lepson sp. nov,

Our discussion above shows that flower color may have eroded as a serious characteristic for diagnosing *Oxalis* in the 100 years since Dinter and Knuth. Nevertheless, we venture to report that we have observed a third *Oxalis* taxon at Haalenberg with a very distinct flower (Figs. 14-19). This small *Oxalis* flowers white with a yellow center and bright lipstick-red margins. With the flower rising above a cushion of grass-green shamrock leaves makes it the most beautiful *Oxalis* we have ever seen. The lipstick-red stripe is found only on the underside of each petal, where it bleeds into the white or yellow of the petal. When folded the flower looks striped like a candy cane.

We know of no other *Oxalis* flower with such a color combination in Namibia. The closest is that of *O. versicolor* L., which occurs in South Africa. However, the leaves, the lack of a strem, and the overall growth form of the Haalenberg plant are very different from those of *O. versicolor*. The plant, undoubtedly, represents a new species.



Fig. 14. Closeup of the flowers of *Oxalis moutoniae*. The flowers dwarf the leaves. The bright-red lipstick margin on the underside of the petal is faintly visible when looking from above.



Fig. 15. Another closeup of the beautifully flowering of *Oxalis moutoniae*.



Fig. 16. Closed flower of *Oxalis moutoniae* exhibiting the dark-red lipstick margins of the petals' underside. A rufus underside can be seen on the central leaflet of the newly emergent leaf near the tawny flower stem.



Fig. 17. Closeup of the flowers of *Oxalis moutoniae* showing tiny bracts below the calyx.



Fig. 18. Non-flowering *Oxalis moutoniae* showing the leaf arrangement.



Fig. 19. Closeup of the three leaflets on a leaf of *Oxalis moutoniae*. The asymmetry of the two lateral leaflets is obvious. The undersides of newly emergent leaves are rufus red.

We dub this new species *Oxalis moutoniae* in honor of Hilde Mouton (Fig. 1), who with her husband Frikkie Mouton, has greatly encouraged and enabled our research of geophytes, *Lithops*, and other succulent plants in the Namib desert and has played a tremendously constructive role in *Lithops* research and conservation over many decades.

As we show in Fig. 12, we encountered *Oxalis moutoniae* more than a dozen times during our searches in the Haalenberg area. Nevertheless, only in a few cases did we see more than one plant in a given locality.

***Oxalis moutoniae* sp. nov.** Beiersdorfer & Lepson

Pusilla, acaulis, usque 4 cm alta. Folia basalia, vix numerosa (5-15), glabra, trifoliata. Foliolum medium obcordatum, margino antico parum incisum, 4-5 mm longum, 6-8 mm latum. Folia lateralia obliqua, obovata vel obcordata, saepe minora; superne viridia, subtus purpurea vel fulvus; petiolus 5-20 mm longus, fulvus vel rufus, vix strictus. Pedunculi basales, 1-2 cm longi, ± erecti, glabri. Bractee setaceae, subulatae et 1-2 mm longae. Sepala 3-4 mm longa, oblonga, acuta, pupurea, viridia vel fulva. Petala circa 12-20 mm longa, ± cuneata, margine anteriore retusa vel repando-sinuata; tubus luteolus; limbus tubo vix longior; limbus albidus, margine purpureo-violaceus. 20 mm longa, albida, ± cuneata, margine anteriore retusa vel repando-sinuata.

A small, stemless perennial, no taller than 4 cm, with multiple (5-15), basal, trifoliate, glabrous leaves. The central obcordate leaflet is 6-8 mm wide and 4-5 mm tall; the lateral leaflets are obovate or obcordate, assymetrical, and often smaller than the central leaflet. The upper side of a leaflet is green, the underside is tawny to dark red. The petioles are 5-20 mm long, tawny or rufus and seldom upright. A single flower is supported by a 1-2 cm long, ± erect glabrous, tawny or red peduncle. The subulate, stemless bracts are about 1-2 mm long. The acute oblong sepals are upto 4 mm long and green or tawny with purple. The cuneate, 12-20 mm long petals are white with a yellow throat and a dark-red or purple margin. Their upper part is blunt or bluntly curved.

Entymology: moutoniae - Mouton's Oxalis. Named after Hilde Mouton, who with her husband Frikkie Mouton has enabled our work and has been an incessant supporter of *Lithops* research and conservation.

VII. The "Rediscovery" of *Lithops halenbergensis* Tischer

Finally, we can report that we also photographed the "yellow" flower, which is diagnostics for the elusive *Lithops halenbergensis*. In Figs. 20 and 21 we show two yellow-flowering plants we encountered near the Haalenberg train station, both of which also match most other characteristics of *L. halenbergensis*.

The reason, however, why the flowers are yellow is because they have started to senesce. Before the flower dies back its color is pure white, as we show in Fig. 22.



Fig. 20. Two yellow flowers on *Lithops eberlanzii* var. *halenbergsis*. The plants are fully gorged after winter rains.



Fig. 21. A yellow flower on a mutliheaded *Lithops eberlanzii* var. *halenbergensis*.

It is easy to think that having encountered only one or a few such plants with old flowers and none in full bloom the plant was described as having yellow flowers. Adding to this belief was the fact the pure white flower of *Lithops bella*, which was the best known *Lithops* at the time, remained white even when it died back (Fig. 13).

The yellowing of the petals as the flower senesces is probably why *Lithops halenbergensis* was described as looking like *L. eberlanzii* but with a diagnostic yellow flower instead of a white flower typical for *L. eberlanzii* (Tischer 1932). The details of our search for *L. halenbergensis* are given by Beiersdorfer et al. (2024). In this article we list additional possibilities why the flower color was thought to be yellow, including a possibility that the plant was born on the wrong side of the train tracks because Dinter had very stated just two years before the plants were collected that all *Lithops* north of the train tracks flower yellow; only those south of the rail line might flower white (or yellow).

Having solved the puzzle surrounding the elusive *Lithops halenbergensis*, we now recognize Tischer's plant at Haalenberg as *L. eberlanzii* var. *halenbergensis* (Tischer) Beiersd. & Lepson.

Clearly, a little rain goes a long way to reveal some of the desert's mysteries.



Fig. 22. Pure-white budding petals emerging from the bud on *Lithops eberlanzii* var. *halenbergensis*.

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