Midday Flowers

Southern Namibia is home to some beautiful succulents, many of which only occur in this part of the world

Inset: Brownanthus namibenis *with a hungry beetle feeding on nectar or pollen.*

Main picture: Well camouflaged against its background, even when flowering, Lithops schwantesii *can genuinely be called a "living stone".*

Renowned for its magnificent flower displays during August to October, Namaqualand is the Mecca for flower lovers from all over the world. However, very few people know that the exceptionally rich winter-rainfall flora, which is responsible for this magnificent spectacle, extends far beyond the Orange River into southern Namibia. The southern Namib and the eastwards adjoining farmlands also receive winter rains and many of the Namaqualand species or relatives with similar adaptations occur here.

On one of my many visits to southern Namibia, travelling from Maltahöhe to Aus and then to the Orange River, good rains had fallen a few weeks before and the usually monotonous dwarf shrub savanna had mutated into a brilliant mosaic of shades of yellow, purple, pink and red. Curious to find out what was causing this delightful sighting, our journey was prolonged for many hours, because I had to stop and investigate more closely, much to the distress of my fellow-travellers.

There were daisies and legumes, members of the caper, mustard, Euphorbia and Pelargonium family, but most outstanding were the succulent herbs and small shrubs of the Mesembryanthemum family (Mesembryanthemaceae or Aizoaceae), often referred to as midday flowers, vygies or simply mesembs.

Most mesembs possess showy, daisy-like flowers which can easily be confused with some of the succulent members of the daisy family. With numbers of species ranging from 1 800 to 2 300 in southern Africa, their names changing frequently, many genera not sufficiently studied and new classifications proposed every so often, the Mesembryanthum family is one of the most difficult groups of plants to identify. Plant ecologists working in southern Namibia, the Karoo and Cape can tell you very disheartening stories. Nevertheless, even without knowing the name or taxonomic status of a particular species, the mesembs are no less fascinating.

The incredible diversity of southern African mesembs has occupied botanists for many decades. Their succulent habit is considered a very appropriate adaptation to winter-rainfall conditions. Comparatively mild temperatures throughout the year, high humidity associated with fog in the coastal areas and the bulk of precipitation falling when temperatures and consequently evaporation are low, seem conducive to development of water-storing tissue in the leaves and has resulted in a wide array of different forms of leaf succulence in about 2 000 species within this one family. Although some mesembs also occur naturally in north and east Africa, Australia and America, their centre of distribution lies indisputably in the southern African winter-rainfall region which stretches from the Cape through the southern Namib to Lüderitz. However, mesembs are also an important component of the vegetation bordering the winter-rainfall region, such as the Karoo and parts of southern Namibia. Possibly relics of former winter-rainfall conditions, some mesembs even occur in mountainous habitats in central Namibia, for example in the Naukluft and Aus mountains, the Great Western Escarpment and on the Brandberg.

What puzzles botanists today is why there are so many species of vygies concentrated in a comparatively small area. Besides the climatic conditions in the winter-rainfall region, high variability in anatomy and growth forms and highly specialised seed dispersal strategies may have contributed to the evolutionary success of this plant family in southern Africa. Locally variable conditions in topography and soil, in turn, encouraged the development of numerous species on a small scale adapted to a very particular habitat. Nearly 90% of mesembs are endemic to southern Africa, or to an even more restricted area within southern Africa.

In terms of physiology, often coupled with succulence is the crassulacean acid metabolisms, commonly known as CAM. Unlike plants which follow conventional photosynthetic pathways, CAM plants fix carbon at night, store it in form of organic acid and process it during the day when sunlight is available. This way plants can keep their pores closed during the day which is advantageous in arid climates, because it reduces water loss to a minimum during the heat of the day. Quite a number of mesembs are CAM plants for apparent reasons. Not only a specialised metabolism, but also unique dispersal mechanisms have evolved in the mesemb family. Except for one genus, all mesembs produce capsules which open upon moistening. This ensures that seeds are distributed during the rainy season when conditions are favourable for germination. This at first sight very simple technique is refined in some species which use the force of the raindrops to catapult

Many mesembs, like* Galenia papulosa, *have bladder cells on their leaf surface which give them a frosty appearance. Thus mesembs are also commonly known as ice-plants.

seeds out of their capsules. Others employ different methods of seed dispersal on the same plant by having some seeds washed out by raindrops, others shaken out over a long period and the remaining seeds distributed with an entire capsule compartment when the capsule eventually breaks up into segments. The plant "hedges its bets" thereby increasing the chances of its offspring to find a suitable spot to survive.

Wildlife and livestock obviously relish these living water sources, especially since they provide food at the same time. Because of that and because of the harsh climatic conditions, particularly in areas where sandstorms frequently scour the surface, some mesembs have sought refuge underground. These cryptic, so-called mimicry plants show a dazzling similarity to their background rocks, and are nearly impossible to detect when not flowering. The genus *Lithops*, commonly known as "living stones" is famous for this adaptation. *Fenestraria* species, in turn, are completely hidden underground, only exposing a small see-through window to enable the plant to photosynthesise.

Since mesembs can form the most beautiful carpets of flowers, many species have been cultivated in gardens, especially as ground cover. Their drought resistance adds another benefit to their use as garden ornamentals in arid countries. But their beauty and unique adaptations also make them vulnerable. Illegal plant collecting poses a serious threat to some of the rarer species, even though the majority of the succulent flora in Namibia thrives within the boundaries of conservation and strictly controlled mining areas.

Uniquely adapted, though little known, these gorgeous plants occupy a vital niche on our planet. Let's make sure that future generations may also enjoy the sight of them.

by Antje Burke