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The Bulb Garden

~Gardening with Bulbs ~

What's Inside...

Shining a light on bulbils: *Globba* L. (Zingiberaceae)

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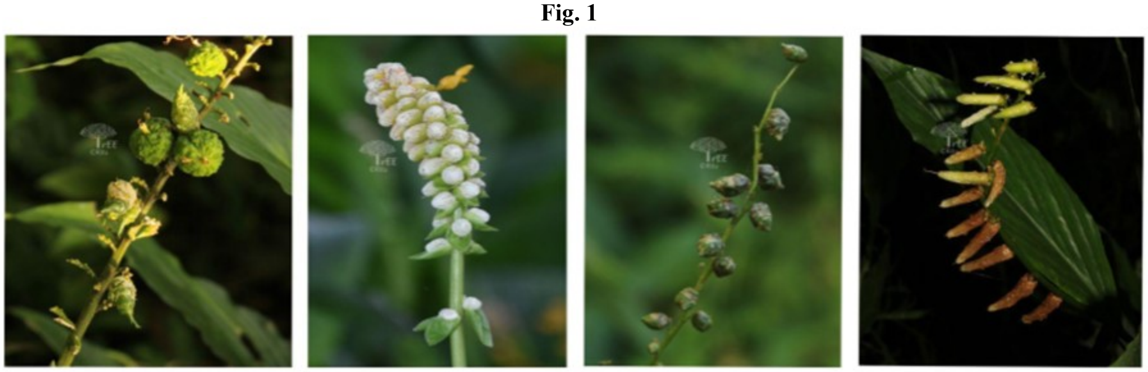
Flowering plants display an exceptional diversity of asexual and sexual reproductive mechanisms. Both asexual and sexual modes represent alternative reproductive mechanisms that plants may adopt in order to counter temporally or spatially variable environments. In plants, it is common to find that a single individual may resort to either mode, resulting in a "mixed reproductive strategy." Investigating the conditions under which plants opt for a mixed reproductive strategy can allow us to explore the evolution of reproductive strategies as a response to environmental, ecological, and physiological stresses. Further, plants with mixed reproductive strategies help us understand how reproductive modes can shape their population genetic structures, since in plants we can find underlying trade-offs such as asexual reproduction resulting in increased inbreeding rates, and sexual reproduction resulting in increased outcrossing rates.

In plants, the most common type of asexual reproduction is clonal reproduction (i.e., vegetative propagation by asexual propagules), in which parental genotypes produce vegetative propagules (via rhizome, pseudovivipary, runner, sucker, stolon, and other structures) which are capable of independent growth and reproduction (Meeus et al. 2007, Ashokan and Gowda 2018). One example of asexual propagules is the bulbil (Fig. 1). Bulbils are typically asexual, enlarged, corky, storage root-forming structures that can also act as propagules (Box et al. 2006). For horticulturists, bulbils are a convenient method of propagation because they can withstand extended periods of adverse conditions, and therefore can be easily stored for several months before planting. In the plant genus *Globba* (Zingiberaceae), horticulturists have specifically exploited bulbils because of this ease of propagation, especially where certain genotypes are preferred and a breed/variety/species needs to be conserved in horticulture. However, very little is known of the phylogenetic origin of bulbils in

Fig. 1



G. multilofra *G. schomburgkii* *G. clarkei* *G. sessiliflora*

Globba cont'd

Globba, or about their role as an efficient reproductive strategy (although see Box and Rudall 2006).

The Zingiberaceae constitutes the largest family within the plant order Zingiberales, which comprises c. 53 genera and more than 1,300 species (Ivanovic et al. 2021). Members of this family are perennial, rhizomatous herbs which usually grow in moist, shady places (Saha et al. 2020). *Globba* L. is the fourth-largest genus within Zingiberaceae and one of the three genera within the tribe Globbeae, the other two being *Gangnepainia* and *Hemiorchis* (Cao et al. 2019). Plants are herbaceous, rhizomatous, and perennial, and may bear multiple inflorescences (from multiple ramets) which emerge from a single genet (rhizome). Currently, the genus *Globba* comprises at least 120 species distributed from Sri Lanka and Southeast Asia to Australia. In India, it is represented by 14 species which are confined to a few states in the Western Ghats and North East India (Joe et al. 2019). Plants within this genus are popular as ornamentals, variously known as "Dancing Girls," "Weeping Goldsmith," "Snowball," "Singapore Gold," "White Dragon," and "Ruby Queen," highlighting the delicate, attractive shape of the flowers. Many species, such as *Globba winitii* and *Globba sherwoodiana*, have become popular in horticulture due to their showy, colorful bracts, along with their delicate flowers. Flowers in this genus are characteristic pf the Zingiberaceae in possessing a single stamen and epigynous nectaries, and the anthers are unique in having triangular lateral appendages that are diagnostic of subgenera and sections within the tribe Globbeae. The labellum is attached to the filament and acts as a landing platform for pollinators, and the style is held tightly in position across the curvature of the filament like a bowstring (Box and Rudall 2006).

Besides sexual reproduction, most if not all *Globba* species can reproduce asexually by rhizomes and bulbils. Bulbils have been suggested to be rare in tropical and subtropical plants, but *Globba* is unusual in being a tropical species that invests heavily in vegetative reproduction by means of bulbils (Box and Rudall 2006). Bulbils have also been identified as a very important character in this genus, routinely used to identify many species (e.g., *G. marantina*, *G. schomburgkii*). The Tropical Ecology and Evolution Laboratory (TrEE lab) at IISER Bhopal has been studying the ecology and evolution of many taxa within the plant family Zingiberaceae (gingers) since 2013.

One of our interests has been to investigate ecological factors that may have shaped the evolution of bulbils in *Globba*, and also how this strategy may have helped the genus diversify in the Asian tropical understory. As part of the proposed Pacific Bulb Society grant, we specifically addressed whether both ecological and phylogenetic tools could be used to understand the evolutionary significance of bulbils and how they may present ecological advantages to plant species that may be using a mixed-reproductive strategy (i.e. presence of both asexual and sexual reproduction) within the same plant.

Although fieldwork for this study was planned for 2020, due to the pandemic, field experiments were carried out only in 2021, from July through October, which represents the flowering period for *Globba*; this matches the monsoon season in the Western Ghats. Further, due to pandemic-induced limited access to field locations across India, all studies were carried out only within the southern state of Kerala (Fig. 2). In total, we studied three species (Fig.3) of *Globba* (*Globba sessiliflora* Sims, *Globba orixensis* Roxb. and *Globba marina* L.) across 28 different locations. Ecological experiments included documenting and quantifying floral opening time, pollinator visits, nectar quantification, stigma receptivity, and quantifying reproductive success by estimating fruit set rates. Compatibility experiments to test selfing and outcrossing rates were carried out by setting up four crossing experiments (autogamy, selfing, geitonogamy [transfer of pollen by a vector but on the same plant], and xenogamy) in the wild. While all three species were studied in the wild, here we summarize the ecological and reproductive biology results only for *Globba marantina*, since we have the most

Globba cont'd

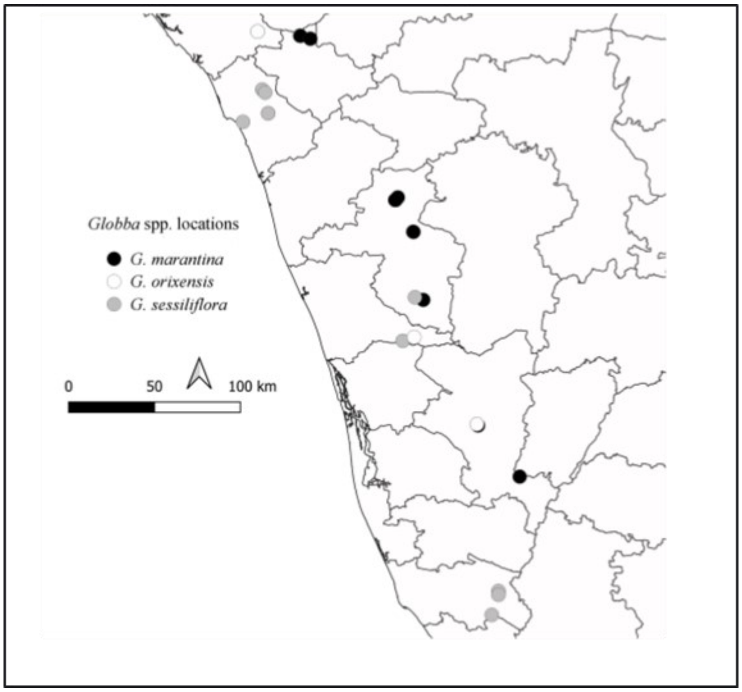


Fig 2: Study sites of three *Globba* spp. within the state of Kerala, India.

extensive sampling (n = 11 populations) for this species because of its wide distribution. All herbarium vouchers are deposited at BHPL, IISER Bhopal, India.

Globba marantina produces 1–2 flowers per inflorescence and predominantly relies on asexual reproduction by bulbils and rhizomes for propagation. Among the three species, *G. marantina* was observed to be an obligate asexual, while both *G. sessiliflora* and *G. orixensis* were facultative asexual plants. In *G. marantina*, bulbils were present throughout the inflorescence, that is on lower as well as upper bracts, as well as in the axils of leaves. Each bulbil is ovoid, brownish-yellow in its young stage, and becomes dull yellow when mature (Fig 3: Flowers of *Globba* subsp. studied). Note the presence or absence of the anther appendages and labellum shape as diagnostic features.

Flower opening time for this species was between 2:00 and 3:00 am, and anther dehiscence was observed between 9:00 and 11:00 am. Nectar energy ranged from (1-5 Kcal per flower) and peak nectar was observed at 12:00 pm (9 hours after the time of anthesis); stigma receptivity was highest at 9:00 am and 12:00 pm (6 and 9 hours after the time of anthesis). We observed zero fruit set in all of the 40 hand-pollination experiments, where 10 flowers from different genets were used in each of the four pollination treatments (autogamy, selfing, geitonogamy, and xenogamy), which suggests that the formation of bulbils in this species is not due to pollen limitation.

No natural visitors or pollinators were observed on *Globba marantina* in the studied populations, and bulbils were present in all populations. This suggests that propagation in *G. marantina* is strictly vegetative, and that most individuals in a population may be clonal. Given these observations, we also infer that despite the lack of pollinators, an asexual mode of reproduction may be a critical factor in maintaining the population size in this species. Among the three species, *G. marantina,* which is an obligate asexual species, showed higher clumping of local population sizes (n=200-350/400 m^2) when compared to the sexual species *G. sessiliflora* and *G. orixensis.* We suggest that since bulbils can survive adverse environmental conditions and can establish faster than seedlings of completely sexual species, bulbils probably provide a survival and establishment advantage. *G. marantina* was present in more diverse habitats ranging from tropical evergreen, moist deciduous to dry deciduous forest, compared to its facultative asexual congeners, which supports the theory of geographic parthenogenesis, i.e., distinct distribution of asexually reproducing species when compared to their sexual relatives. The distribution success of this species provides an insight into the role and advantage of bulbils

Fig. 3

A. *Globba marantina* B. *Globba orixensis* C. *Globba sessiliflora*

Globba cont'd

as an efficient reproductive strategy.

Our future studies include field experiments to study the ecological, physiological, and genetic relevance of bulbils as an important reproductive strategy in other *Globba* species. Finally, we think that knowledge of the reproductive system of a plant species in its natural habitat can be very important for plant breeders, who may be interested in increasing the propagation of their desired genotypes in controlled greenhouse conditions.

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A love affair with *Hippeastrums*

Vlad Hempel is an active member of the PBS Discussion List and a Certified Bulb Lover who lives in Berlin, Germany. He lists as his two favorite bulbs, Hippeastrum *and* Narcissus. *This article focuses on the basics of growing* Hippeastrum. *Ed. This article covers techniques for growing commercial* Hippeastrum *selections and hybrids. Botanical species may have a much wider range of cultural requirements. See* The Genus *Hippeastrum* in Bolivia*. All photos by author unless noted.*

I have been in love with *Hippeastrum* ever since I can remember: the vibrant colors, the speed of growth and the shiny green leaves, growing left and right. I was 10 years old when my great-grandfather gave me my very first *Hippeastrum*, the original 'Mont Blanc'. It had only two pristine white flowers and very tall, thin, dark green leaves. I was so excited; a journey had begun. In this article I would like to share my experience of growing this genus for so many years.

When it comes to *Hippeastrum*, one cannot do much wrong; it is a fairly easy-to-grow bulbous plant that is mostly sold around the Christmas holiday because its big, colorful flowers bring joy in the darkest time of year. *Hippeastrum* are commonly called "Amaryllis," a marketing name, and they have become a very successful commercial plant, with numerous new hybrids registered each year. *Hippeastrum* and *Amaryllis* are closely related and similar in appearance, and during more than one period, botanists lumped both under the name *Amaryllis*. The genus *Hippeastrum* comes from South and Central America, while the true *Amaryllis* is native to South Africa.

This article is solely based on my own experience with *Hippeastrum* here in northern Europe (Berlin, Germany), where summers are relatively warm and winters rather mild. Fall and spring are short and unpredictable in regard to temperature, and usually drier than the rest of the year.

Preparation and planting of newly purchased bulbs. If you get a hippeastrum as a cut flower, its beautiful blooms will impress you in a vase for a week or two. If you get it as a potted plant, you simply place the pot in a sunny, warm location in your house and follow the instructions it came with (more on this below). Alternatively, you can get it as a dry dormant bulb, which you need to plant yourself. I prefer to get the dry bulbs and have the full experience: planting, the first sign of a flowering scape, flowering, and

A love affair cont'd

A freshly potted hippeastrum

the decorative foliage thereafter.

Hippeastrum are also sold as waxed bulbs, as dry bulbs on a wooden plate or in a package with a vase and pebbles. These are valid temporary growing methods, just for a beautiful display. If you want a healthy plant that blooms every year, though, it is best to choose either dry bulbs or potted plants. Most will reward you with beautiful blooms every year, sometimes even twice a year.

Once you get the dry bulbs, inspect them carefully. Some come with issues such as rot. Clean anything that comes off easily, and if there are any signs of rot, remove them carefully and let the bulb dry for a day or two before planting it. Most important is a dry, clean bulb neck (also from the top down) and a dry basal plate. If your new bulbs arrive soft (perhaps when you have ordered online and not picked them up in a store), simply discard them. They will not produce anything. This happens once in a while; however, new bulbs usually come without substantial problems. In addition, please note before planting: do not remove any roots unless they are completely shriveled. You can also place the bulbs in a bowl with water for an hour or so, just up to the level of the basal plate to rehydrate the roots. Then you can dust the basal plate with an antifungal product such as sulfur powder to prevent rot.

After your bulbs are inspected and cleaned, they are ready for planting. Choose any free-draining mix, the best being equal parts of compost, pumice, and coarse sand. I also add a small amount of bone meal upon planting, since I noticed that this stimulates root growth and thus, healthier plants overall. You can also use coconut fiber (coir), vermiculite, or perlite, but I have observed that hippeastrums grow better in organic compost. Perlite floats and flies around whenever I water my plants. Make sure to choose appropriate pots too: the big-

A bulb (left) from Vlad's greenhouse vs newly purchased bulb

ger the hybrid, the bigger the pot. For standard large varieties with flowers having a diameter of 18 cm or more, I usually choose a 5 or 6 liter pot. For smaller blooming varieties I choose a 3 liter pot. Also, most hybrids grow better in tall rather than wide pots, something like the pots used for roses. You can also use pots of any material; they will grow well in plastic or clay pots. If you live in a climate with prolonged hot summers, avoid black plastic pots and go for clay. This will help your plants cope with high temperatures. Whatever the material is, make sure the pot has a good drainage hole.

Once you have your planting medium and pots ready, make some labels and start planting. Plant the bulb with the soil covering at least two-thirds of the bulb below the neck, and gently firm it around the bulb. If your bulb has roots, make sure they are equally distributed in the planting medium. Then add water until it drains through the bottom. It is best to use warm water (not hot!), since sitting in warm, moist soil will stimulate root development. I prefer white plastic labels and write on them with pencil, which lasts longest.

If you live in a warm climate (Zone 9a and above), you can plant your bulbs directly in open ground; just make sure the site is protected from winter rains and strong winds. Against a sunny wall is perfect! In the garden, plant the bulbs deeper, with just the neck above the surface. This prevents

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burns on the bulbs in the summer months and offers them better protection from cold rains in winter.

What happens once you have planted your bulb? After your bulb is planted and watered for the first time, place it in a sunny, and warm place indoors. While it does not need direct sun, it will surely benefit from a spot with indirect bright sunlight. If you live in a zone with very short days in November and December, as I do in Berlin, put your bulb in the sunniest place in your house. It will surely enjoy the direct sun! However, if you live further south, say at the latitude of Rome (41°) or Cairo (30°), direct sunlight may give your *Hippeastrum* plants serious sunburns. If you are not sure, place your plants in a spot with bright but indirect sunlight.

At this stage, you do not need to water your bulb much; about once a week or even less should be fine. Once there are growth signs, water freely once a week, or more often in low indoor humidity or in a warm climate. The planting medium needs to become slightly dry between waterings. Important note: keep the bulb neck dry at all times and water from the margin of the pot. This keeps rotting issues away! Remember, hippeastrums do not like to sit in wet soil, especially if it is not warm enough. The ideal temperature after planting is 22 degrees Celsius, but anything between 18 to 25 degrees C would be just fine. If the temperature is below this range, a heating pad underneath the pot helps. Just make sure not to water with cold water. Kept in these conditions, your bulb should bloom in about 6 weeks from planting; some start much earlier (after 3 weeks), while others take longer (10 weeks or more). Each bulb is different and has a character of its own, so be patient and the reward will come eventually. Another important note: it is quite common that flowering stems grow toward the light source. If you rotate the pot 180 degrees every other day, the stem will straighten by itself.

Flowering is the most exciting period for most of us. Modern hybrids tend to open all their flowers simultaneously, which is of course a nice display. However, keep in mind that this might reduce the flowering period. Usually, the flowering of a single stem will last one to two weeks, with some exceptions. The rule is, the warmer it is, the shorter the flowering period. To extend it, place the pot in a cooler room, say at 15 degrees C. If you do this, please avoid watering with cold water: you do not want any rot. Importantly, first, you may need a firm stick to support the flowering stems, especially for those bulbs with 2 and 3 stems growing simultaneously; and second, big, adequately heavy pots are important, so that your plants will not fall over sideways. Those small nursery pots provided with prepotted bulbs are temporary (more on this below).

Strong summer growth needed for future blooms. The leaves usually grow during flowering and/or after it. Either way, you need to start fertilizing your hippeastrum bulbs once the flowering time has finished. They need regular fertilizing and can be placed outside, best in a location with morning sun, when the outdoor temperatures are warmer than your home. I fertilize every week with a soluble mineral fertilizer with

Note (red) blotches on leaves

a NPK value of 8-5-5. I have observed that most bulbs tend to grow better throughout spring and summer when they are fertilized this way. If you are not sure about how often you should fertilize, follow the instructions on the fertilizer you use. Most commercial fertilizers should be fine for hippeastrums, if the quantity of nitrogen (N) is double the amount of phosphorus (P) and potassium (K). This active growth period should last about six months, but it can last longer. Five to six months are necessary if you want your bulbs to rebloom. The rule is: the more leaves the bulbs grow, the better the chance it will bloom again. Also, sometimes in late spring or summer a third or forth flowering scape might appear. If this happens, it means your bulb is happy, so

A love affair cont'd

kudos to you for good care!

Fall bulb care. After a good summer and especially before the cold fall rains start, take your bulbs inside. It is time for a well-deserved rest period. Depending on your location, this would start anytime from mid-September to December. What hippeastrum doesn't like are cold rains, so avoid any rain with a temperature below 12 degrees C. This minimizes the danger of red blotch (*Stagonospora curtisii*), the most common pathogen of hippeastrums. If your plants present any visible signs of red blotch (red marks), remove infested part and treat with a good fungicide. If you are not sure which, check with experts online. The ideal temperature for the resting period is 13 degrees C, but anything in the range of 5 to 15 degrees C would be just fine. Remember, the colder they rest, the drier you should keep them. The resting period should be at least 8 weeks, but anything up to six months should be all right.

If your bulb decides to wake up earlier than you planned, get it back to a warm, sunny location. Of course, during this period you do not need to fertilize or water. Contrary to the usual advice given, hippeastrums do not need to be placed in the dark to rest, nor do the leaves need to be cut off. I cut off the leaves in fall only if they present signs of red blotch; otherwise I let nature do its trick. They will usually yellow and dry during the resting period anyway. If this does not happen, no worries; some varieties are always or sometimes evergreen. No biggie, just let them be! For those folks in warmer climates: if you cannot provide a constant temperature of 15 degrees C or below in their resting period, take the bulbs out of their pots, then clean and place them in your fridge in the vegetable compartment for 8 weeks. It's best to store them in paper bags — not plastic. Be sure to check on them once in a while for any rotting. With the help of a fridge, you can trigger your hippeastrums to flower any time of the year. Try it out with a bulb or two, and see how it works for you. The resting period is the last important step in a full growing cycle.

Recap of how to care for and rebloom your hippeastrums.

To recap the steps from planting to reblooming:

- inspect and clean the bulbs (first day)
- prepare the planting media and pots (first day)
- plant and first watering (first day)
- waking up and bud initiation (usually in first 6 weeks, can take longer)
- flowering (usually 2 weeks long, longer if your bulb had multiple stems or if not all the flowers open simultaneously)
- active leaf growth (minimum 5-6 months, can last longer)
- resting period (minimum 8 weeks, can last longer)

After the seventh step, the bulb usually wakes up and a new growing cycle begins. This is the best time to repot in fresh soil. I prefer to leave the bulbs in the same soil for a second year, since most will produce better and more long-lasting blooms if left undisturbed.

I know it seems a lot, but trust me, it is not that complicated. The key is consistency, especially with fertilizing. Another important thing is to observe your plants closely. If you notice anything suspicious, it is best to check the roots and the basal plate, treat with fungicide and replant, even if the bulb is flowering. I have saved many bulbs this way. Just keep a close eye on your beauties, and they will reward you each year.

Of course, now with climate change, everything can vary, and care in your area can change. Once you start growing hippeastrums and observe them closely, you will know what to do. Do not be afraid to try something new or completely different. If you want to experiment, use some variety of which you have multiple bulbs, both offsets and mature bulbs. Try it out and see how they grow for you!

'Tango', one of Vlad's favorite *Hippeastrum cybisters*.

Vlad is happy to answer questions. Contact him at vlad.hempel@gmail.com

Companion planting Part 2—In the open garden

Johannes-Ulrich (Uli) Urban previously wrote about planting several bulbs together in one pot. He now continues with bulb combinations in the open at his garden in Portugal.

In the previous part of two articles, I shared my experience with companion planting of bulbs in pots. This second part deals with planting bulbs with suitable other plants in the open garden, in Portugal's Algarve region, a Mediterranean climate with dry, hot summers and frost-free, wet winters.

I would like to take you to a long, narrow border along a southeast-facing paved terrace. It is about 12 meters long and 80 cm wide. In front is a pavement of traditional Portuguese hand-laid "Calçadas" stone, and at the back of the border is the top of a 2.5 meter-tall retaining wall, which holds the terrace against a steep descent. This narrow border merges into a much larger one on both ends, which gives the terrace an optical frame. The retaining walls and the paved terrace were built in 2017/18; the border was planted in November 2018.

Patio of Calçadas stone.

Its position on top of a tall retaining wall means that in summer the bed becomes very dry, and the soil is warm; the border and high wall are southeast-facing. When the bed was laid out, a good amount of grit and sand was incorporated into the naturally well-draining, fertile soil. So drainage is no problem at all, but summer heat may be a limiting factor for some plants. As a design feature, the retaining wall rises about 20 cm higher than the pavement of the terrace, thus preventing the unpleasant sensation of being drawn to the precipice.

As I have a longstanding dislike of monotonous "botanical" plantings of only succulents, only cacti, or only bulbs, and I have been inspired by many trips into the natural habitats of these plants, it was clear from the beginning that this border would be planted in companion style with plants of similar cultural requirements, among them many bulbs. But this article might also interest succulent and cacti growers. And also, because this border is at a very prominent place in the garden, viewed every day from the house, there is a high year-round aesthetic goal to meet.

So let's have a look! We will follow the seasons and start in August, when a huge clump of *Amaryllis belladonna* 'Rose Foncé' is in eye-catching bloom at the base of a tall arborescent aloe species, raised from seed more than 30 years ago. The amaryllis clump was formed by about 15 purchased bulbs planted in summer 2018. They have established beautifully and produce more flowering scapes every year. A large specimen of *Centaurea pulcherrima* forms the perfect backdrop with its lacy silver leaves. In summer there will be a bare spot over the dormant bulbs, for which I have not yet found a ground cover that would survive the long period of shading by the vigorous *Amaryllis* foliage. But next to it is a vigorous specimen of *Podranea* 'Comtesse Sarah', which remains compact and sprawls over some of the empty space; on the other side is the dark red *Salvia* 'Silkes Red', which does the same. The rest is hidden by one of the water features mentioned later. The cultivar 'Rose Foncé' flowers well ahead of other forms of *Amaryllis belladonna* in this garden.

Soon after the amaryllis is over, the bright golden goblets of *Sternbergia* appear; there are different species and varieties with larger or smaller flowers and broader or narrower leaves. They are *Sternbergia lutea*, *S. lutea* var. *angustifolia* and *S. sicula*. It is always amazing how these bulbs manage to flower in completely dry soil.

The next corm to follow is *Crocus niveus*. It flowers in early autumn before the leaves, when the hottest time of year is over. The large blooms appear white from a distance, but a closer look reveals complex shading of the slightest pink and blue, and a yellow throat. This crocus grows in repeated clumps in between its companions:

Companion planting, pt. 2 cont'd

dwarf *Aloe brevifolia*, *Aloe humilis*, and *Aloe virens*. A taller neighbour is *Aeonium spathulatum* which forms a rounded mound of tiny tight balls of foliage like a miniature cabbage at every branch tip during summer dormancy but will go green and leafy with the first autumn rains. It will be crowned by yellow inflorescences in late spring before going dormant again. Next to it is *Pelargonium fulgidum*. This lovely half-succulent, half-shrubby perennial produces bright red flowers almost year round and gets some water during summer. In front of the *Pelargonium* and next to the crocus there are two mature bulbs of a *Veltheimia capensis* form, flowering as early as November; it may be *Veltheimia deasii*, purchased in the succulent nursery in Niewoudtville, South Africa a long time ago. Careful hand pollination produces very few seeds. Both the reddish pink flowers followed by inflated seed pods and the wavy blue-gray foliage are very ornamental until the leaves disappear in late spring. This composition is complemented by the deep yellow autumn flowers of *Oxalis perdicaria* var. *perdicaria*. It is one of the few oxalis which is allowed a free run because it is not invasive at all.

In the same place there is a particularly deep blue form (or hybrid?) of *Babiana melanops* which flowers in spring. I was given a few bulbs in 2018 and they have increased nicely since. Seedlings have yet to prove that they come true, but offset bulbils were placed at intervals into the same border.

However, let's remain in autumn for now! There is one small clump of the dainty and charming *Acis autumnalis*. It needs a close look to reveal its charm. It will awake with the first drop of rain in autumn. Care must be taken to protect it from over-vigorous neighbours; it cannot take competition. A purple flowered *Arctotis* had to be removed from this position as it was too vigorous, swamping its neighbours.

A very nice companion is an *Asparagus* species which was saved from the collection of the late John Lavranos. It is winter-growing and completely disappears in summer. Its soft, bright green foliage on creeping shoots is no threat to the *Acis*. In spring the *Asparagus* bears many small lime-green bells that turn into green pea-sized fruit. I have not yet managed to identify this interesting plant to species level.

Another geophyte planted in this border is *Cyclamen graecum* in its pure white form. It seems to need more time to establish, but last autumn there were the first flowers. The tubers were raised from seed in trays and planted later in between the other plants; seed sprinkled into this border has germinated but needs much longer than pot-raised plants to mature.

The backbone of this border is formed by succulents and cacti which look attractive all year round. They must not become too large or too tall but are allowed to fill their allocated space. We have already met the tall (3 m) aloe on one end of the border. On the opposite end there is a group of nearly spineless *Trichocereus pachanoi* (syn. *Echinopsis pachanoi)*. It will eventually mark the full stop of the border on its eastern end and will bear large white blooms, but has not yet reached this stage.

Spaced at intervals there are larger *Aloe* species: *A. arborescens* yellow form, which is daintier than the typical red one, *A. striata*, and a mottled aloe without a name, as well as two young specimens of

Aloe arborescens

Aloe plicatilis. As this is very close to people moving on the terrace, no agaves are included in this scheme for safety reasons. In between the aloes there are columnar cacti and cushion-forming cacti; the

Companion planting, pt. 2 cont'd

taller ones are *Trichocereus* hybrids in deep magenta, lilac, pink, pure white and bright yellow. Their flowers provide interest at intervals throughout the warm season.

These larger plants combine happily with small *Pelargonium* species. One of my favourites is the tuberous *P. magenteum*, a little shrub which is leafless in summer but bears small bright magenta flowers in spring, nicely offset with small gray leaves. Another one is *P. abrotanifolium*, whose appealing soft, hairy cushions want to be stroked by by passersby. It flowers on and off all year. *P. sidoides* in almost black, dark aubergine does the same, but large plants suffer from unpredictable dieback.

Some *Nerine* hybrids were planted here as well; they were one of my emergency purchases before Brexit and came from the Exbury Nerine collection. As they were expensive, I bought only one bulb of each; most have flowered, but all of them seem to need more time to show their full potential. Their glistening flowers last for quite some time in the cooler weather of late autumn and early winter.

The peak season for bulbs in this long, narrow border is late April and early May. A clump of *Watsonia marginata*, increasing every year, is the queen of the spring-flowering bulbs. Its straight inflorescences lean outwards and are as stiff as if made of steel wire, so they are very resistant to wind in spite of their impressive height of around two metres. They gently swing in the slightest breeze. A closer look reveals short upright branching clasping the main stem, which extends the flowering period. This impressive fountain of pink is complemented by pure blue *Echium candicans* next to it, and deep golden-yellow *Iris xiphium* var. *lusitanica* at intervals in the border. The difficulty with *Echium* is that it grows very fast into a large specimen, but being short-lived, it can leave a big gap. This problem can be relieved by an adaptable *Salvia* 'Silkes Red', which stands by to quickly fill a gap and survives next to the over-vigorous *Echium*.

Watsonia marginata

A very unusual geophyte from South Africa is *Monsonia speciosa*, in the family Geraniaceae. The fairly large pink flowers look made of crinkly silk, but in spite of their fragile appearance they do last surprisingly long. I managed to raise one single plant from Silverhill seed; it is defending itself successfully at the base of the yellow-flowering *Aloe arborescens* in the center of the border. Seed set is poor, but I would love to grow more of them. *Monsonia* is winter-growing and disappears into a woody beet-like rootstock in summer.

There are two more features I would like to share: on each end of the border, standing on the pavement in front of the plants, is one large glazed ceramic container holding aquatic plants. No problem with mosquitoes: the very resilient and adaptable small *Gambusia* fish eliminate all larvae. As the climate is frost-free, these containers are not emptied in winter. On the contrary, all winter long the fragrant flowers of *Aponogeton distachyos* are of interest. This aquatic geophyte is winter-growing and only performs in cold water. As soon as the water warms up in spring, it will go dormant. As *Aponogeton* can be extremely invasive given the right conditions, it is pot-grown and not allowed into natural water. The dormant tubers are kept dryish and warm. Once the *Aponogeton* is removed from the tub, dwarf waterlilies in either blue or yellow will move in for the whole

Companion planting, pt. 2 cont'd

summer. They spend the winter dormant in a small pond. As the exposed ceramic containers warm up quite significantly, they are the perfect home for the dwarf *Nymphaea* which loves warm water and full sun, performing beautifully. Every visitor is magically drawn to these small water features.

Impossible to miss in this border are the bright *Lampranthus* shrublets. They form cushion-like domes which completely disappear under an overdose of color in spring. They come in different shades of purplish pink and magenta, white, orange and yellow. Deep blue *Babiana melanops* looks magnificent next to bright yellow *Lampranthus*, bright red *Aloe virens* and *Pelargonium fulgidum*. And golden *Iris xiphium* var. *lusitanica* wants to rise from a cushion of magenta. Spring in the Algarve is not the moment for muted color schemes!

Babiana melanops, Aloe virens, Lampranthus in border of patio.

There are plants of muted charm, though. *Iris reichenbachii* has proved vigorous and floriferous in this border; its soft purple and brown flowers have their own charm. The extravagant *Iris kirkwoodiae* has only flowered once, but so profusely that the plant has since been exhausted and barely lives. A very dwarf form of *Iris lutescens* with giant deep purple flowers is too dwarf for its allocated place and needs to be rescued from its more vigorous neighbours.

How is this border being cared for?

There is no automatic irrigation, so it becomes very dry in summer. But the kitchen is nearby, and in summer we always have a big dish in our sink which collects clean water from washing fruit and salad and the like. This water is used to hand water some of the plants, especially the cacti that come from summer-rain climates. Maybe once or twice during summer, a hosepipe with a hand rose is used to water the whole border to avoid it looking stressed. The bulbs and the cacti are individually fertilized with diluted low-nitrogen balanced fertilizer, and this winter a small amount of general fertilizer was applied for the very first time, with good effect. As the plants are closing up to one another, there is little weeding needed. To avoid bare soil after planting, a thin layer of long-lasting shredded olive tree clippings was applied; it feels like a "luxury mulch."

✧✧✧✧✧

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Pacific Bulb Society, *The Bulb Garden*, Volume 20, No. 2

‘Saffron’ a reblooming small *Hippeastrum cybister* from South Africa.

Inside This Edition:

The Bulb Garden is the newsletter of the Pacific Bulb Society (PBS). It is published, if enough articles are submitted, around the third week of each quarter and is available to PBS members. This newsletter provides gardening or bulb related articles, news of interest to members, and announcements of the PBS organization.

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