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Palynology of *the Capes' top ten richest families* and its
taxonomic implications

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Abstract

Principal pollen characters, of the Cape floristic Regions ten richest families, which are phylogenetically useful at higher taxonomic levels (including aperture type, exine structure, pollen-unit, polarity, symmetry, shape), and their evolutionary trends are examined. Monocotyledons differ from eu-dicotyledons (and eu-dicots from basal-dicots) in their aperture number and form, and exine structure and are discussed in relation to their pollination syndrome as well as their evolutionary trends. We also discuss the possibilities of creating a taxonomic key at species level, if not only for use at the vegetation-type scale for paleobotanists as well as honey farmers.

Introduction

Pollen grains and spores are of great interest to science in many ways. Plant spores (including seed plant microspores = pollen grains) have a resistant coat which has features unique to a particular lineage. They are extensively used for taxonomy, cytology and morphology. For example, well-preserved spores are preserved in suitable geological deposits provide invaluable windows to study past vegetation. They provide clues for the reconstruction of past climates and vegetation and consequently of the former life of man and animals on the earth. Erdtman (1954) highlights that honey analysis can determine several features such as its country of origin and time of year honey was produced.

There are a few palynological studies on the flora of the Cape Floral Region (CFR) of South Africa. Several systematic studies have sampled current CFR vegetation or taxa, in focussed studies (e.g. *Acacia* subgenus *Aculeiferum*: Caccavari & Dome 2000) or as part of broader studies (e.g. *Aristea*: Goldblatt & Le Thomas, 1997; *Cypereaceae*: Nagels et al., 2009). When new species are described, or taxa revised, pollen grains are rarely considered, resulting in hardly any detailed research on the pollen-grain, at species level (Faegri, 1956), especially in the CFR at light microscopy level (e.g. Meadows et al., 1996, Meadows & Baxter, 1999). This can be partly attributed to the poorly preserving soils of the CFR (Meadows & Sudjen, 1993).

The use of pollen morphology to make unambiguous identification depends on accurate characterisation of pollen morphological traits and the categorisation of pollen into a simplistic taxonomic key based on these traits. The development of such a taxonomic key is the main focus of this project, aiming to fill the knowledge gap on the palynology of major plant families in the region. This study forms a foundation for the use of pollen data for wider application by taxonomists and paleobotanists studying former vegetation in the CFR.

The CFR is one of the worlds' 25 botanical hotspots (Myers et al. 2000). Goldblatt et al. (2008) estimated the CFR to have 172 plant families (four endemic), 992 genera (162 endemic: 16.3%) and 9 086 species (6 226: 68.5% endemic). The largest families based on species numbers are, in descending order, Asteraceae (1047), Fabaceae (761), Iridaceae (684), Ericaceae (667), Aizoaceae (658), Scrophulariaceae (411), Proteaceae (330), Restionaceae (318), Rutaceae (273), and Orchidaceae (227), Poaceae (208), Cyperaceae (206). Disproportionate radiation has resulted in 59.1% of CFR species falling into the 10 largest families, and the families have species richness greater than would be expected from their global species richness.

Lineages of angiosperms have unique pollen morphology. Among the various characters of pollen grains and spores, the apertures position and number may be considered to be of primary importance in phylogenetic studies owing to its consistency in pollen-spore morphology (Nair, 1979). The in-aperturate form is considered transitional between the primitive distally monocolpate and the advanced tricolpate form (Walker, 1974; Muller, 1970). Other prominent differences aiding in identification include the form in which pollen grains are released from anthers (e.g. monads, tetrads, polyads, pollinia); outer wall (exine) ornamentation and shape (Walker & Doyle, 1975). However pollen grains are highly variable between and within families (Erdtman, 1954), and thus unique features to particular families or even species can aid in identification, such as the projectate tri-porate pollen grains found in Proteaceae (Punt et al. 2007), or the seldom di-colpate Iridaceae pollen grain, (Goldblatt & Le Thomas, 1997).

Kuprianova (1948) suggested, via pollen morphology, that monocotyledons may be divided into two closely connected branches, which have their origin in, respectively, Palmae and Liliales. The former branch, besides Pandanales, contains the grasses and groups leading up to them (e.g. Restionaceae), but a special group is formed by Cyperaceae and Juncaceae. All the other families go with the Liliales (used to include Iridaceae, now in Asparagales).

We hypothesise that the morphology of pollen, in the CFR, are diagnostic at the family level and can be used to identify particular plant genera and/or species. We expect differences in aperture number with monoporate/monosulcate pollen within monocot families (Cyperaceae, Iridaceae, Restionaceae) and tricolpate pollen in eudicots. We evaluate diversity of pollen wall surface ornamentation and apertures between families and relate it to pollination syndrome.

Methods

This study is based on a permanent slide collection held at the Botany Department (University of Cape Town, South Africa). These slides were prepared by acetolysis method (Erdtman 1960) of a number of years, mostly from herbarium specimens deposited at the Bolus herbarium. Pollen samples from the ten most species rich families, comprising 605 different species, were studied. These include Asteraceae (180 - sampled species), Iridaceae (82), Fabaceae (75), Cyperaceae (58), Restionaceae (53), Proteaceae (48), Ericaceae (36), Rutaceae (33), Scrophulariaceae (30) and Aizoaceae (10). The Orchidaceae samples were too few and mostly damaged for an accurate representation, thus this family was excluded from this study and Cyperaceae added instead. A complete list of species studied, ordered by family and then genus, is provided in Appendix 1.

Digital light microscopy (LM) photographs were taken using a Leica DFC295 microscope. All pictures and measurements were taken at 400x total magnification. The following parameters were measured for all families: polar axis (P), equatorial diameter (E). Measurements, consistently, represent the

mean of ten grains. P/E ratio is also given. Shape was calculated from this P/E ratio in accordance with Erdtman (1969). Size was calculated by adding P and E, and categorized into small ($<50\mu\text{m}$), medium ($50 < x < 100\mu\text{m}$) and large ($>100\mu\text{m}$). For all families, observations were made on aperture type, number and position in relation to the P/E axes, and pollen wall (exines) surface ornamentation. Other variables were recorded depending on families. For Aizoaceae the presence of granules on colpus membrane and length of colpi (short defined as less than half the length of the polar diameter) were recorded. For Asteraceae, the length of spines, colpi width were recorded and it was noted whether grains were crescentric, lophate or geniculate. For Cyperaceae, the polarity of the ventral cryptocolpi was recorded. For Ericaceae, the ambit and outline were recorded and it was noted whether the grains were coaperturate, geniculate and/or were dispersed in monads or tetrads. For Fabaceae it was noted whether the grains were geniculate or demicolpus and whether they were dispersed as polyads or monads. For Iridaceae the type of aperture and width of aperture were recorded. For Proteaceae the ambit was recorded and it was also noted whether the grains were projectate. For Restionaceae the ulcus diameter was measured, the thickness of the annulus and whether the ulcus membrane had granules was also noted. For Rutaceae no other variables were recorded. For Scrophulariaceae it was noted whether the colpus membrane had granules and if the grains were geniculate or demicolpus. The terminology and concepts mainly follow Erdtman (1952) and Punt et al. (2007).

Results

Monocotyledons:

Pollen grains are shed in monads in Cyperaceae (pseudomonads), Iridaceae and Restionaceae, but Cyperaceae pollen are predominantly prolate (pear shaped), Iridaceae also prolate but more 'boat shaped', while the rest of Iridaceae and Restionaceae have spherical grains. The three families have mostly single aperture, which is an ulcus in Restionaceae and Cyperaceae, but colpus in Iridaceae. Additional apertures are seen in Cyperaceae (3-4 colpate) or 2-syncolpate in some Iridaceae. All Cyperaceae have reticulate (either micro- or striato-) exine structuring, where the other two families have some psilate grains

and several Iridaceae species have gemma. The ulcus of the majority of Restionaceae species has an annulus, occasionally coated with granules, Cyperaceae is without both of these structures (Table 1 & Fig. 4).

Dicotyledons:

All studied eu-dicots' grains are shed as monads, except for a few Fabaceae species, which produce polyads and the majority of Ericaceae, which produce tetrads. All are predominantly 3-(or more) aperturate, with the exception of a few individuals within Asteraceae (inaperturate). All studied eu-dicots except for Rutaceae have a similar oblate-prolate spheroidal shape (Fabaceae and Ericaceae monads). Rutaceae has a more prolate to perprolate shape. Asteraceae is the sole family with spikes, as well as a few lophate grains. Asteraceae, Fabaceae, 3-colpate Scrophulariaceae and Ericaceae monads have some geniculate grains, with only Fabaceae and Scrophulariaceae having some demicolpate grains. A few individuals from both Scrophulariaceae and Aizoaceae have granules around the colpi membrane.

The basal-dicots in this study, Proteaceae, are shed as monads and are also 3-aperturate, however the over-whelming majority are 3-porate and are all triangular in polar view, even projectate in some individuals (Table 1 & Fig. 4).

Descriptions of individual families:

Aizoaceae

Pollen grains shed as monads; 3-colpate, prolate spheroidal-subprolate, some oblate spheroidal, small to medium sized grains (31.4-64.4 μ m). Exine structures psilate or reticulate. Granules are present on the colpus membrane of 40% of the species (Figure 1. A).

Asteraceae

Pollen grains shed as monads; 3-colpate, 3-colporate, 3-porate, prolate spheroidal-subprolate (12% oblate spheroidal), small to medium sized grains (28.6-116 μ m). Exine structures consist of spikes of varying lengths (6% with none or below 0.3, maximum length of 3.44, mean=1.087). The majority (89%)

have thin colpi, 5% having wide colpi and 6% having semi-wide colpi. Seven species from four genus's are lophate. 15 species are geniculate (all six species in *Pentzia* are geniculate) (Figure 1. B & C).

Cyperaceae

Pollen grains shed as monads; mono-ulcate (some 3-, 4-cryptocolpate), prolate spheroidal-subprolate, some prolate and oblate spheroidal, medium to large grains (41.5-176.3µm). Grains with ventral cryptocolpi are either anisopolar or isopolar. Exine structures reticulate, occasionally micro-, striato-reticulate and one species is psilate (Figure 1. D & E).

Ericaceae

Pollen are either shed as monads, or tetrads; 3-, 4-, 6- colpate, 3-, 4- colporate, 3-colpate or 3-colporate, oblate spheroidal-prolate spheroidal, small to medium sized grains (24.3-96.6µm). Most monads are geniculate and most tetrads have coapertures. Colpi are thin with pointed ends. The ambit of monads is mostly hexagonal (28% circular), tetrads can be triangular, circular or bulbous (Figure 1. F, I & J).

Fabaceae

Pollen shed as monads; except in *Acacia* and *Entada* where they are dispersed as polads of 16 grains; 3-colpate, 3-porate (2 species), 3-colporate (nine species, incl. all four *Psoralea* species), majority prolate spheroidal-subprolate, some prolate and oblate spheroidal, small to medium grains (28.3-100.4µm; 1 species with large grains). Exine structures psilate, perforate or reticulate. 72% of monads are geniculate, 14% non-geniculate and 14% demicolpate (Figure 1. G & H).

Iridaceae

Pollen shed in monads; 1-colpate (except in 2-syncolpate *Geissorhiza bolusii* and acolpate *Romulae atranda*), majority subprolate-prolate, rarely prolate spheroidal, medium to large grains (54.8-175.8µm). Exine structures psilate, perforate, reticulate (macro-, striato-), striate and two species have gemma

(*Galaxia ovata* and *Witsenia maura*). *Aristea oligocephala* has a spiraperture. Majority of grains have wide apertures (91%) (Figure 2. A – C).

Proteaceae

Pollen shed in monads; majority 3-porate, some 3-colpate or 3-colporate, majority Prolate with tapered ends (some subprolate and *Aulax cancellata* has oblate spheroidal grains), small to medium grains (32-81.9 μ m). Exine structures psilate, perforate, reticulate (striato-) and occasionally indented or raised at the poles. The ambit is either triangular (rounded convex, slightly rounded convex or slightly concave), tribulbous or triangular convex. Some grains are extremely convex even projectate in ambit (Figure 2. D – G).

Restionaceae

Pollen shed in monads; 1-ulcate, majority subprolate, with some prolate or prolate spheroidal grains, medium to large (44-106.8 μ m) with one exception (*Restio rivulus*). Exine structures psilate, reticulate (heterobrochus-) and rugulate. Ulcus diameter is 1.5-5.7. Thickness of annulus varies across family as well as within genres. Granules are sometimes present on the inner membrane of the ulcus (Figure 2. H).

Rutaceae

Pollen shed in monads; 3-colpate (*Adenandra vilosa* 4-colpate), prolate-perprolate (*Euchaetis glomerulata* is suboblate and *Clausena anisata* is subprolate), small to medium grains (33.4-115.4 μ m) (*Adenandra vilosa* has large grains). Exine structures striate, reticulate (micro-, striato-, micro-striato-) and echinate (Figure 2. I – K).

Scrophulariaceae

Pollen shed in monads; majority 3-colpate. 3-colporate, some polycolpate, and fewer 4-exo, 4-endo colpate and 4-endocolpate, mostly small but some medium sized grains (18.5-71.5 μ m). Exine structures striate, perforate, echinate and reticulate (striato-, micro-). Colpus membrane mostly smooth, but occasionally granules are present. Some grains geniculate or demicolpate. Polycolpate grains

often flatten to form a six, seven or nine armed star shape (dependant on number of colpi) when viewed from polar axis (Figure 3).

Discussion

This study represents one of the most thorough LM study of extant species in the CFR. We recognize that the sampling was opportunistic, biased to what taxa previous workers prepared slides on. A more rigorous study to represent all lineages (genera and species) in the CFR would be desirable to get a more complete picture. On the other hand, we view this study as laying foundation for such expanded study to include acetolysed pollen of CFR taxa. Such an approach differs from studies using Scanning Electron Microscopy (SEM) where emphasis is on external morphology of pollen. As majority of palaeobotanical studies use acetolysis method, we find these results to be more relevant for identification of unprocessed or acetolysed pollen under LM.

As can be seen from our results, angiosperm pollen grains are clearly divisible into two fundamentally different types (each with its own exceptions): heteropolar, bilateral, boat/pear-shaped monosulcate pollen (monocots) versus isopolar, radio-symmetric, spheroidal tri-aperturate pollen (dicots). However the exceptions are vast and must be noticed when trying to identify pollen grains. This first split allows for a large step to be taken towards identification by exclusion, however exceptions, such as inaperturate Asteraceae grains, can throw an identification procedure off course or result in the wrong conclusion if the exclusion is unknown or disregarded. Exceptions from this study, within each family, are highlighted in the next section.

The monosulcate aperture type is believed to be the most primitive among angiosperms due to its prevalence in the ranalean complex (Walker, 1974), its presence in the first fossil-dispersed angiosperm pollen (Doyle, 1969), and its widespread occurrence in the most primitive taxa of each monocot subclass (Kuprianova, 1967; Walker and Doyle, 1975). It is believed that this aperture type evolved at the distal pole (facing outward in the meiotic tetrad) and were

furrow-like (sulcate). Monad grains such as the Cyperaceae pseudomonads are believed to have evolved from permanent tetrads since the only family that has permanent tetrads, is the basally related Juncaceae family, and since have evolved a distal ulcerate type of aperture. Zavada (1983) highlights that the trend from this monosulcate aperture type moves towards a monoporate type, via this ulcerate type, and correlates with a shift from insect (e.g. Iridaceae) to wind pollination (e.g. Restionaceae and Cyperaceae) in this subclass. This can be seen in our results (Fig. 4).

Another major evolutionary trend in the monocots is an increase in the number and types of apertures. This trend is exhibited in the subclass Arecidae, the order Liliales and in the order Alismatales (Zavada, 1983), but also within this study is highlighted by the cryptocolpi present in Cyperaceae as the Asparagales are considered basal to the Poales. However it should be mentioned that the disulcate aperture type seen in Iridaceae is also considered as a mono-sulcate derived aperture type, and is also common in Liliales and Arecidae (Zavada, 1983). This can also be seen within the basal dicot family, Proteaceae, increasing in number but still similar in shape and position of aperture to that of the monocot families' original ulcerate aperture.

Pollen grain shape is largely correlated with aperture type, polarity, and symmetry (Walker & Doyle, 1975). As previously mentioned, monosulcate grains are usually boat/pear-shaped, heteropolar, and bilateral (Fig. 4), while colpate grains are generally spheroidal, isopolar, and radiosymmetric (Fig. 4).

Inaperturate pollen is normally spheroidal, apolar, and radially symmetrical (e.g. certain individuals from Asteraceae, Table 1). The primitive shape of angiosperm pollen grains is clearly boat-shaped, with spheroidal pollen representing an advanced character-state (Walker & Doyle, 1975).

The main trend within the eu-dicot pollen grains, through evolutionary time, follows the monocots pattern of an increase in the number and complexity of apertures and the complexity of exine structure. The structure and chemical nature of the exine, as well as the size and structures associated with apertures

are adapted to prevent desiccation of the gamete (Muller, 1979). Zavada (1983) highlights that in hydrophytes and in pollen that are efficiently transferred to stigma, environmental factors influencing water relations of pollen are greatly diminished. Thus an increase of the thickness and complexity of the exine and aperture might be expected to occur in these taxa where desiccation is no longer a problem. This trend can be seen in the predominantly insect pollinated families of Asteraceae (spikes, lophate, thick exined grains), Scrophulariaceae (polyaperturate) and Aizoaceae (wide colpi). However this is not seen in Fabaceae (Leguminosae often with very specialized flowers), where grains' exines are often psilate and thin, but apertures are often wide. Walker and Doyle (1975) show that Commelinidae exhibits a reduction of the aperture, and is correlated with the shift from insect to wind pollination.

Pollen size is shown to be an easily reversible character within and between families, such that the primitive size class of any taxon must be determined based on correlation of pollen size with other characters of the taxon (Walker & Doyle, 1975). Even if phytogeographical distribution or other auxiliary evidence indicates that only a few species within a genus or tribe is present, I found that size is too variable within samples for this to be used as an identification variable, at least at species level, occasionally at genus or even family level.

The morphological traits seen in this study resemble what is found from global literature (see descriptions of families above, or literature, Aizoaceae: Mulder, 2003; Asteraceae: Telleria et al. 2003, Magenta et al. 2010; Cyperaceae: Nagels et al., 2009; Ericaceae: Golam Sarwar & Takashi, 2006; Fabaceae: Banks et al. 2009, Pinar et al. 2009; Iridaceae: Goldblatt and Le Thomas, 1997, Isik & Donmez, 2006; Proteaceae: Feuer, 2009; Restionaceae: Chanda & Rowley, 2009, Linder & Ferguson, 2009; Rutaceae: Morton & Kullunki, 1993, Victor & van Wyk, 2010; Scrophulariaceae: Lewis, 2000, Minkin & Eshbaugh, 2009, Martinez-Ortega et al. 2010). However, this study proposes for the first time a new Scrophulariaceae pollen type. 6-colpate Scrophulariaceae have been reported before (e.g. Lewis, 2000), but 7- and 9-colpate Scrophulariaceae grains are unseen within the literature (Fig. 3). This may correlate to the great influence pollinators have on

highly specialized Cape floras flowers and their pollen (Johnson, 1996).

In conclusion, a taxonomic key to family level is obvious (using aperture number, shape and complexity, and exine structuring, see Fig. 4 and Table 1) for these ten studied families, except possibly for the geniculate grains from Asteraceae, Fabaceae, 3-colpate Scrophulariaceae and Ericaceae monads. A taxonomic key to the genus level is highly possible for a few genera within a most of the families (i.e. within Asteraceae it is highly improbable that a genus can be identified due to the number of genera's), once family has been identified irrefutably. Then if phytogeographical or other auxiliary evidence (such as a unique character state found in only one species within that genus) may result in a working taxonomic key to species level.

Emphasis should be applied to preparation of slides and further LM observations for missing taxa within the families of this study, but also for the remainder of the CFRs' flora or at least the top 20 families. LM observations of pollen has proven to be a low-effort tool yielding exceptional results for a floras' pollen that was considered relatively uniform at the family and even genus level, but especially at species level. I also suggest that instead of attempting to create a taxonomic key for the entire CFR, which would be less practically useful, we create many smaller spatially-scaled taxonomic keys aimed at the vegetation-type scale, starting at the few sites where well preserved pollen is obtainable, but also in areas focusing on honey production. This will result in more efficiency in both the paleobotanical and economic sectors.

Exceptions and Patterns

Aizoaceae

Only *Tetragonia arbuscula* and *Phamaceum lanatum* are oblate spheroidal. Only *Tetragonia* has medium sized grains (two species studied). All but one species has long colpi (*Polpoda capensis*).

Asteraceae

Gazania is the only genus without apertures. Only four species have large grains (*Circium valgare*, *Gazania durineifolia*, *Hirpicum allernatum* and *Pteronia incana*).

Of the twelve species with no spikes or spikes less than 0.3 in length, *Elytropappus* has six (from the seven species studied), *Brachylaena*, *Stilpnophyllum* and *Tarchonanthus* each have one (however only one species studied from each genus) and *Felicia*, *Othonia* and *Helicrysum* each have one (many species in each of these three genus's with larger spikes). *Cotula*, *Hippia**, *Lidbeckia**, *Pentzia*, *Phymaspermum** and *Stilpnophyllum** (stars indicate only one species was studied from the genus) have wide apertures. *Othonia*, *Helicrysum*, *Eriocephalus* and *Athanasia* (four out of five species) have a few of their species with wide apertures.

Cyperaceae

One species is oblate spheroidal (*Scleria woodii*). One species has small grains (*Cyperus sphaerospermus*). *Tetraria* and *Chrysithrix* are the only genus's with large grained species. All colpi in *Carpha* and *Cyperus* show isopolar arrangement. *Ficinia*, when colpi are present, are predominantly anisopolar (8 of 10 species), *Tetraria* shows isopolar colpi in 8 of 11 species. *Pycneus polystachyus* is the only species with psilate exine structuring.

Ericaceae

All grains are monads except in *Erica* where 94% are shed as tetrads. All monads and two tetrads (*Erica haematosiphon* and *Erica cristiflora*) are 3-colpate or 3-colporate. *Blaeria ericoides* is the only subprolate species. The majority (81%) of *Erica* have medium sized grains (all other genus's all have small grains).

Fabaceae

All species in *Argyrolobium*, *Indigofera*, *Lebeckia*, *Lessertia*, *Sesbania* and 18 of 21 species in *Aspalathus* are geniculate. All species in *Psoralea* are non-geniculate. All species with demicolpii are within a genus with geniculate species. All polyads are spheroidal, except prolate *Entada*. All species in *Indigofera*, *Coelidium* and *Psoralea* are spheroidal. All species in *Lessertia*, *Latononis*, *Lebeckia* and *Tephrosia* are subprolate. Only one species from each of *Vicia*, *Priestleya*, *Newtonia* and *Argyrolobium* are prolate.

Iridaceae

All species within *Aristea*, *Babiana*, *Dierama*, *Homeria*, *Romulae*, *Synnotia* and all

but one of seven species within *Moraea* have a reticulate exine. The single and only species in each of *Sparaxis* and *Thereianthus* have perforate exine. The only species in *Anapalins* has a striate exine.

Proteaceae

All species in *Leucospermum*, *Serruria*, *Mimetes*, *Brabeium* and *Aulax* have medium sized grains. All species in *Sorocephallus* and *Spatalla* have small grains. All grains Prolate except for one species in both *Protea* and *Serruria* and three in *Leucodendron* which are subprolate. All species in *Serruria* and one species from *Leucospermum* are tribulbous compared to the rest which are triangular convex and/or concave in ambit. Exine structure is variable across and within all genus's. Only *Protea* has 3-colpate or 3-colporate species, but the majority of species in *Protea* are still 3-porate like the rest of the family.

Restionaceae

All grains medium except for two large and one small species within *Restio*. Exine structures are variable within all genus's except in *Elegia*, *Thamnocortus* and *Wildenowia* where all grains are reticulate. Heterobrochus-reticulate exine structuring is only found in 5 species within *Restio*. *Hypodiscus* is the only genus where all grains have a thick annulus and *Thamnocortus* is the only genus with a thin annulus. *Chondropetalum*, *Restio*, *Thamnocortus* and *Wildenowia* are the only genus's with some species having granules on the ulcus membrane.

Rutaceae

Only *Agathosma* has smaller grained species (67% of the genus) and a large grained species, the rest have medium sized grains. *Agathosma* and *Macrostylis* are the only two genus's with perprolate grains (22% and 50% respectively). All species (4) within *Macrostylis*, exclusively, have micro-striato-reticulate exine structuring.

Scrophulariaceae

Most species reticulate, but two species psilate (*Manulea laxa* and *Nemesia cheiranthus*), two species striato-reticulate (*Sutera aurantiaca* and *Melasma sessiliforum*), one species striate (*Oftia africana*), one species perforate (*Chaenostoma affine*) and one species echinate (*Ixianthes*). Three species have a

granular exo-colpus membrane (*Sopubia cana*, *Melasma sessiliflorum* and *Nemesia fruticans*) the rest are smooth. All species from *Zaluxianskya* and *Polycarena*, as well as three of the six species in *Sutera* have non-geniculate pollen. This also applies for all polycolpate grains (all species within the genus's) from *Nemesia*, *Hemimeris* and *Diascia* as well as the only 4-porate species from *Sutera* (*S. tristis*). Only *Oftia* and *Phyllopodium* have demicolpate pollen grains (only one species was studied for both genus's).

References

- Banks, H, Himanen, I & Lewis, GP. 2010. *Evolution of pollen, stigmas and ovule numbers at the caesalpinoid-mimosoid interface (Fabaceae)*. Bot J Linn Soc, 162: 594-615
- Caccavari, M. & Dome, E. 2000. *Subpseudocolpi in polyads of Acacia, subgenus Aculeiferum*. Grana 39:1 32-38
- Chanda, S & Rowley, J. 1967. *Apertural Types in Pollen of the Restionaceae and Flagellariaceae*. Grana Palynologica, 7:1 16-36
- Doyle, JA. 1969. *Cretaceous angiosperm pollen of the Atlantic coastal plain and its evolutionary significance*. J. Arnold Arbor. 50: 1-35
- Erdtmann, G. 1952. *Pollen morphology and plant taxonomy: Angiosperms (an introduction to Palynology 1)*. Chronica Botanica Company, Waltham, Mass, U.S.A.
- 1954. *An introduction to pollen analysis*. Chronica Botanica Company, Waltham, Mass, U.S.A.
- 1960. *The acetolysis method. A revised description*. Svensk Bot. Tidsk, 54: 561-4
- 1969. *Handbook of palynology: Morphology, taxonomy, ecology. An introduction to the study of pollen grains and spores*. 1st Printing, Munksgaard, Copenhagen
- 1992. *Handbook of Palynology*. 1st Printing, Munksgaard, Copenhagen
- Deborah Q. Lewis, DQ. 2000. *A Revision of the New World Species of Lindernia (Scrophulariaceae)*. Castanea 65:2 93-122
- Fægri, K. 1956. *Recent Trends in Palynology*. Botanical Review, 22:9 639-664
- Feuer, S. 1990. *Pollen morphology of the Embothriaceae (Proteaceae) II. Embothriinae (Embothrium, Oreocallis, Telopea)*. Grana, 29:1 19-36
- Goldblatt, P., Manning, J.C., Snijman, D. 2008. *Cape plants: corrections and additions to the flora*. Cape flora additions. From URL: http://posa.sanbi.org/flora/flora_cp/CapePlantsUpdate.pdf
- Goldblatt, P & Le Thomas, A. 1997. *Palynology, Phylogenetic Reconstruction, and Classification of the Afro-Madagascan Genus Aristea (Iridaceae)*. Annals of the Missouri Botanical Garden, 84:2 263-284
- Golem Sarwar, AKM & Takahashi, H. 2006. *Pollen morphology of Enkianthus (Ericaceae) and its taxonomic significance*. Grana, 45: 161-174
- Johnson, SD. 1996. *Pollination, Adaptation and Speciation Models in the Cape Flora of South Africa*. Taxon, 45:1 59-66

- Isik, S & Donmez, EO. 2006. *Pollen Morphology of some Turkish Crocus L. (Iridaceae) Species. Acta Biologica Cracoviensia Series Botanica* 48:1 85-91
- Kuprianova, LA. 1948. *Pollen morphology and the phylogeny of the monocotyledons*. Comm. Komarov Bot. Inst. Acad. Sci, 1: 163-262
- 1967. *Apertures of pollen grains and their evolution in angiosperms*. Rev. Paleobot. Palynol, 3: 73-80
- Linder, HP & Ferguson, IK. 1985. *Notes on the Pollen Morphology and Phylogeny Restionales and Poales*. Grana, 24:2 65-76
- Magenta, MAG, Nunes, ADD, Mendonca, CBF & Goncalves-Esteves, V. 2010. *Palynotaxonomy of Brazilian Vigulera (Asteraceae) Species*. Bol Soc Argent Bot, 45:3-4 285-299
- Martínez-Ortega, MM, Sánchez, JS & Rico, E. 2010. *Palynological study of Veronica Sect. Veronica and Sect. Veronicastrum (Scrophulariaceae) and its taxonomic significance*. Grana, 39:1, 21-31
- Meadows, M.E., Sudjen, J.M. 1993. *The late quaternary paleoecology of the floristic kingdom – the southwestern Cape South Africa*. Palaeogeography, palaeoclimatology, palaeoecology 101:3-4 271-281
- Meadows, ME & Baxter, AJ. 1999. *Late Quaternary Palaeoenvironments of the southwestern Cape, South Africa: a regional synthesis*. Quaternary International 57:8 193-206
- Meadows, ME, Baxter, AJ & Parkington, J. 1996. *Late Holocene environments at verlorenvlei, Western Cape Province, South Africa*. Quaternary International, 33: 81-95
- Minkin, JP & Eshbaugh, WH. 1989. *Pollen morphology of the Orobanchaceae and rhinanthoid Scrophulariaceae*. Grana, 28:1, 1-18
- Morton, CM & Kallunki, JA. 1993. *Pollen Morphology of the Subtribe Cuspariinae (Rutaceae)*. Brittonia, 45:4 286-314
- Mulder, CH. 2003. *The Northwest European Pollen Flora, 61 AIZOACEAE*. Review of Palaeobotany and Palynology 123: 41-45
- Muller, J. 1970. *Palynological evidence on early differentiation of angiosperms*. Biol. Rev. 45: 417-450
- 1979. *Form and function in angiosperm pollen*. Annals Missouri Bot. Gard. 66: 593-632
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., daFonseca, G.A.B. & Kent, J. 2000. *Biodiversity hotspots for conservation priorities*. Nature, 403: 853-858
- Nagels, A, Muasya, M, Huysmans, S, Vrijdaghs, A, Smets, E & Vinckier, S. 2009. *Palynological diversity and major evolutionary trends in Cyperaceae*. Plant Syst Evol, 277:117-142
- Nair PKK. 1979. *The palynological basis for the triphyletic theory of angiosperms*. Grana, 18:3 141-144
- Pinar, NM, Ekici, M, Aytac, Z, Akan, H, Ceter, T & Alan, S. 2009. *Pollen morphology of Astragalus L. sect. Onobrychoidei DC. (Fabaceae) in Turkey*. Turk J Bot, 33: 291-303
- Punt, W, Hoen, PP, Blackmore, S, Nilsson, S & Le Thomas, A. 2009. *Glossary of pollen and spore terminology*. Review of Palaeobotany and Palynology, 143: 1-81
- Rebelo, A.G., Siegfried, W.R., Oliver E.G.H. 1985. *Pollination syndromes of Erica species in the southwestern Cape*. S Afr J Bot, 51:4 270-280

Telleria, MC, Urtubey, E & Katinas, L. 2003. *Proustia and Lophopappus (Asteraceae, Mutisieae): generic and subtribal relationships based on pollen morphology*. Review of Palaeobotany and Palynology 123: 237-246

Victor, JE & van Wyk, AE. 1999. *Pollen morphology of Diosma and Coleonema (Rutaceae: Diosminae) and its taxonomic implications*. Grana, 38:1 12-19
- 2000. *Pollen morphology of Phyllosma and Sheilantha (Diosminae: Rutaceae) and its taxonomic implications*. Grana, 39:2-3 103-107

Walker, JW. 1974. *Apertural evolution in the pollen of primitive angiosperms*. Am. J. Bot. 61: 1112-1137

Walker, JW & Doyle, JA. 1975. *The Bases of Angiosperm Phylogeny: Palynology*. Annals of the Missouri Botanical Garden, 62: 3 664-723

Zavada, MS. 1983. *Comparative Morphology of Monocot Pollen and Evolutionary Trends of Apertures and Wall Structures*. Botanical Review, 49:4 331-379

Figures and Tables:

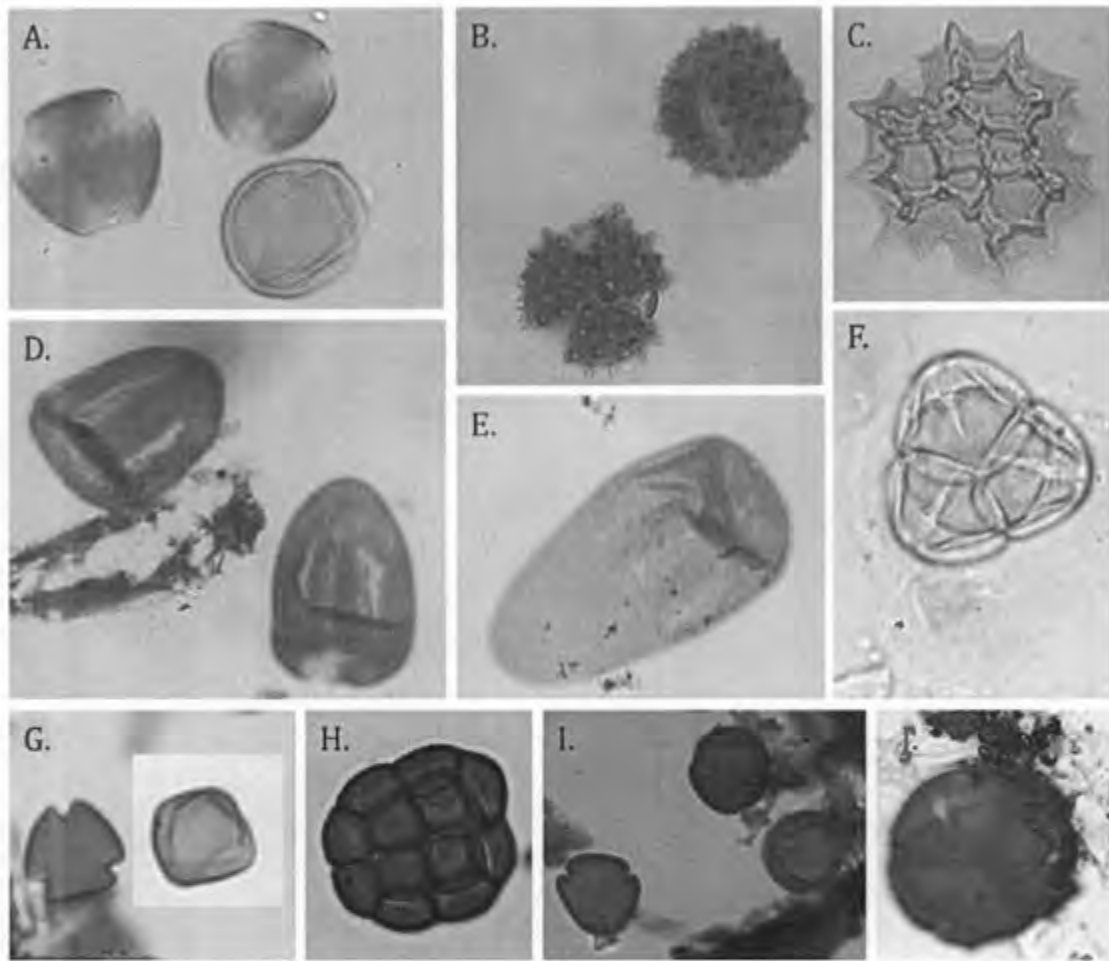


Figure 1. A. Aizoaceae *Tetragonia robusta*, B. Asteraceae *Athrixia fontana* C. Asteraceae *Berkheya pupurea*, D. Cyperaceae *Cyperus esculentus*, E. Cyperaceae *Ficinia argyrolopa*, F. Ericaceae *Erica chamissonis*, G. Fabaceae *Indigofera amoena*, H. Fabaceae *Acacia longifolia*, I. Ericaceae *Erica thunbergii*, J. Ericaceae *Erica nubigena*.

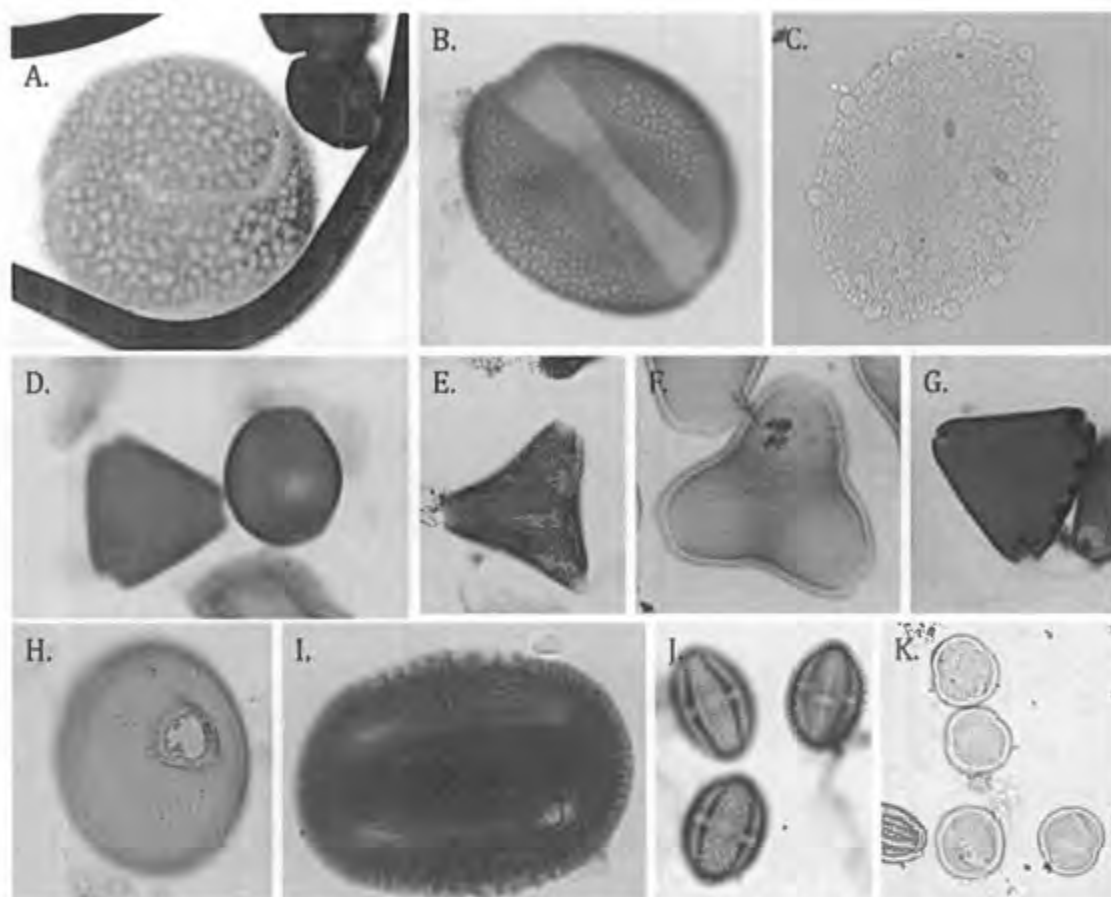


Figure 2. A. Iridaceae *Aristea oligocephala*, B. Iridaceae *Aristea cuspidate*, C. Iridaceae *Witsenia Maura*, D. Proteaceae *Leucodendron glaberrimum*, E. Proteaceae *Leucospermum calligerum*, F. Proteaceae *Leucospermum reflexum*, G. Proteaceae *Protea repens*, H. Restionaceae *Restio fruticosus*, I. Rutaceae *Adenandra villosa*, J. Rutaceae *Acmadenia bodkinii*, K. Scrophulariaceae *Acmadenia bodkinii*

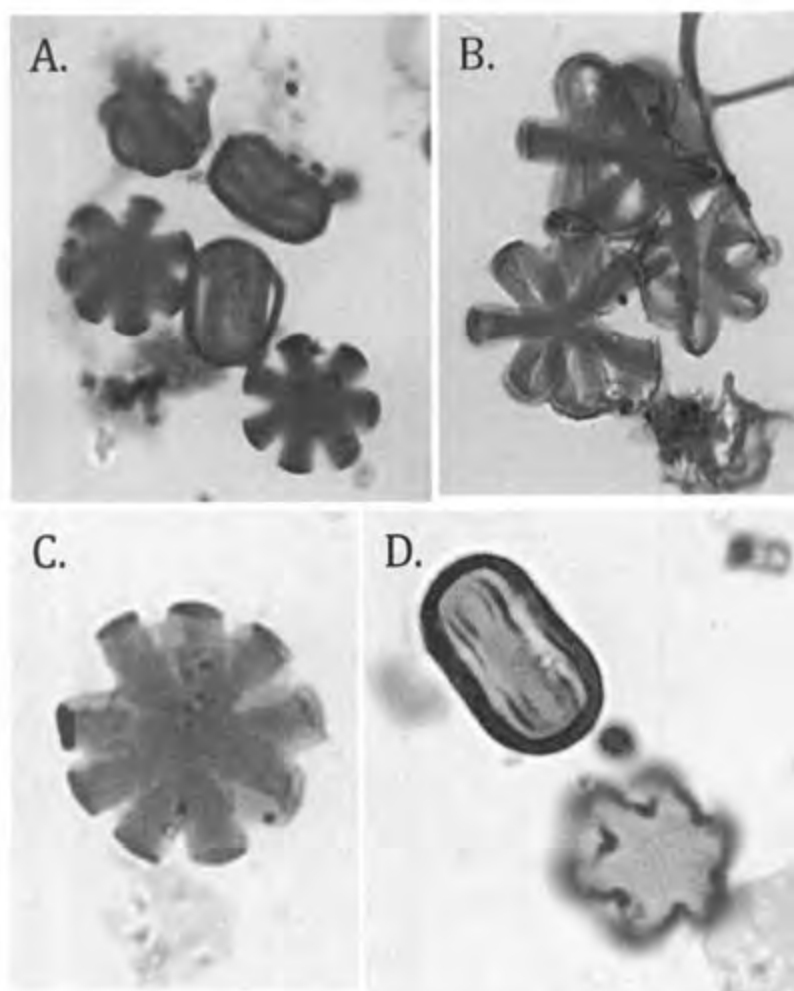


Figure 3. A. *Scrophulariaceae* *Diascia longicornis*, B. *Scrophulariaceae* *Hemimeris sabulosa*, C. *Scrophulariaceae* *Nemesia barbata*, D. *Scrophulariaceae* *Nemesia capensis*

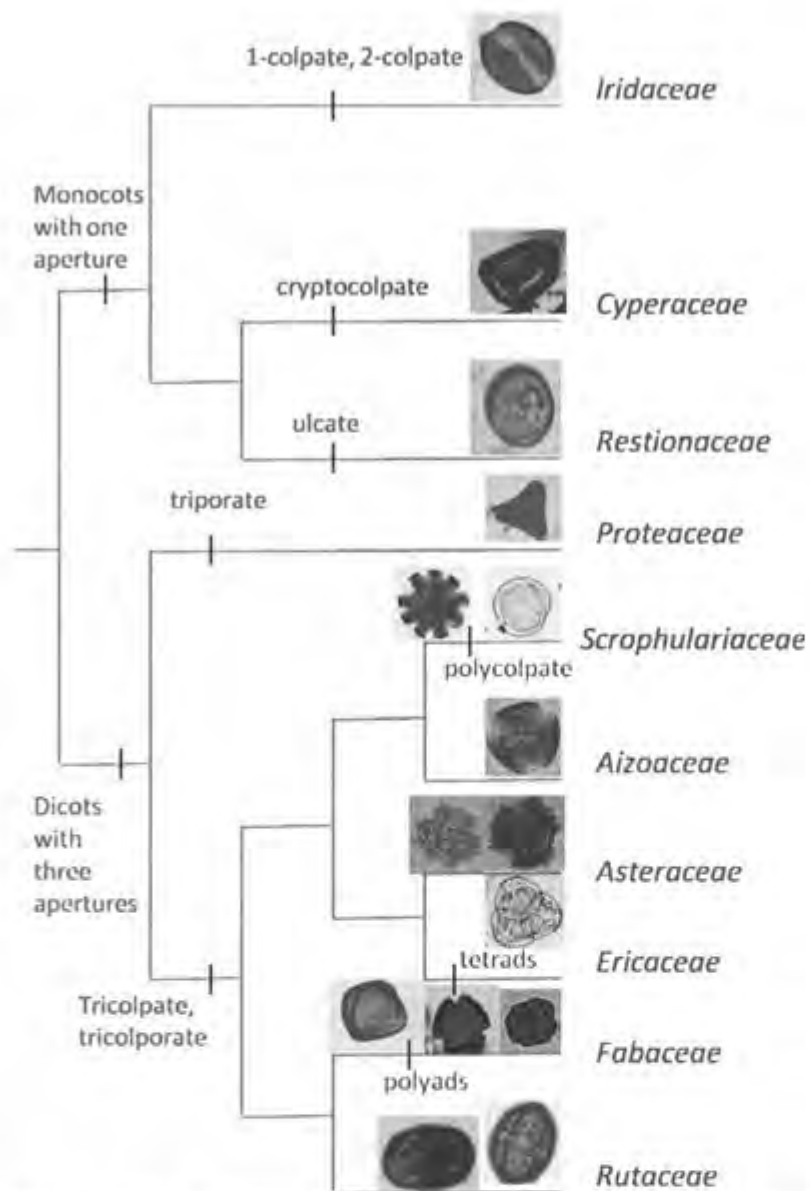


Figure 4. Phylogeny of the studied families with representative pictures of the most common types of pollen grains with trends in pollen morphology changes through evolution.

Table 1. Summary of pollen observations and measurement. S-small (<50µm), M-medium (50<x<100µm) and L-large (>100µm). n= number of species studied within each family. Bold represents most common attribute within family.

family		size	P/E ratio	Shape	ornamentation	apertures
Alzooceae						
n=10	min	S	0.96	Oblate spheroidal	psilate, reticulate	colpi
	max	M	1.28	Subprolate		tricolpate
Asteraceae						
n=180	min	S	0.86	Suboblate		colpi/pori
	max	L (4)	1.39	Prolate		tricolpate, tricolporate, triporate, ecolpate
Cyperaceae						
n=58	min	S(1), M	0.93	Oblate spheroidal	reticulate (micro-, striate-)	calca-ulcus/cryptocolpi
	max	L	1.78	Prolate		ε-ulcerate, mono-ulcerate and 2-, 3-, 4-, 5-cryptocolpate
Ericaceae						
n=36	min	S	0.91	Oblate spheroidal		colpi/pori
	max	M	1.15	Subprolate		3-, 4-, 6-colpate; 3-, 4-colporate,
Fabaceae						
n=75	min	S, M	0.94	Oblate spheroidal	psilate, perforate, reticulate	colpi/pori
	max	L (1)	1.69	Prolate		tricolpate, tricolporate
Iridaceae						
n=82	min	M	1.05	Prolate spheroidal	psilate, perforate, reticulate (macro-, striate-),	colpi
	max	L	1.92	Prolate	striate, with gemma	mono-, di-colpate
Proteaceae						
n=48	min	S	0.89	Oblate spheroidal	psilate, perforate, reticulate (striate-),	colpi/pori
	max	M	1.89	Prolate	with indented or raised poles	tricolpate, triporate, tricolporate
Restionaceae						
n=53	min	S (1), M	1.03	Prolate spheroidal	psilate, reticulate (heterobrochus-), rugulate	ulcus
	max	L (2)	1.45	Prolate		mono-ulcate
Rutaceae						
n=30	min	S, M	0.86	Oblate spheroidal	striate, reticulate (micro-, striate-, micro-striate-),	exo-/endo-colpi
	max	L (1)	2.20	Perprolate	echinate	all 3-endo, 3-axocolpate, except 1 which is 4-endo-colpate
Scrophulariaceae						
n=33	min	S	0.95	Oblate spheroidal	striate, perforate, echinate,	6-, 7-, 8 (poly)colpate, 3-colpate, 3-colporate,
	max	M	1.64	Prolate	reticulate (striate-, micro-)	4-axo 4-endo colpate, 4-endo-colpate

Table 1 cont. Summary of pollen observations and measurements. n= number of species studied within each family. Bold represents most common attribute within family. Short defined as less than half the polar length of the pollen grain.

family	other variables			
Alzooecaceae	length of colpi			colpus membrane
n=10	Long, short			granules, smooth
Asteraceae	spike length	colpi size	notes	
n=160	min= 0 max= 3.44 mean=1.087	thin, semi, thick	crescentic, lophate, geniculum	
Cyperaceae	polarity of cryptocolpi			
n=58	anisopolar, isopolar			
Ericaceae	ambit	outline	notes	dispersal unit
n=36	hexagonal, triangular, circular	spherical irregular	non-, coaperturate (tetrads) ; a-, geniculate (monads)	monad, tetrad
Fabaceae			notes	dispersal unit
n=75			a-, geniculate, demicolpate,	Polyad, monad
Iridaceae	type of aperture	size of apertures		
n=82	monocolpate, syn-dicolpate, spiraperturate	thin, medium, wide		
Proteaceae	ambit		notes	
n=48	triangular (rounded convex, slightly rounded convex, slightly concave) tribulbous or triangular convex		projectate	
Ranunculaceae	pore diameter	annulus		ulcus membrane
n=53	min= 1.5 max= 5.7 mean= 2.84	thick, thin		smooth, granules
Rutaceae				
n=30				
Scrophulariaceae			notes	colpus membrane
n=33			non-, geniculate, demicolpate	smooth, granules

Appendix 1. showing species studied and raw data of P- polar diameter, E- equatorial diameter, P/E ratio, shape, ornamentation. Note spikes for Asteraceae

genus	species	size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornamentation
Adenogramma	molluga	M	17.625	13.75	1.28	Subprolate	psilate
Galenia	fruticosa	M	20.75	19.5	1.06	Prolate spheroidal	psilate
Galenia	sarcophylla	M	24.875	23	1.08	Prolate spheroidal	reticulate
Lineum	fenesistratum	M	19.125	18.25	1.05	Prolate spheroidal	reticulate
Pharmaceum	elongatum	M	20.875	18	1.16	Subprolate	psilate
Pharmaceum	lanatum	M	15.375	16	0.96	Oblate spheroidal	psilate
Pharmaceum	serratifolium	M	16.375	15	1.09	Prolate spheroidal	psilate
Polypoda	capensis	M	20	19.125	1.05	Prolate spheroidal	reticulate
Tetragonia	arbuscula	M	27.875	28.25	0.99	Oblate spheroidal	reticulate
Tetragonia	robusta	M	34.375	30	1.15	Subprolate	reticulate
genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	length of spines
Arctotheca	repens	M	19.125	16.5	1.03	Prolate spheroidal	0.7
Arctotis	acaulis	M	19.5	20	0.98	Oblate spheroidal	1
Arctotis	Arctotoides	M	28.125	23.25	1.21	Subprolate	1.9
Arctotis	aspera	M	21	20.875	1.01	Prolate spheroidal	1
Arctotis	leucarpa	M	16.625	17.625	0.94	Oblate spheroidal	1
Aster	tsakerianus	M	44.25	42.25	1.05	Prolate spheroidal	1.2
Aster	hisp.	M	39.5	37.625	1.05	Prolate spheroidal	1.3
Athanasia	dregeana	M	33	30.125	1.1	Prolate spheroidal	1
Athanasia	flexuosa	M	20.625	20.5	1.01	Prolate spheroidal	1
Athanasia	linifolia	M	34	30.5	1.11	Prolate spheroidal	1.4
Athanasia	microphylla	M	24.875	21.75	1.14	Subprolate	1.1
Athanasia	schizolepis	M	24	23.875	1.01	Prolate spheroidal	1.1
Athrix	fontana	M	35.375	33.25	1.06	Prolate spheroidal	1
Athrix	phylicoides	M	28.375	26.875	1.06	Prolate spheroidal	0.9
Berkheya	curvicaulis	M	36.5	35.375	1.03	Prolate spheroidal	3.1
Berkheya	discolor	M	36	38.625	0.93	Oblate spheroidal	2
Berkheya	purpurea	M	45.5	44	1.03	Prolate spheroidal	2.4
Brechyleena	discolor	M	39.125	37.375	1.05	Prolate spheroidal	0.1
Callilepis	laureola	M	39.875	34.625	1.15	Subprolate	0.5
Castalis	nudicaulis	M	29.5	28.125	1.05	Prolate spheroidal	1.3
Chrysocoma	candelabrum	M	20.625	17.625	1.17	Subprolate	1
Chrysocoma	tenuifolia	M	29.75	21.375	1.39	Prolate	1
Cineraria	aspera	M	22.5	21	1.07	Prolate spheroidal	0.7
Cineraria	lobata	M	28.75	24.375	1.18	Subprolate	1
Cineraria	platycarpa	M	32.875	29.25	1.12	Prolate spheroidal	1
Cineraria	tomentosa	M	42.25	34.625	1.22	Subprolate	1
Circium	virgare	L	61.625	54.375	1.13	Prolate spheroidal	2.1
Conysa	scabrifida	M	26.125	23.5	1.11	Prolate spheroidal	1
Corymbium	africanum	M	30.625	28.875	1.06	Prolate spheroidal	2.4
Corymbium	laxum	M	44	40.625	1.08	Prolate spheroidal	2

Corymbium	vilosum	M	48.25	44.125	1.09	Prolate spheroidal	2.8
Cotula	heterocarpa	M	23.375	23	1.02	Prolate spheroidal	1.7
Cotula	turbinate	M	24.75	20.625	1.2	Subprolate	1.3
Dimorphotheca	cuneata	M	44.375	38.75	1.15	Subprolate	1.4
Disparego	encoides	M	24.25	20	1.21	Subprolate	1
Elytropappus	gnaphaloides	M	19.675	20.25	0.98	Oblate spheroidal	0.1
Elytropappus	rhinocerotis	M	33.5	33.625	1	Oblate spheroidal	0.2
Eriocephalus	africanus	M	20.75	20.125	1.03	Prolate spheroidal	0.2
Eriocephalus	encoides	M	25.675	22.5	1.15	Subprolate	0.1
Eriocephalus	eximius	M	25.5	23.375	1.09	Prolate spheroidal	0.5
Eriocephalus	racemosus	M	19	19.625	0.97	Oblate spheroidal	0.1
Eriocephalus	spinescens	M	26	22.625	1.15	Subprolate	0.1
Euryops	imbricatus	M	19.75	18.25	1.08	Prolate spheroidal	0.4
Euryops	lenussimus	M	42.125	36.875	1.14	Subprolate	1.3
Euryops	othonoides	M	18.25	16.75	1.09	Prolate spheroidal	0.8
Euryops	speciosissimus	M	24.75	20.875	1.19	Subprolate	0.5
Euryops	tagetoides	M	20.75	19.625	1.06	Prolate spheroidal	0.6
Euryops	virginicus	M	31.625	26.875	1.18	Subprolate	0.6
Euryops	wagneri	M	25.125	23.375	1.07	Prolate spheroidal	0.9
Felicia	ameloides	M	31.625	25.25	1.25	Subprolate	1
Felicia	amoena	M	20.75	18.125	1.14	Subprolate	0.7
Felicia	cymbalariae	M	20.5	15.75	1.22	Subprolate	0.7
Felicia	ferulacea	M	22.125	18.375	1.2	Subprolate	0.9
Felicia	filifolia	M	30.75	26.875	1.14	Subprolate	0.8
Felicia	hispidula	M	23.125	19.625	1.18	Subprolate	1
Felicia	scabra	M	23.875	19.75	1.21	Subprolate	0.8
Felicia	tenella	M	15.75	12.875	1.22	Subprolate	0.26
Galearia	hippinsum	M	30.125	25.75	1.17	Subprolate	1.4
Gazania	duriniifolia	L	51.625	51.5	1	Prolate spheroidal	3.4
Gazania	krebsiana	M	43	42.875	1	Prolate spheroidal	2.7
Gazania	lichtensteini	M	37.125	36.875	1.01	Prolate spheroidal	1.9
Geigeria	africana	M	38.5	29.75	1.29	Subprolate	1.8
Geigeria	ornativa	M	30.375	26.5	1.15	Subprolate	1.8
Gnaphalium	luteo-album	M	22.25	18.5	1.2	Subprolate	0.64
Gnaphalium	undulatum	M	26.625	21.625	1.23	Subprolate	0.9
Gynodiscus	capillaris	M	14.375	14.875	0.97	Oblate spheroidal	0.5
Helichrysum	aregeanum	M	23.5	19.25	1.22	Subprolate	0.6
Helichrysum	argyrophyllum	M	26.125	24.375	1.07	Prolate spheroidal	1
Helichrysum	cylindricolum	M	15.75	16.125	0.98	Oblate spheroidal	0.2
Helichrysum	cymosum	M	23.875	21.25	1.12	Prolate spheroidal	0.9
Helichrysum	foetidum	M	22.75	20.375	1.12	Prolate spheroidal	0.22
Helichrysum	heliathanemifolium	M	23	20.5	1.12	Prolate spheroidal	1
Helichrysum	glomeratum	M	28.25	24.875	1.14	Prolate spheroidal	1
Helichrysum	lucoides	M	26	23.875	1.09	Prolate spheroidal	0.6
Helichrysum	micronifolium	M	29.5	25.125	1.17	Subprolate	1.4
Helichrysum	odoratissimum	M	23.875	20.125	1.19	Subprolate	1.2

Helichrysum	rosunt	M	25.875	21.625	1.2	Subprolate	0.5
Helichrysum	rugulosum	M	22.75	19.25	1.18	Subprolate	1
Helichrysum	rutilans	M	14.75	15	0.98	Oblate spheroidal	0.3
Helichrysum	setosum	M	33.875	32.375	1.05	Prolate spheroidal	1.5
Helichrysum	squamosum	M	30.125	29.5	1.02	Prolate spheroidal	1
Helichrysum	subglomeratum	M	24.5	22.25	1.1	Prolate spheroidal	1
Helichrysum	teretifolium	M	18.125	15.125	1.07	Prolate spheroidal	0.42
Helichrysum	tinclum	M	16.125	17.25	0.93	Oblate spheroidal	0.48
Helichrysum	zeyheri	M	25.625	22.75	1.13	Prolate spheroidal	0.9
Helipterum	canescens	M	26.75	24	1.11	Prolate spheroidal	1.18
Helipterum	dregeanum	M	30.75	29.875	1.03	Prolate spheroidal	1.5
Helipterum	flavum	M	30.75	29	1.06	Prolate spheroidal	1.5
Helipterum	variegatum	M	27.675	25.25	1.1	Prolate spheroidal	2
Hertia	alata	M	32.25	29.125	1.11	Prolate spheroidal	1
Hippia	pilosii	M	19.875	19.25	1.03	Prolate spheroidal	1.06
Hirpicum	alienatum	L	50.5	50.5	1	Prolate spheroidal	3.44
Lachnospermum	ericoides	M	23.125	22.5	1.03	Prolate spheroidal	1.1
Lasiospemum	perilunculare	M	20.25	18.25	1.11	Prolate spheroidal	1
Laysia	gnaphaloides	M	21.375	19.5	1.1	Prolate spheroidal	0.8
Lidbeckia	lobata	M	20.5	20	1.03	Prolate spheroidal	1
Macowanina	glandulosa	M	38.125	35.25	1.08	Prolate spheroidal	1.3
Mairea	ecklonis	M	18.75	19.375	0.97	Oblate spheroidal	1
Mairea	microcephalus	M	18.75	18.75	1	Prolate spheroidal	1
Mairea	perezoides	M	19.375	20.5	0.95	Oblate spheroidal	1
Metalsia	cephalotes	M	23.75	21.75	1.09	Prolate spheroidal	1.1
Metalsia	seriphillofolia	M	24.5	20.875	1.17	Subprolate	1.12
Microglossa	mespilifolia	M	29	27.125	1.07	Prolate spheroidal	1.1
Microglossa	pyralia	M	29.75	25.875	1.15	Subprolate	0.38
Osteospermum	amplexiens	M	22.75	24	0.95	Oblate spheroidal	1
Osteospermum	calendulaceum	M	27	30.75	0.88	Suboblate	2
Osteospermum	grandiflorum	M	25.125	24.75	1.02	Prolate spheroidal	1
Osteospermum	imbricatum	M	24.75	22.625	1.09	Prolate spheroidal	1.66
Osteospermum	microphyllum	M	23.25	24.375	0.95	Oblate spheroidal	1.5
Osteospermum	polygaloides	M	21.875	21.625	1.01	Prolate spheroidal	1
Osteospermum	scariosum	M	22.75	26	0.88	Suboblate	1.06
Osteospermum	sinuatum	M	26.875	29.875	0.9	Oblate spheroidal	1.5
Osteospermum	spinescens	M	26.125	27	0.97	Oblate spheroidal	2
Othonia	slata	M	20.75	20.75	1	Prolate spheroidal	1.1
Othonia	alba	M	20	19.75	1.01	Prolate spheroidal	0.8
Othonia	auriculifolia	M	20	20.125	0.99	Oblate spheroidal	1.1
Othonia	eriocarpa	M	31.625	28.125	1.12	Prolate spheroidal	1.5
Othonia	furcata	M	21.875	20.375	1.07	Prolate spheroidal	0.56
Othonia	humilis	M	22.375	21.25	1.05	Prolate spheroidal	1.2
Othonia	multicaulis	M	19.5	17.75	1.1	Prolate spheroidal	0.26
Othonia	pavonia	M	25.875	25	1.04	Prolate spheroidal	1.22
Pentzia	calcareis	M	18.5	18.75	0.99	Oblate spheroidal	0.5

Pentzia	incana	M	24.5	22.875	1.07	Prolate spheroidal	0.7
Pentzia	punctata	M	33.875	31.25	1.08	Prolate spheroidal	1.6
Pentzia	quinquefolia	M	24	23.25	1.03	Prolate spheroidal	1.04
Pentzia	spinescens	M	24.5	26.125	0.94	Oblate spheroidal	1.04
Phymaspermum	parvifolium	M	30.5	28.125	1.08	Prolate spheroidal	1.12
Plecostachya	polifolia	M	21.75	20.625	1.05	Prolate spheroidal	0.5
Pteronia	aspalatha	M	23.75	23.25	1.02	Prolate spheroidal	0.5
Pteronia	campanata	M	25.375	24.875	1.02	Prolate spheroidal	2
Pteronia	divaricata	M	26.625	26	1.1	Prolate spheroidal	1
Pteronia	glomerata	M	40.625	33.375	1.22	Subprolate	1.1
Pteronia	incana	L	57.625	48.875	1.16	Subprolate	1
Pteronia	membranaceae	M	40.75	35.375	1.15	Subprolate	1.2
Pteronia	patens	M	26.75	24	1.11	Prolate spheroidal	1
Pseudographalium	undulatum	M	15	13.75	1.09	Prolate spheroidal	0.42
Rhelhania	calyona	M	24.875	23	1.08	Prolate spheroidal	1.1
Rhelhania	corymbosa	M	20.125	20.125	1	Prolate spheroidal	0.64
Rhelhania	pumila	M	18.875	17.875	1.06	Prolate spheroidal	0.5
Rhelhania	sedifolia	M	21.875	20.75	1.05	Prolate spheroidal	0.7
Roseria	humilis	M	30.375	28.375	1.07	Prolate spheroidal	1
Roseria	oppositifolia	M	37.625	32.75	1.15	Subprolate	1.24
Roseria	spinescens	M	26.5	25.5	1.04	Prolate spheroidal	1
Senecio	amabilis	M	19.75	18.875	1.05	Prolate spheroidal	1
Senecio	angulatus	M	44.375	34.25	1.3	Subprolate	1.5
Senecio	angustifolius	M	26.5	21.875	1.21	Subprolate	1
Senecio	articulatus	M	45.25	37.5	1.21	Subprolate	1
Senecio	asperulus	M	42.375	34.75	1.22	Subprolate	1.4
Senecio	brevidentatus	M	37.25	28.375	1.31	Subprolate	1.7
Senecio	bupleuroides	M	44	31.625	1.39	Prolate	1.6
Senecio	conic.	M	36	31.875	1.13	Prolate spheroidal	1.1
Senecio	cotyledonis	M	34.375	29.625	1.16	Subprolate	1
Senecio	enobasis	M	23.25	22.875	1.02	Prolate spheroidal	1
Senecio	erosus	M	25	23.125	1.08	Prolate spheroidal	1
Senecio	erubescens	M	30	27	1.11	Prolate spheroidal	1
Senecio	grandiflorus	M	20.5	18.75	1.09	Prolate spheroidal	1.2
Senecio	haworthii	M	20.625	17.5	1.18	Subprolate	1
Senecio	longitellus	M	33.875	29.5	1.15	Subprolate	1
Senecio	madagascariensis	M	26.875	24.625	1.09	Prolate spheroidal	1
Senecio	nupifolius	M	40.875	33.5	1.22	Subprolate	1.1
Senecio	paniculatus	M	19.875	18.125	1.1	Prolate spheroidal	1
Senecio	pinnulatus	M	27.875	25.375	1.1	Prolate spheroidal	1
Senecio	pterophorus	M	31.5	27.75	1.14	Prolate spheroidal	1.8
Senecio	speciosus	M	37.75	32	1.18	Subprolate	1
Senecio	sophoides	M	19.75	18.125	1.09	Prolate spheroidal	1
Stipnophytum	linifolium	M	31.375	31.5	1	Oblate spheroidal	1.5
Stoebe	intricata	M	21.5	22	0.98	Oblate spheroidal	0.1
Stoebe	leucocephala	M	34	30.5	1.11	Prolate spheroidal	0.5

Stoebe	vulgare	M	30.25	31.5	0.96	Oblate spheroidal	0.1
Tagetes	minata	M	30.75	31	0.99	Oblate spheroidal	1.8
Tarhonanthus	camphoratus	M	44.5	35.5	1.25	Subprolate	0
Ursinia	antheroides	M	20.25	20.25	1	Prolate spheroidal	1.6
Ursinia	nana	M	22.375	21.875	1.02	Prolate spheroidal	1.2
Ursinia	punctata	M	21.25	20.625	1.03	Prolate spheroidal	1.3
Ursinia	rigida	M	20.875	20.625	1.01	Prolate spheroidal	1.2
Ursinia	serica	M	20.625	20.375	1.01	Prolate spheroidal	1.1
Ursinia	subfoculosa	M	24.625	23.625	1.04	Prolate spheroidal	1.6
Veridium	decurrens	M	25.375	23.375	1.09	Prolate spheroidal	1.1
Vernonia	anisochaetoides	M	36.5	36.5	1	Prolate spheroidal	1
Vernonia	capensis	M	42.375	38.375	1.1	Prolate spheroidal	2
genus	species	Size	Polar diameter	Equatorial diameter	PIE ratio	Shape	Ornamentation
Poaceae							
Bulbosylis	burchellii	M	38	33.25	1.14	Subprolate	striate-reticulate
Carex	zuluensis	M	48.5	43.75	1.11	Prolate spheroidal	reticulate
Carpha	bracteosa	M	51.5	36.25	1.42	Prolate	reticulate
Carpha	glomerata	M	57.5	37.5	1.53	Prolate	reticulate
Chrysithrix	dodi	L	63	40	1.58	Prolate	reticulate
Chrysithrix	capensis	M	51.75	39.25	1.32	Subprolate	reticulate
Chrysithrix	junciformis	M	55.75	42.75	1.3	Subprolate	striate-reticulate
Cyperus	compactus	M	44	41	1.07	Prolate spheroidal	micro-reticulate
Cyperus	esculentus	M	38	29.25	1.3	Subprolate	micro-reticulate
Cyperus	fastigatus	M	31.75	26.5	1.2	Subprolate	micro-reticulate
Cyperus	longus	M	27.25	27	1.01	Prolate spheroidal	micro-reticulate
Cyperus	rupestris	M	45.75	37.75	1.21	Subprolate	micro-reticulate
Cyperus	sphaerospermus	M	22.75	18.75	1.21	Subprolate	micro-reticulate
Cyperus	tenellus	M	29	25.25	1.15	Subprolate	reticulate
Epischoenus	adnatus	M	51.25	39.5	1.3	Subprolate	reticulate
Fidnia	acuminata	M	37.25	28.25	1.32	Subprolate	reticulate
Fidnia	anceps	M	36	30.5	1.18	Subprolate	micro-reticulate
Fidnia	argyrolopa	M	51.25	32.25	1.59	Prolate	reticulate
Fidnia	brevifolia	M	39.5	22.5	1.76	Prolate	reticulate
Fidnia	tubosa	M	42	26.75	1.57	Prolate	reticulate
Fidnia	capitata	M	39.5	28.5	1.39	Prolate	reticulate
Fidnia	cinnamomea	M	33.5	26.25	1.28	Subprolate	reticulate
Fidnia	elongata	M	42.25	26.75	1.58	Prolate	reticulate
Fidnia	fascicularis	M	31	27.5	1.13	Prolate spheroidal	reticulate
Fidnia	filiformis	M	33.5	24.75	1.35	Prolate	reticulate
Fidnia	gracilis	M	51	34.75	1.47	Prolate	reticulate
Fidnia	gracilis	M	35	29	1.21	Subprolate	reticulate
Fidnia	gracilis	M	47	32.25	1.46	Prolate	reticulate
Fidnia	gydomoniense	M	46.75	35.5	1.32	Subprolate	reticulate
Fidnia	indica	M	37.75	29.25	1.29	Subprolate	reticulate
Fidnia	ixioides	M	41.5	35.75	1.16	Subprolate	reticulate
Fidnia	micrantha	M	31.25	27.75	1.13	Prolate spheroidal	reticulate

Floria	nigrescens	M	38.75	31.25	1.24	Subprolate	reticulate
Ficinia	secunda	M	42.75	27	1.58	Prolate	reticulate
Floria	sinata	M	45.75	29.5	1.55	Prolate	reticulate
Fuirena	coenulescens	M	47.5	43.75	1.09	Prolate spheroidal	reticulate
Fuirena	hirsuta	M	46.25	43.25	1.07	Prolate spheroidal	reticulate
Isolopis	proifer	M	33.75	31.25	1.08	Prolate spheroidal	reticulate
Juncellus	laevigatus	M	36.5	31	1.18	Subprolate	reticulate
Macropchaetum	icktonii	M	49	42.25	1.16	Subprolate	striate-reticulate
Mariscus	congestus	M	27.75	25	1.11	Prolate spheroidal	reticulate
Cyperus	rupestris	M	40	36.75	1.09	Prolate spheroidal	reticulate
Cyperus	papyrus	M	29.25	26	1.13	Prolate spheroidal	reticulate
Pycreus	polystachyus	M	24.75	26.5	0.93	Oblate spheroidal	pilate
Scleria	bubifera	M	41.5	36	1.15	Subprolate	micro-reticulate
Scleria	woodii	M	29.75	30.25	0.98	Oblate spheroidal	reticulate
Scirpus	modosus	M	42.5	27.75	1.53	Prolate	reticulate
Tetraria	compa	M	45.25	35	1.29	Subprolate	micro-reticulate
Tetraria	crinifolia	M	47.5	35.5	1.34	Prolate	reticulate
Tetraria	cuspidata	M	52.25	46	1.14	Prolate spheroidal	reticulate
Tetraria	fasciata	L	75.75	57.5	1.32	Subprolate	reticulate
Tetraria	ferruginea	L	56.75	43.75	1.3	Subprolate	reticulate
Tetraria	fourcadei	L	77	63.5	1.21	Subprolate	reticulate
Tetraria	maculata	L	56.5	55.75	1.01	Prolate spheroidal	striate-reticulate
Tetraria	picta	M	53.25	39.75	1.34	Prolate	reticulate
Tetraria	pubescens	M	43.75	34.25	1.28	Subprolate	reticulate
Tetraria	ustulata	L	100.25	76	1.32	Subprolate	micro-reticulate
Tetraria	vaginala	M	52.5	43.75	1.2	Subprolate	reticulate
genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	outline
Anserica	gracilis	M	17	16.125	1.05	Prolate spheroidal	irregular
Annesornhiza	filicaulis	M	17.625	15.375	1.15	Subprolate	spherical
Blaeria	ericoides	M	16.375	17.5	0.94	Oblate spheroidal	irregular
Eremia	recurvata	M	12.125	12.125	1	Prolate spheroidal	irregular
Erica	acuta	M	24.375	24.5	0.99	Oblate spheroidal	irregular
Erica	articularis	M	36.5	36.625	1	Oblate spheroidal	irregular
Erica	bergiana	M	31.5	31.5	1	Prolate spheroidal	irregular
Erica	bruniades	M	33.625	33.5	1	Prolate spheroidal	irregular
Erica	calycina	M	32.625	35	0.93	Oblate spheroidal	irregular
Erica	censua	M	34.875	35.125	0.99	Oblate spheroidal	spherical
Erica	chamissonis	M	34.875	37.25	0.94	Oblate spheroidal	irregular
Erica	confolia	M	36.25	36.625	0.99	Oblate spheroidal	spherical/irregular
Erica	copiosa	M	26	27.875	0.93	Oblate spheroidal	spherical/irregular
Erica	crisillora	M	30	29.875	1	Prolate spheroidal	spherical
Erica	curviflora	M	36.875	36.5	1.01	Prolate spheroidal	irregular
Erica	daphniflora	M	33.25	33.5	0.99	Oblate spheroidal	spherical/irregular
Erica	eugenea	M	47.5	49.125	0.97	Oblate spheroidal	spherical/irregular
Erica	haematodesiphon	M	35.375	36.375	0.97	Oblate spheroidal	spherical/irregular

Erica	hirtiflora	M	30	30	1	Prolate spheroidal	spherical
Erica	humifusa	M	23.625	23.75	0.99	Oblate spheroidal	spherical
Erica	junonia	M	35	34.75	1.01	Prolate spheroidal	irregular
Erica	lucida	M	28.75	28.25	1.02	Prolate spheroidal	spherical/irregular
Erica	lutes	M	33.125	33.125	1	Prolate spheroidal	spherical
Erica	maderi	M	32.375	32.125	1.01	Prolate spheroidal	spherical/irregular
Erica	monsoniana	M	40.125	40.375	0.99	Oblate spheroidal	spherical
Erica	rubigena	M	33	33	1	Prolate spheroidal	spherical
Erica	ruoiflora	M	32.875	32.25	1.02	Prolate spheroidal	spherical
Erica	philippioides	M	22.375	22	1.02	Prolate spheroidal	spherical/irregular
Erica	rubiginosa	M	35	34.375	1.02	Prolate spheroidal	irregular
Erica	senilis	M	33.75	33.75	1	Prolate spheroidal	spherical
Erica	subulata	M	43.125	44.625	0.97	Oblate spheroidal	spherical/irregular
Erica	thunderbergii	M	17.5	18.25	0.96	Oblate spheroidal	spherical
Erica	lunida	M	38.25	38.5	0.99	Oblate spheroidal	irregular
Erica	verecunda	M	24.375	24.375	1	Prolate spheroidal	spherical/irregular
Erica	woodii	M	23.875	23.875	1	Prolate spheroidal	spherical/irregular
Grisebachia	ciliata	M	16.875	18.5	0.91	Oblate spheroidal	spherical
genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornimentation

Acacia	karoo	M	45	42.25	1.07	Prolate spheroidal	psilate
Acacia	longifolia	M	45.125	43.125	1.05	Prolate spheroidal	psilate
Acacia	mesauii	M	43	39.75	1.08	Prolate spheroidal	psilate
Acacia	saligna	L	50.375	50	1.01	Prolate spheroidal	psilate
Alysicarpus	rugosus	M	40.75	41	0.99	Oblate spheroidal	perforate
Argyrobolium	pauciflorum	M	27.625	25.75	1.07	Prolate spheroidal	reticulate
Argyrobolium	speciosum	M	28.75	21	1.27	Subprolate	psilate
Argyrobolium	sulherlandii	M	31.125	26.5	1.17	Subprolate	psilate
Argyrobolium	tuberosum	M	28.75	24.625	1.17	Subprolate	reticulate
Argyrobolium	tumentosum	M	26.625	18.5	1.44	Prolate	reticulate
Aspalathus	altissima	M	20.875	18.875	1.11	Prolate spheroidal	reticulate
Aspalathus	bodkini	M	16.125	14.125	1.14	Subprolate	psilate
Aspalathus	bracteata	M	21.375	16.625	1.15	Subprolate	psilate
Aspalathus	costulata	M	21.125	19	1.11	Prolate spheroidal	perforate
Aspalathus	divercate	M	18.625	14.875	1.25	Subprolate	psilate
Aspalathus	flexuosa	M	18.625	15	1.24	Subprolate	psilate
Aspalathus	galeata	M	25.875	23.25	1.11	Prolate spheroidal	reticulate
Aspalathus	hirta	M	23.375	19	1.23	Subprolate	psilate
Aspalathus	hispida	M	15.25	13	1.17	Subprolate	psilate
Aspalathus	lanata	M	19.75	16.25	1.22	Subprolate	psilate
Aspalathus	lanceifolia	M	20.375	18	1.13	Prolate spheroidal	psilate
Aspalathus	lanifera	M	21.5	19.25	1.12	Prolate spheroidal	psilate
Aspalathus	linearis	M	19	17.875	1.06	Prolate spheroidal	psilate
Aspalathus	polyccephala	M	18.5	15.25	1.21	Subprolate	psilate
Aspalathus	quinquifolia	M	24.5	21.25	1.15	Subprolate	perforate
Aspalathus	spicata	M	21	19.875	1.06	Prolate spheroidal	psilate

Aspalathus	spinosissima	M	21.25	19.25	1.1	Prolate spheroidal	psilate
Aspalathus	tridentata	M	17.625	15.625	1.13	Prolate spheroidal	psilate
Aspalathus	triquetra	M	23.5	19.125	1.23	Subprolate	reticulate
Aspalathus	vulnerans	M	19	20	0.95	Oblate spheroidal	psilate
Aspalathus	wormbeana	M	17.25	16.875	1.02	Prolate spheroidal	psilate
Buchenroedera	multiflora	M	16.125	17.375	1.04	Prolate spheroidal	psilate
Calpurnia	aura	M	20.75	16.875	1.23	Subprolate	reticulate
Cassia	longiracemosa	M	36.25	30.625	1.18	Subprolate	reticulate
Cassia	occidentalis	M	50.25	47	1.07	Prolate spheroidal	psilate
Coelidium	cedarbergiensis	M	21.625	20.625	1.05	Prolate spheroidal	psilate
Coelidium	vilosum	M	19	17.5	1.09	Prolate spheroidal	psilate
Dolichos	buchanii	M	42.75	40.25	1.06	Prolate spheroidal	reticulated
Enlada	spicata	M	37.125	27.5	1.35	Prolate	psilate
Eriosema	glomeratum	M	31.5	26.5	1.19	Subprolate	reticulated
Indigofera	adenoides	M	22.625	21.625	1.05	Prolate spheroidal	psilate
Indigofera	amoena	M	29.75	26.5	1.12	Prolate spheroidal	psilate
Indigofera	hombiei	M	49.25	44.375	1.11	Prolate spheroidal	reticulate
Indigofera	sessiflora	M	24	22.125	1.08	Prolate spheroidal	psilate
Lebeckia	cytisoides	M	19.125	16.125	1.19	Subprolate	psilate
Lebeckia	sinensis	M	17.5	14.5	1.21	Subprolate	psilate
Lessertia	perennans	M	29.625	25.375	1.17	Subprolate	reticulate
Lessertia	physodes	M	29.25	22.5	1.3	Subprolate	reticulate
Lotononis	corymbosa	M	27	21.25	1.27	Subprolate	psilate
Lotononis	humifusa	M	34.125	28	1.22	Subprolate	reticulate
Melolobium	candicans	M	29.125	28.625	1.02	Prolate spheroidal	reticulate
Melolobium	microphyllum	M	33.875	26.5	1.28	Subprolate	reticulate
Melolobium	obcordatum	M	27.5	27.375	1	Prolate spheroidal	reticulate
Newtonia	hildebrandii	M	37.75	27	1.4	Prolate	psilate
Podalyria	pearsonii	M	20.25	15.5	1.31	Subprolate	psilate
Priestleya	umbellifera	M	24.75	14.625	1.69	Prolate	reticulate
Prosope	glendulosa	M	33.625	35.875	0.94	Oblate spheroidal	psilate
Psoralea	aphylla	M	27.75	28.5	0.97	Oblate spheroidal	reticulate
Psoralea	oligophylla	M	28.25	27.875	1.01	Prolate spheroidal	reticulate
Psoralea	pinnata	M	36.125	35.125	1.03	Prolate spheroidal	reticulate
Psoralea	triantha	M	24.125	25.625	0.94	Oblate spheroidal	reticulate
Rafnia	amplexicaulis	M	17.5	15.625	1.12	Prolate spheroidal	psilate
Rafnia	capensis	M	19.125	15.125	1.26	Subprolate	psilate
Rafnia	opposita	M	13.75	14.5	0.95	Oblate spheroidal	psilate
Rafnia	spicata	M	15.875	13	1.22	Subprolate	psilate
Rafnia	triflora	M	20.375	15.75	1.29	Subprolate	psilate
Rhynchosia	cliatii	M	41.5	35.5	1.17	Subprolate	reticulate
Sesbania	dummeri	M	42.75	35.125	1.22	Subprolate	reticulate
Sesbania	greenwayi	M	34.375	28.625	1.2	Subprolate	reticulate
Tephrosia	capensis	M	36.25	31.25	1.16	Subprolate	psilate
Tephrosia	linensis	M	48.625	40.875	1.19	Subprolate	reticulate
Trifolium	burchellianum	M	46.125	34.75	1.33	Subprolate	reticulate

Vicia	saliva	M	34.75	22.375	1.55	Prolate	perforate
Wiborgia	sericea	M	19.625	15.125	1.3	Subprolate	psilate
Wiborgia	teiraplia	M	15.125	14.75	1.03	Prolate spheroidal	psilate
genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornamentation
Anapalina	nervosa	L	68.875	40	1.72	Prolate	striate
Aristea	africana	M	47.5	35.75	1.33	Subprolate	reticulate
Aristea	capitata	L	60.375	51	1.18	Subprolate	striate-reticulate
Aristea	cuspidata	M	44.125	36.25	1.22	Subprolate	reticulate
Aristea	oligocephala	M	56	37.25	1.5	Prolate	macro-reticulate
Babiana	dissicha	L	73.625	49.375	1.49	Prolate	reticulate
Babiana	edlioni	L	66.75	46.25	1.44	Prolate	reticulate
Babiana	pilosa	L	64.375	39.75	1.62	Prolate	reticulate
Babiana	plicata	L	78.25	47.375	1.65	Prolate	reticulate
Babiana	sambucina	M	57.5	30	1.92	Prolate	reticulate
Babiana	scabrifolia	L	66.25	45.75	1.45	Prolate	reticulate
Bobartia	macrocephala	M	45.75	34.75	1.32	Subprolate	reticulate
Dierama	paucum	M	60.25	39	1.54	Prolate	reticulate
Dierama	pendula	L	78.5	64.75	1.21	Subprolate	reticulate
Dierama	robustum	L	59.75	47.75	1.25	Subprolate	reticulate
Engysiphon	longitubus	L	80.75	62.25	1.3	Subprolate	perforate
Galaxia	ovata	L	62.25	47	1.32	Subprolate	reticulate with gemma
Geissorhiza	aspera	M	49.125	46.75	1.05	Prolate spheroidal	reticulate
Geissorhiza	bolusi	M	47.5	34.125	1.39	Prolate	striate-reticulate
Geissorhiza	cedermontana	M	38.625	28.875	1.34	Prolate	reticulate
Geissorhiza	confusa	L	69.875	48.75	1.43	Prolate	reticulate
Geissorhiza	juncea	M	46.5	37.375	1.3	Subprolate	reticulate
Geissorhiza	longifolia	L	59.875	48.5	1.23	Subprolate	perforate
Geissorhiza	louisabolusae	L	56.25	48.125	1.17	Subprolate	perforate
Geissorhiza	parva	M	43.375	30.125	1.44	Prolate	reticulate
Geissorhiza	scillaris	M	40	29.125	1.37	Prolate	reticulate
Geissorhiza	umbrosa	L	61.5	55.25	1.11	Prolate spheroidal	reticulate
Gladiolus	angustus	L	59.75	48.875	1.22	Subprolate	perforate
Gladiolus	carinatus	L	53.625	47.5	1.13	Prolate spheroidal	reticulate
Gladiolus	hyalinus	L	60.5	42.125	1.44	Prolate	reticulate
Gladiolus	inflatus	M	52	40	1.3	Subprolate	reticulate
Gladiolus	iliacus	L	58.875	41.875	1.41	Prolate	perforate
Gladiolus	odoratus	L	57.875	43.75	1.32	Subprolate	reticulate
Gladiolus	pritzellii	L	62.125	46.625	1.33	Prolate	psilate
Gladiolus	scallyi	M	56.5	40	1.41	Prolate	psilate
Gladiolus	tristis	L	67.5	45.5	1.48	Prolate	perforate
Gladiolus	uyssae	L	60.375	40.625	1.49	Prolate	reticulate
Hesperantha	bachmannii	M	34.75	29	1.2	Subprolate	perforate
Hesperantha	elsiae	M	50.5	37.5	1.35	Prolate	reticulate
Hesperantha	falcata	M	41.125	29.875	1.38	Prolate	reticulate
Hesperantha	radiata	M	36.625	29	1.26	Subprolate	psilate

Homeria	cedarmentana	L	65.5	44.125	1.48	Prolate	striate-reticulate
Homeria	cooki	M	61.125	43.25	1.18	Subprolate	reticulate
Homeria	flaccida	L	63.75	55.25	1.15	Subprolate	reticulate
Homeria	flavescens	L	66.375	51	1.34	Prolate	reticulate
Homeria	miniata	L	64.875	51	1.27	Subprolate	reticulate
Homeria	ochroleuca	L	68.25	51.875	1.32	Subprolate	reticulate
Homeria	tenuis	M	45.25	34.75	1.3	Subprolate	reticulate
Ixia	capillaris	M	36.875	24.375	1.51	Prolate	reticulate
Ixia	maculata	M	47.875	32.75	1.46	Prolate	perforate
Ixia	paucifolia	M	54.25	36.5	1.49	Prolate	perforate
Ixia	repunculoides	M	37.375	23	1.63	Prolate	psilate
Ixia	scillaris	M	31.875	22.875	1.39	Prolate	psilate
Lapeirousia	fabricii	L	80.5	46.625	1.73	Prolate	reticulate
Lapeirousia	falcata	M	60.5	38.25	1.58	Prolate	reticulate
Lapeirousia	jacquinii	L	87.75	46.625	1.88	Prolate	perforate
Lapeirousia	micrantha	M	55.75	36.25	1.54	Prolate	psilate
Micranthus	silopecuroidei	M	49.5	43.125	1.15	Subprolate	reticulate
Moraea	anomala	M	61.75	36.75	1.68	Prolate	reticulate
Moraea	Barkeriae	M	53.625	37.625	1.43	Prolate	reticulate
Moraea	edulis	L	60.5	42.75	1.42	Prolate	reticulate
Moraea	fugax	L	59.875	47.625	1.26	Subprolate	reticulate
Moraea	papilionaceae	M	48.75	34.5	1.41	Prolate	reticulate
Moraea	textilis	L	75.125	46.75	1.61	Prolate	reticulate
Moraea	ungulata	M	34.875	23.875	1.46	Prolate	psilate
Romulea	atranda	M	48.25	30.875	1.56	Prolate	reticulate
Romulea	crucata	M	46	30.875	1.49	Prolate	reticulate
Romulea	rosea	L	64.375	40.5	1.59	Prolate	reticulate
Sparaxis	elegans	L	63.875	41.5	1.54	Prolate	perforate
Thereanthus	tracteolius	M	56	36.75	1.52	Prolate	perforate
Tritonia	crispa	L	67.5	42.5	1.59	Prolate	perforate
Tritonia	lineata	L	73.125	53	1.36	Prolate	reticulate
Tritonia	seevigera	L	78.25	52.75	1.45	Prolate	reticulate
Tritoniopsis	nemorosa	L	59.125	41.25	1.43	Prolate	reticulate
Tritoniopsis	nervosa	L	63.5	49	1.3	Subprolate	striate-reticulate
Tritoniopsis	parviflora	M	61.125	34.125	1.79	Prolate	perforate
Tritoniopsis	ramosa	M	49.375	36.25	1.36	Prolate	psilate
Synnolla	variegata	L	66.125	42.25	1.57	Prolate	reticulate
Watsonia	marginata	L	64.75	48.375	1.34	Prolate	perforate
Watsonia	meriana	L	99.5	78.25	1.3	Subprolate	striate-reticulate
Watsonia	sickoei	L	79.125	49.5	1.6	Prolate	perforate
Wiseria	maurz	L	67.75	69.25	1.27	Subprolate	striate-reticulate with gamma

genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornamentation
Aulax	cancelata	M	35.125	39.625	0.89	Oblate spheroidal	perforate
Brabeium	stefatfolium	M	31	21	1.48	Prolate	psilate
Leucodendron	arcuatum	M	43.75	36.125	1.15	Subprolate	psilate

Leucodendron	brunoides	M	34.625	21.875	1.58	Prolate	reticulate
Leucodendron	chamelaea	M	33.75	23.875	1.41	Prolate	psilate
Leucodendron	dubium	M	33.5	22.75	1.47	Prolate	psilate
Leucodendron	glaberrimum	M	31.125	25.375	1.23	Subprolate	psilate
Leucodendron	loranthifolium	M	39.75	29.875	1.33	Prolate	psilate
Leucodendron	nilida	M	36.875	25.875	1.43	Prolate	reticulate
Leucodendron	pubescens	M	32.75	22.75	1.44	Prolate	perforate
Leucodendron	rubrum	M	38.5	26.25	1.47	Prolate	perforate
Leucodendron	salignum	M	29.375	17.375	1.69	Prolate	perforate
Leucodendron	spissifolium	M	26.75	21.625	1.24	Subprolate	reticulate
Leucospermum	calligerum	M	38.75	25.125	1.54	Prolate	reticulate
Leucospermum	reflexum	M	51.875	27.5	1.89	Prolate	striate-reticulate
Leucospermum	truncatulum	M	41	27.25	1.5	Prolate	reticulate
Mimales	hirtus	M	32.625	23.375	1.4	Prolate	psilate
Paranomis	botuli	M	28.5	19	1.5	Prolate	psilate
Paranomis	bracteolaris	M	22.125	14	1.58	Prolate	reticulate
Paranomis	spicatus	M	33	22.375	1.47	Prolate	perforate
Paranomis	tomentosus	M	29.5	20.625	1.43	Prolate	reticulate
Protea	acaulis	M	22.5	18.375	1.37	Prolate	reticulate with raised pole
Protea	acuminata	M	18.625	14.125	1.32	Subprolate	psilate
Protea	angustata	M	22.5	15.125	1.49	Prolate	psilate with indented pole
Protea	caffra	M	27.375	19.75	1.39	Prolate	striate-reticulate
Protea	cynaroides	M	35.125	23	1.53	Prolate	psilate
Protea	glabra	M	21.375	13.25	1.61	Prolate	psilate
Protea	laevis	M	22.625	16.75	1.35	Prolate	psilate with indented pole
Protea	laurifolia	M	26.75	19.75	1.35	Prolate	psilate with indented pole
Protea	nilida	M	21.625	13.375	1.62	Prolate	psilate
Protea	pendula	M	18.75	13.25	1.42	Prolate	psilate
Protea	pityphylla	M	30.625	19.5	1.57	Prolate	psilate with indented pole
Protea	punctata	M	23.875	15.75	1.52	Prolate	psilate
Protea	recondita	M	26.25	17	1.54	Prolate	psilate with indented pole
Protea	repens	M	22.875	16	1.43	Prolate	psilate
Protea	subvestita	M	35.375	24.625	1.44	Prolate	reticulate
Protea	witzenbergiana	M	25.75	16.125	1.6	Prolate	psilate with indented mid
Semuria	aemula	M	37.75	25.875	1.46	Prolate	psilate
Semuria	aitthonii	M	33.25	26.625	1.25	Subprolate	reticulate
Semuria	cygnea	M	30.75	24	1.53	Prolate	psilate
Semuria	furcellata	M	38.375	27.25	1.41	Prolate	reticulate
Semuria	leipoldtii	M	33.375	22.875	1.46	Prolate	reticulate
Semuria	mittelekii	M	31.25	20.75	1.51	Prolate	psilate
Sorocephalus	lanatus	M	24.5	18.75	1.31	Subprolate	reticulate
Spatula	caudata	M	25.125	16.5	1.52	Prolate	psilate
Spatula	confusa	M	24.375	14.375	1.7	Prolate	reticulate
Spatula	incurva	M	21.625	15.75	1.37	Prolate	psilate
Spatula	tubaghensis	M	24.75	17.25	1.43	Prolate	striate-reticulate
genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornamentation

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Cannomois	congesta	M	52	44.625	1.17	Subprolate	rugulate
Cannomois	dregei	M	54	45.375	1.19	Subprolate	reticulate
Cannomois	nilata	M	50	42.875	1.17	Subprolate	perforate
Cannomois	parviflora	M	50.625	42.75	1.18	Subprolate	reticulate
Cannomois	scirpoides	M	44.125	36.25	1.22	Subprolate	reticulate
Cannomois	virgata	M	47.625	34.75	1.37	Prolate	psilate
Chondropetalum	albo-annatum	M	54.875	43.875	1.25	Subprolate	reticulate
Chondropetalum	capitatum	M	49.25	41.5	1.19	Subprolate	rugulate
Chondropetalum	hookerianum	M	38.5	32	1.2	Subprolate	psilate
Chondropetalum	insigne	M	33.125	25.875	1.28	Subprolate	psilate
Chondropetalum	macrocarpum	M	51.125	41.875	1.22	Subprolate	psilate
Chondropetalum	nitidum	M	55.125	44.5	1.24	Subprolate	psilate
Elegia	capensis	M	30.625	26.125	1.17	Subprolate	reticulate
Elegia	neesii	M	38.375	30.75	1.25	Subprolate	reticulate
Elegia	parviflora	M	27.125	26.25	1.03	Prolate spheroidal	reticulate
Hypodiscus	aristatus	M	31.125	24.375	1.28	Subprolate	psilate
Hypodiscus	binatus	M	32.5	25.75	1.26	Subprolate	psilate
Hypodiscus	neesii	M	43.625	30	1.45	Prolate	reticulate
Hypodiscus	squamosus	M	31.5	26.75	1.18	Subprolate	reticulate
Leptocarpus	distichus	M	39.125	33	1.19	Subprolate	reticulate
Restio	bifurcus	L	61.375	44.5	1.38	Prolate	reticulate
Restio	cinnamatus	M	28.5	24.5	1.16	Subprolate	psilate
Restio	curvivalvis	M	40.75	31.375	1.3	Subprolate	psilate
Restio	cuspidatus	M	38.5	32.875	1.17	Subprolate	reticulate
Restio	filiformis	M	42.875	32.875	1.3	Subprolate	reticulate
Restio	fraternus	M	30.125	27.5	1.1	Prolate spheroidal	reticulate
Restio	fruticosus	L	59	47.75	1.24	Subprolate	reticulate
Restio	gaudichaudianus	M	45.25	35.625	1.38	Prolate	reticulate
Restio	gossypinus	M	34	24.75	1.37	Prolate	reticulate
Restio	monanthus	M	40.625	28.125	1.44	Prolate	heterobrochus reticulate
Restio	nanus	M	36.25	28.625	1.27	Subprolate	heterobrochus reticulate
Restio	nodosus	M	45.625	32.375	1.41	Prolate	reticulate
Restio	occultus	M	43.625	34.75	1.26	Subprolate	reticulate
Restio	ocreatus	M	38.375	30	1.28	Subprolate	heterobrochus reticulate
Restio	patens	M	50.25	40.125	1.25	Subprolate	reticulate
Restio	perplexus	M	42.25	39	1.08	Prolate spheroidal	reticulate
Restio	rhodocoma	M	28.5	24.5	1.16	Subprolate	psilate
Restio	rvivulus	M	24	20	1.2	Subprolate	psilate
Restio	sieben sieben	M	31.375	25.5	1.23	Subprolate	reticulate
Restio	sieben venustus	M	38.5	28.75	1.34	Prolate	heterobrochus reticulate
Restio	strobilifer	M	47.875	36.125	1.33	Subprolate	psilate
Restio	trilobus	M	51.5	39.75	1.3	Subprolate	psilate
Restio	tuberculatus	M	46.5	38.5	1.21	Subprolate	reticulate
Restio	wallichii	M	35.125	25.875	1.36	Prolate	heterobrochus reticulate
Thamnocerius	acuminatus	M	36.5	27.375	1.33	Prolate	reticulate

Thamnocortia	bachmanvii	M	34.75	26.375	1.32	Subprolate	reticulate
Thamnocortus	erectus	M	35.675	26.75	1.34	Prolate	reticulate
Thamnocortus	schlechteri	M	36.75	26.25	1.3	Subprolate	reticulate
Wildenowia	affinis	M	49.5	41	1.21	Subprolate	reticulate
Wildenowia	arescens	M	39.5	30.75	1.28	Subprolate	reticulate
Wildenowia	luciwana	M	42.75	34.125	1.25	Subprolate	reticulate
Wildenowia	slokoel	M	44.375	39.5	1.12	Prolate spheroidal	reticulate
Wildenowia	striata	M	34.125	33.125	1.03	Prolate spheroidal	reticulate

genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornamentation
Acmadenia	bockinii	M	30.5	21.75	1.4	Prolate	reticulate
Acmadenia	flaccida	M	45.25	24.375	1.86	Prolate	micro-reticulate
Acmadenia	macradenia	M	31.25	18.875	1.66	Prolate	micro-reticulate
Acmadenia	teretifolia	M	31.75	18.5	1.72	Prolate	echinate
Adenandra	villosa	L	71	44.375	1.6	Prolate	striate-reticulate
Agathosma	alpina	M	39	20.625	1.89	Prolate	striate
Agathosma	atrica	M	30.375	16.125	1.88	Prolate	striate
Agathosma	bisulca	M	24.75	11.75	2.11	Perprolate	perforate
Agathosma	bockinii	M	24.625	12.375	1.99	Prolate	reticulate
Agathosma	craspedota	M	20.75	12.625	1.64	Prolate	micro-reticulate
Agathosma	crenulata	M	29.375	18.875	1.56	Prolate	perforate
Agathosma	divariculata	M	30.125	18.375	1.64	Prolate	micro-reticulate
Agathosma	dregeana	M	27.125	13.25	2.05	Perprolate	striate
Agathosma	giltbergensis	M	27.25	15	1.82	Prolate	striate
Agathosma	krakadouwensis	M	27.625	13.25	2.08	Perprolate	echinate
Agathosma	microcalyx	M	31.375	14.25	2.2	Perprolate	striate
Agathosma	squamosa	M	26.75	14.125	1.89	Prolate	psilate
Agathosma	stibaeoides	M	27	14.875	1.82	Prolate	striate
Clausena	anisata	M	33.25	27	1.23	Subprolate	reticulate
Diosma	acmeophylla	M	38.125	23.875	1.6	Prolate	reticulate
Diosma	hirsuta	M	37.375	25.625	1.46	Prolate	striate-reticulate
Diosma	meyeriana	M	44.5	29.5	1.51	Prolate	striate-reticulate
Euchaetis	alsiae	M	33.375	21.5	1.55	Prolate	striate-reticulate
Euchaetis	glomerulata	M	35.625	41.375	0.86	Suboblate	striate
Euchaetis	longibracteata	M	37	25	1.48	Prolate	striate
Macrostylis	decipiens	M	42.375	25	1.7	Prolate	micro-striate-reticulate
Macrostylis	remulosa	M	40.375	19.875	2.03	Perprolate	micro-striate-reticulate
Macrostylis	squarrosa	M	33.375	19.25	1.73	Prolate	micro-striate-reticulate
Macrostylis	tenuis	M	36.75	18.875	2.05	Perprolate	micro-striate-reticulate
Phytosmi	capensis	M	41	26.375	1.55	Prolate	micro-reticulate

genus	species	Size	Polar diameter	Equatorial diameter	P/E ratio	Shape	ornamentation
Bowkeria	verticillata	M	18.375	17.75	1.04	Prolate spheroidal	reticulate
Chaenostoma	affine	M	17.25	12.875	1.34	Prolate	perforate
Diascia	longloomis	M	20.625	13.625	1.51	Prolate	micro-reticulate
Hemimeris	sabulosa	M	26.625	16.25	1.64	Prolate	reticulate

<i>Izanthis</i>	<i>retzioides</i>	M	14	13.5	1.04	Prolate spheroidal	echinate
<i>Limnolalia</i>	<i>capensis</i>	M	32.5	23.75	1.37	Prolate	reticulate
<i>Manulea</i>	<i>laxa</i>	S	9.5	9	1.06	Prolate spheroidal	psilate
<i>Manulea</i>	<i>rigida</i>	S	9.75	9.625	1.01	Prolate spheroidal	reticulate
<i>Melasma</i>	<i>sessiliflorum</i>	M	28.25	29.625	0.95	Oblate spheroidal	striate-reticulate
<i>Nemisia</i>	<i>barbata</i>	M	25.5	16.75	1.36	Prolate	reticulate
<i>Nemisia</i>	<i>capensis</i>	M	24.125	16.25	1.48	Prolate	reticulate
<i>Nemisia</i>	<i>cheiranthus</i>	M	14	11.25	1.24	Subprolate	psilate
<i>Nemisia</i>	<i>fruticosa</i>	M	15.625	13.5	1.16	Subprolate	reticulate
<i>Nemisia</i>	<i>ligulata</i>	M	20.375	14.875	1.37	Prolate	reticulate
<i>Nemisia</i>	<i>parviflora</i>	M	16.5	14	1.18	Subprolate	reticulate
<i>Ofsia</i>	<i>africana</i>	M	16.5	16.375	1.13	Prolate spheroidal	striate
<i>Phytopodium</i>	<i>cuneifolium</i>	M	19.25	16.875	1.14	Subprolate	reticulate
<i>Polycarona</i>	<i>aurea</i>	M	27.375	25.125	1.09	Prolate spheroidal	reticulate
<i>Polycarona</i>	<i>capensis</i>	M	20.625	19.625	1.05	Prolate spheroidal	reticulate
<i>Polycarona</i>	<i>leipoldii</i>	M	29.125	25.375	1.15	Subprolate	reticulate
<i>Polycarona</i>	<i>rufiflora</i>	M	19	16.625	1.14	Subprolate	reticulate
<i>Selago</i>	<i>corymbosa</i>	M	25.625	21.5	1.19	Subprolate	reticulate
<i>Selago</i>	<i>forbesii</i>	M	20	16.625	1.07	Prolate spheroidal	reticulate
<i>Sopubia</i>	<i>cana</i>	M	40.75	30.75	1.33	Subprolate	reticulate
<i>Sutera</i>	<i>aurantiaca</i>	M	15.5	14	1.11	Prolate spheroidal	striate-reticulate
<i>Sutera</i>	<i>foetida</i>	M	15.625	14.125	1.11	Prolate spheroidal	reticulate
<i>Sutera</i>	<i>halimifolia</i>	M	22	19.25	1.14	Subprolate	reticulate
<i>Sutera</i>	<i>linifolia</i>	M	17.5	13.75	1.27	Subprolate	reticulate
<i>Sutera</i>	<i>pinnatifida</i>	M	19.75	17.5	1.13	Prolate spheroidal	reticulate
<i>Sutera</i>	<i>trialis</i>	M	32	30.125	1.06	Prolate spheroidal	reticulate
<i>Walefrida</i>	<i>paniculata</i>	M	20.625	18	1.15	Subprolate	reticulate
<i>Zaluzianskya</i>	<i>capensis</i>	M	20.875	21.125	0.99	Oblate spheroidal	reticulate

Appendix 2. Showing other variables measured or observed, as stated in the methods section.

genus	species	colpus membrane	Colpi	pori	length of colpi	size μm
izoaceae						
Adenogramma	molluga	s		3	0 long	31.375
Galenia	fruticosa	s		3	0 long	40.25
Galenia	sarcophylla	g		3	0 long	47.875
Limeum	fenestratum	s		3	0 long	37.375
Pharnaceum	elongatum	s		3	0 long	38.875
Pharnaceum	lanatum	s		3	0 long	31.375
Pharnaceum	seryllifolium	s		3	0 long	31.375
Polypoda	capensis	g		3	0 short	39.125
Tetragonia	arbuscula	g		3	0 long	56.125
Tetragonia	robusta	g		3	0 long	64.375

genus	species	notes	colpi size	colpi	pori	size μm
staraceae						
Arctotheca	repens		thin	3	0	38
Arctotis	acaulis		thin	3	0	40
Arctotis	Arctotoides		thin	3	0	51
Arctotis	aspera		thin	3	3	42
Arctotis	leicarpa		thin	3	0	34
Aster	bakerianus		thin	3	0	87
Aster	hisp.	large variation in spines	thin	3	0	77
Athanasia	dregeana		thin	3	3	63
Athanasia	flexuosa	crenentric	thick	3	0	41
Athanasia	linifolia	crenentric	thick	3	0	65
Athanasia	microphylla	crenentric	semi	3	0	47
Athanasia	schizolepis	crenentric	thick	3	0	48
Athrixia	fontana		thin	3	0	69
Athrixia	phylicoides		thin	3	0	55
Berkheya	curdvoides	lophate	thin	3	0	72
Berkheya	discolor		thin	3	3	75
Berkheya	purpurea	lophate	thin	3	0	90
Brachylaena	discolor	geniculum	thin	3	0	77
Callilepis	laureola		thin	3	0	75
Castalis	nudicaulis		thin	3	0	58
Chrysocoma	candelabrum		thin	3	0	38
Chrysocoma	tenuifolia		thin	3	0	51
Cineraria	aspera		thin	3	0	44
Cineraria	lobata		thin	3	0	53
Cineraria	platycarpa		thin	3	3	62
Cineraria	tomentosa		thin	3	3	77
Circium	valgare		thin	3	0	116
Conyza	scubrida		thin	3	0	50
Corymbium	africanum		thin	3	0	60

Corymbium	laxum		thin	3	0	85
Corymbium	villosum		thin	3	3	92
Cotula	heterocarpa		thick	3	0	46
Cotula	turbinata		semi	3	0	45
Dimorphotheca	cuneata		thin			83
Disparago	ericoides		thin	3	3	44
Elytropappus	gnaphaloides		thin	3	3	40
Elytropappus	rhinocerotis		thin	3	3	67
Eriocephalus	africanus	geniculum	semi	3	3	41
Eriocephalus	ericoides		thin	3	3	48
Eriocephalus	eximus		thin	3	0	49
Eriocephalus	racemosus	geniculum	semi	3	3	39
Eriocephalus	spinescens		thin	3	0	49
Euryops	imbricatus		thin	3	0	38
Euryops	lenuissimus		thin	3	0	79
Euryops	othonnoides		thin	3	0	35
Euryops	speciosissimus		thin	3	0	46
Euryops	tagetoides		thin	3	0	40
Euryops	virginicus		thin	3	0	59
Euryops	wagneri		thin	3	3	49
Felicia	amelloides		thin	3	3	57
Felicia	amoena		thin	3	0	39
Felicia	cymbalariae		thin	3	0	37
Felicia	ferculacea		thin	3	0	41
Felicia	filifolia		thin	3	0	58
Felicia	hispida		thin	3	0	43
Felicia	scabra		thin	3	0	44
Felicia	tenella		thin			29
Garleum	hippinatum		thin	0	3	56
Gazania	durineifolia	lophate	thin	0	0	103
Gazania	krebsiana	lophate	thin	0	0	86
Gazania	lichtensteinii	lophate	thin	0	0	74
Geigeria	africana		thin	3	3	68
Geigeria	ornativa		thin	3	3	57
Gnaphalium	luteo-album		thin	3	0	41
Gnaphalium	undulatum		thin	3	0	48
Gynodiscus	capillaris		thin	3	0	29
Helichrysum	aregeanum		thin	3	0	43
Helichrysum	argyrophyllum	geniculum	semi	3	0	51
Helichrysum	cylindrifolium		thin	3	0	32
Helichrysum	cymosum		thin	3	0	45
Helichrysum	foetidum		thin	3	0	43
Helichrysum	helianthemifolium		thin	3	0	44
Helichrysum	glomeratum		thin	3	0	53
Helichrysum	lucoides		thin	3	0	50
Helichrysum	miconifolium		thin	3	0	55

Helichrysum	odoratissimum		thin	3	3	44
Helichrysum	rosum		thin	3	3	48
Helichrysum	rugulosum		thin	3	0	42
Helichrysum	rutilans		thin	3	0	30
Helichrysum	setosum	geniculum	semi	3	0	66
Helichrysum	sqamosum		thin	3	0	60
Helichrysum	subglomeratum		thin	3	0	47
Helichrysum	teretifolium		thin	3	0	31
Helichrysum	tinctum		thin	3	0	33
Helichrysum	zeyheri		thin	3	0	48
Helipterum	canescens		thin	3	3	51
Helipterum	dregeanum		thin	3	3	61
Helipterum	flavum		thin	3	3	60
Helipterum	variegatum		thin			53
Hertia	alata		thin	3	3	61
Hippia	pilosa	geniculum	thick	3	3	39
Hirpicum	alienatum	lophate	thin	0	0	101
Lachnospermum	ericoides		thin	3	3	46
Lasiospermum	pedunculare		thin	3	3	39
Leysera	gnaphaloides		thin	3	3	41
Lidbeckia	lobata	geniculum	semi	3	3	41
Macowania	glandulosa		thin	3	3	73
Mairea	ecklonis		thin	3	3	38
Mairea	microcephalus		thin	3	0	38
Mairea	perezoides		thin	3	0	40
Metalasia	cephalotes		thin	3	0	46
Metalasia	seriphilifolia		thin	3	0	45
Microglossa	mespilifolia		thin	3	0	56
Microglossa	pyrifolia		thin	3	0	56
Osteospermum	amplectens		thin	3	3	47
Osteospermum	calendulaceum		thin	3	3	58
Osteospermum	grandiflorum		thin	3	3	50
Osteospermum	imbricatum		thin	3	0	47
Osteospermum	microphyllum		thin	3	3	48
Osteospermum	polygaloides		thin	3	0	44
Osteospermum	scariosum		thin	3	3	49
Osteospermum	sinuatum		thin	3	3	57
Osteospermum	spinescens		thin	3	3	53
Otthonia	alata		thin	3	3	42
Otthonia	alba		thin	3	3	40
Otthonia	auriculifolia		thin	3	3	40
Otthonia	ericocarpa		thin	3	3	60
Otthonia	furcata		thin	3	3	42
Otthonia	humilis	geniculum	semi	3	3	44
Otthonia	multicaulis		thin	3	3	37
Otthonia	pavonia		thin	3	3	51

Pentzia	calcareae	geniculum	semi	3	0	37
Pentzia	incana	geniculum	thick	3	3	47
Pentzia	punctata	geniculum	semi	3	0	65
Pentzia	quinquefolia	geniculum	thick	3	0	47
Pentzia	spinescens	geniculum	thick	3	3	51
Phymaspermum	parvifolium	geniculum	semi	3	3	59
Plecostachys	polifolia		thin	3	0	42
Pteronia	aspalatha		thin	3	0	47
Pteronia	camporata		thin	3	3	50
Pteronia	divaricata		thin	3	0	55
Pteronia	glomerata		thin	3	0	74
Pteronia	incana		thin	3	0	107
Pteronia	membranaceae		thin	3	0	76
Pteronia	patens		thin	3	0	51
Pseudographallum	undulatum		thin	3	0	29
Rhelhania	calycina		thin	3	3	48
Rhelhania	corymbosa		thin	3	3	40
Rhelhania	pumila		thin	3	3	37
Rhelhania	sedifolia		thin	3	3	43
Rosenia	humilis		thin	3	3	59
Rosenia	oppositifolia		thin	3	0	70
Rosenia	spinescens		thin	3	3	52
Senecio	amabilis		thin	3	0	39
Senecio	angulatus		thin	3	3	79
Senecio	angustifolius		thin	3		48
Senecio	articulatus		thin	3	0	83
Senecio	asperulus		thin	3	0	77
Senecio	brevidentatus		thin	3	0	66
Senecio	bupleuroides		thin	3	0	76
Senecio	conc.		thin	3	0	68
Senecio	cotyledonis		thin	3	0	64
Senecio	eribasis		thin	3	0	46
Senecio	erosus		thin	3	3	48
Senecio	erubescens		thin	3	3	57
Senecio	grandiflorus		thin	3	0	39
Senecio	haworthii		thin	3	3	38
Senecio	longifolius		thin	3	3	63
Senecio	madagascarenensis		thin	3	0	52
Senecio	nupifolius		thin	3	0	74
Senecio	paniculatus		thin	3	0	38
Senecio	pinnulatus		thin	3	0	53
Senecio	pterochorus		thin	3	0	59
Senecio	speciosus		thin	3	0	70
Senecio	sophioides		thin	3	0	38
Stilpnophytum	linifolium	geniculum	thick	3	0	63
Stoebe	intricata		thin	3	3	44

Stoebe	leucocephala		thin	3	0	65
Stoebe	vulgare		thin	3	0	62
Tagetes	minata		thin	3	0	62
Tarhonanthus	camphoratus		thin	3	0	80
Ursinia	anthermoides		thin	3	3	41
Ursinia	nana		thin	0	3	44
Ursinia	punctata		thin	3	3	42
Ursinia	rigidula		thin	0	3	42
Ursinia	serica		thin	3	3	41
Ursinia	subfloculosa		thin	3	3	48
Veridium	decurrens		thin	3	0	49
Vernonia	anisochaetoides		thin	3	3	73
Vernonia	capensis	lophate	thin	3	0	81

genus	species	cata-ulcer	ventral-cryptocolpi	distinctness	size μm
peraceae					
Bulbosylis	burchellii		1	0	71.3
Carex	zuluensis		1	3	anisopolar colpi 92.3
Carpha	bracteosa		1	3	isopolar colpi 87.8
Carpha	glomerata		1	3	isopolar colpi 95
Chrysithrix	dodii		1	0	103
Chrysithrix	capensis		1	0	91
Chrysithrix	junciformis		1	0	98.5
Cyperus	compactus		1	2	isopolar colpi 85
Cyperus	esculentus		1	3	isopolar colpi 67.3
Cyperus	fastigatus		1	5	isopolar colpi 58.3
Cyperus	longus		1	3	isopolar colpi 54.3
Cyperus	rupestris		1	3	isopolar colpi 83.5
Cyperus	sphaerospermus		1	3	isopolar colpi 41.5
Cyperus	tenellus		1	0	54.3
Epischoenus	adnatus		1	0	90.8
Ficinia	acuminata		1	0	65.5
Ficinia	anceps		1	0	66.5
Ficinia	argyrolopa		1	4-5	anisopolar colpi 83.5
Ficinia	brevifolia		1	4	anisopolar colpi 62
Ficinia	bulbosa		1	4	anisopolar colpi 68.8
Ficinia	capitella		1	4	anisopolar colpi 68
Ficinia	cinnamomea		1	4	anisopolar colpi 59.8
Ficinia	elongata		1	4	isopolar colpi 69
Ficinia	fascicularis		1	0	58.5
Ficinia	filiformis		1	0	58.3
Ficinia	gracilis		1	0	85.8
Ficinia	gracilis		1	0	64

Ficinia	gracilis	1	0		79.3
Ficinia	gydomoniana	1	0		82.3
Ficinia	indica	1	3	anisopolar colpi	67
Ficinia	ixioides	1	0		77.3
Ficinia	micrantha	0	0		59
Ficinia	nigrescens	1	3-4	isopolar colpi	70
Ficinia	secunda	1	5	anisopolar colpi	69.8
Ficinia	striata	1	4	anisopolar colpi	75.3
Fuirena	coerulescens	1	0		91.3
Fuirena	hirsuta	1	0		89.5
Isolepis	prolifer	1	0		65
Juncellus	laevigatus	1	3	isopolar colpi	67.5
Macrochaetium	ecklonii	1	0		91.3
Mariscus	congestus	1	0		52.8
Cyperus	rupestris	1	4	isopolar colpi	76.8
Cyperus	papyrus	1	3	isopolar colpi	55.3
Pycreus	polystachyus	1	4	isopolar colpi	51.3
Scleria	bulbifera	1	3	isopolar colpi	77.5
Scleria	woodii	1	0		60
Seirpus	modosus	1	3	anisopolar colpi	70.3
Tetraria	comper	1	3	isopolar colpi	80.3
Tetraria	crinifolia	1	3	isopolar colpi	83
Tetraria	cuspidata	1	3	isopolar colpi	98.3
Tetraria	fasciata	1	3	anisopolar colpi	133
Tetraria	ferruginea	1	3	anisopolar colpi	101
Tetraria	fourcadei	1	3	isopolar colpi	141
Tetraria	maculata	1	3	isopolar colpi	112
Tetraria	picta	1	3-4	isopolar colpi	93
Tetraria	pubescens	1	3	isopolar colpi	78
Tetraria	ustulata	1	3	anisopolar colpi	176
Tetraria	vaginata	1	3	isopolar colpi	96.3

genus	species	monad-tetrad	notes	colpi	pori	amb	size μm
aceae							
Erica	gracilis	monad	geniculate	3	3	hexagonal	33
Annesorhiza	filicaulis	monad	geniculate	3	3	circular	33
Blaeria	ericoides	monad	ageniculate	3	3	hexagonal	34
Erica	recurvata	monad	geniculate	3	3	hexagonal	24
Erica	acuta	tetrad	coaperturate	4	0	circular	49
Erica	articularis	tetrad	coaperturate	4	4	circular	73
Erica	bergiana	tetrad	coaperturate	4	4	circular	63
Erica	bruniades	tetrad	coaperturate	4	4	triangular	67
Erica	calycina	tetrad	coaperturate	4	4	triangular	68
Erica	cemua	tetrad	coaperturate	4	0	circular	70
Erica	chamissonis	tetrad	coaperturate	4	0	triangular	72
Erica	corifolia	tetrad	coaperturate	4	4	bulbous	73
Erica	copiosa	tetrad	coaperturate	4	0	bulbous	54
Erica	crisiflora	tetrad	coaperturate	3	0	bulbous	60
Erica	curviflora	tetrad	coaperturate	4	0	circular	73
Erica	daphniflora	tetrad	coaperturate	4	0	circular	67
Erica	eugenea	tetrad	coaperturate	4	4	circular	97
Erica	haematosiphon	tetrad	coaperturate	3	0	bulbous	72
Erica	hirtiflora	tetrad	coaperturate	4	4	circular	60
Erica	humifusa	tetrad	coaperturate	4	0	bulbous	47
Erica	junonia	tetrad	non coaperturate	6	0	triangular	70
Erica	lucida	tetrad	coaperturate	4	4	circular	57
Erica	lutea	tetrad	coaperturate	4	0	circular	66
Erica	maderi	tetrad	coaperturate	4	0	bulbous	65
Erica	monsoniana	tetrad	coaperturate	4	4	circular	81
Erica	nubigena	tetrad	coaperturate	4	4	circular	66
Erica	nudiflora	monad	ageniculate	3	0	circular	65
Erica	philippoides	tetrad	coaperturate	4	4	bulbous	44
Erica	rubiginosa	tetrad	coaperturate	4	4	triangular	69
Erica	senilis	tetrad	coaperturate	4	4	circular	68
Erica	subdulata	tetrad	coaperturate	4	0	circular	88
Erica	thunderbergii	monad	geniculate	3	0	hexagonal	36
Erica	tumida	tetrad	coaperturate	4	4	bulbous	77
Erica	verecunda	tetrad	coaperturate	4	0	bulbous	49
Erica	woodii	tetrad	coaperturate	4	0	bulbous	48
Sebachia	ciliaris	monad	geniculate	3	3	hexagonal	35

genus	species	in polyad	colpl	pori	distinctness	notes	µm
Fabaceae							
Acacia	karoo	16	0	0			87
Acacia	longifolia	16	0	0			88
Acacia	mearnsii	16	0	0			83
Acacia	saligna	16	0	0			##
Alysicarpus	rugosus	1	0	3	tri-angulaperfurate	nongeniculate	82
Argyrolobium	pauciflorum	1	3	0	tri-zonocolpate	geniculate	53
Argyrolobium	speciosum	1	3	0	tri-zonocolpate	geniculate	48
Argyrolobium	sutherlandii	1	3	3	tri-zonocolporate	geniculate	58
Argyrolobium	tuberosum	1	3	0	tri-zonocolpate	geniculate	53
Argyrolobium	tumentosum	1	3	0	tri-zonocolpate	geniculate	45
Aspalathus	altissima	1	3	0	tri-zonocolpate	demicolpate	40
Aspalathus	bodkinii	1	3	0	tri-zonocolpate	demicolpate	30
Aspalathus	bracteata	1	3	0	tri-zonocolpate	geniculate	40
Aspalathus	costulata	1	3	0	tri-zonocolpate	geniculate	40
Aspalathus	divaricata	1	3	0	tri-zonocolpate	geniculate	34
Aspalathus	flexuosa	1	3	0	tri-zonocolpate	geniculate	34
Aspalathus	galeata	1	3	0	tri-zonocolpate	geniculate	49
Aspalathus	hirta	1	3	0	tri-zonocolpate	geniculate	42
Aspalathus	hispida	1	3	0	tri-zonocolpate	geniculate	28
Aspalathus	lanata	1	3	0	tri-zonocolpate	geniculate	36
Aspalathus	lanceifolia	1	3	0	tri-zonocolpate	geniculate	38
Aspalathus	lanifera	1	3	0	tri-zonocolpate	geniculate	41
Aspalathus	linearis	1	3	0	tri-zonocolpate	geniculate	37
Aspalathus	polycephala	1	3	0	tri-zonocolpate	geniculate	34
Aspalathus	quinqifolia	1	3	0	tri-zonocolpate	geniculate	46
Aspalathus	spicata	1	3	0	tri-zonocolpate	geniculate	41
Aspalathus	spinosissima	1	3	0	tri-zonocolpate	geniculate	41
Aspalathus	tridentata	1	3	0	tri-zonocolpate	geniculate	33
Aspalathus	triquetra	1	3	0	tri-zonocolpate	nongeniculate	43
Aspalathus	vulneraris	1	3	0	tri-zonocolpate	geniculate	39
Aspalathus	wormbeana	1	3	0	tri-zonocolpate	geniculate	34
Buchenroedera	multiflora	1	3	0	tri-zonocolpate	geniculate	36
Calpurnia	aura	1	3	0	tri-zonocolpate	geniculate	38
Cassia	longiracemosa	1	3	0	tri-zonocolpate	demicolpate	67
Cassia	occidentalis	1	3	0	tri-zonocolpate	geniculate	97
Coelidium	cedarbergiensis	1	3	0	tri-zonocolpate	geniculate	42
Coelidium	villosum	1	3	0	tri-zonocolpate	geniculate	37
Dolichos	buchanii	1	3	0	tri-zonocolpate	geniculate	83
Entada	spicata	16	0	0			65
Eriosema	glomeratum	1	0	3	tri-zonoporate	geniculate	58
Indigofera	adenoides	1	3	0	tri-zonocolpate	geniculate	44
Indigofera	amoena	1	3	0	tri-zonocolpate	geniculate	56
Indigofera	hombelii	1	3	0	tri-zonocolpate	geniculate	94
Indigofera	sessifolia	1	3	0	tri-zonocolpate	geniculate	46
Lebeckia	cytisoides	1	3	0	tri-zonocolpate	geniculate	35
Lebeckia	simsiana	1	3	0	tri-zonocolpate	geniculate	32
Lessertia	perennans	1	3	3	tri-zonocolporate	geniculate	55
Lessertia	physodes	1	3	3	tri-zonocolporate	geniculate	52

Latononis	corymbosa	1	3	0	tri-zonocolpate	demicolpate	48
Latononis	humifusa	1	3	0	tri-zonocolpate	geniculate	62
Melolobium	candicans	1	3	0	tri-zonocolpate	demicolpate	58
Melolobium	microphyllum	1	3	0	tri-zonocolpate	demicolpate	60
Melolobium	obcordatum	1	3	0	tri-zonocolpate	geniculate	55
Newtonia	hildebrandtii	1	3	0	tri-zonocolpate	demicolpate	65
Podalyria	pearsonii	1	3	0	tri-zonocolpate	demicolpate	36
Priestleya	umbellifera	1	3	0	tri-zonocolpate	geniculate	39
Prosopis	glandulosa	1	3	3	tri-zonocolporate	geniculate	70
Psoralea	aphylla	1	3	3	tri-zonocolporate	nongeniculate	56
Psoralea	oligophylla	1	3	3	tri-zonocolporate	nongeniculate	56
Psoralea	pinnata	1	3	3	tri-zonocolporate	nongeniculate	71
Psoralea	triantha	1	3	3	tri-zonocolporate	nongeniculate	50
Rafnia	ampleicaulis	1	3	0	tri-zonocolpate	demicolpate	33
Rafnia	capensis	1	3	0	tri-zonocolpate	geniculate	34
Rafnia	opposita	1	3	0	tri-zonocolpate	demicolpate	28
Rafnia	spicata	1	3	0	tri-zonocolpate	nongeniculate	29
Rafnia	triflora	1	3	0	tri-zonocolpate	geniculate	36
Rhyncosia	ciliata	1	3	0	tri-zonocolpate	geniculate	77
Sesbania	dummeri	1	3	0	tri-zonocolpate	geniculate	78
Sesbania	greenwayi	1	3	0	tri-zonocolpate	geniculate	63
Tephrosia	capensis	1	3	0	tri-zonocolpate	nongeniculate	68
Tephrosia	linearis	1	3	0	tri-zonocolpate	geniculate	90
Trifolium	burchellianum	1	3	0	tri-zonocolpate	geniculate	81
Vicia	sativa	1	3	3	tri-zonocolporate	nongeniculate	57
Wiborgia	sericea	1	3	0	tri-zonocolpate	nongeniculate	35
Wiborgia	tetraptia	1	3	0	tri-zonocolpate	geniculate	30

genus	species	type of aperture	colpi	pori	size of colpi	size μm
Iridaceae						
Anapalina	nervosa	monocolpus		1	0 large colpi	108.875
Aristea	africana	monocolpus		1	0 large colpi	83.25
Aristea	capitata	monocolpus		1	0 large colpi	111.375
Aristea	cuspidata	monocolpus		1	0 medium colpi	80.375
Aristea	oligocephala	Spiraperturate		1	0	93.25
Babiana	disticha	monocolpus		1	0 large colpi	123
Babiana	ecklonii	monocolpus		1	0 large colpi	113
Babiana	pillosa	monocolpus		1	0 large colpi	104.125
Babiana	plicata	monocolpus		1	0 large colpi	125.625
Babiana	sambucina	monocolpus		1	0 large colpi	87.5
Babiana	scabrifolia	monocolpus		1	0 large colpi	112

Bobartia	macrospatha	monocolpus	1	0	large colpi	80.5
Dierama	pansum	monocolpus	1	0	large colpi	99.25
Dierama	pendula	monocolpus	1	0	large colpi	143.25
Dierama	robustum	monocolpus	1	0	large colpi	107.5
Engysiphon	longetubus	monocolpus	1	0	large colpi	143
Galaxia	ovata	monocolpus	1	0	large colpi	109.25
Geissorhiza	aspera	monocolpus	1	0	large colpi	95.875
Geissorhiza	bolusii	syn-dicolpus	2	0	thin colpi	81.625
Geissorhiza	cedamontana	monocolpus	1	0	thin colpi	67.5
Geissorhiza	confusa	monocolpus	1	0	large colpi	118.625
Geissorhiza	juncea	monocolpus	1	0	thin colpi	85.875
Geissorhiza	longifolia	monocolpus	1	0	large colpi	108.375
Geissorhiza	louisabolusae	monocolpus	1	0	large colpi	104.375
Geissorhiza	parva	monocolpus	1	0	large colpi	73.5
Geissorhiza	scillaris	monocolpus	1	0	large colpi	69.125
Geissorhiza	umbrosa	monocolpus	1	0	large colpi	116.75
Gladiolus	angustus	monocolpus	1	0	large colpi	108.625
Gladiolus	carinatus	monocolpus	1	0	large colpi	101.125
Gladiolus	hyalinus	monocolpus	1	0	large colpi	102.625
Gladiolus	inflatus	monocolpus	1	0	large colpi	92
Gladiolus	liliaceus	monocolpus	1	0	large colpi	100.75
Gladiolus	odoratus	monocolpus	1	0	large colpi	101.625
Gladiolus	pritzelii	monocolpus	1	0	large colpi	108.75
Gladiolus	scullyi	monocolpus	1	0	large colpi	96.5
Gladiolus	tristis	monocolpus	1	0	large colpi	113
Gladiolus	uysiae	monocolpus	1	0	large colpi	101
Hesperantha	bachnannii	monocolpus	1	0	large colpi	63.75
Hesperantha	elsiae	monocolpus	1	0	large colpi	88
Hesperantha	falcata	monocolpus	1	0	large colpi	71
Hesperantha	radiata	monocolpus	1	0	large colpi	65.625
Homeria	cedamontana	monocolpus	1	0	large colpi	109.625
Homeria	cookii	monocolpus	1	0	large colpi	94.375
Homeria	flaccida	monocolpus	1	0	large colpi	119
Homeria	flavescens	monocolpus	1	0	large colpi	119.375
Homeria	miniata	monocolpus	1	0	large colpi	115.875
Homeria	ochroleuca	monocolpus	1	0	large colpi	120.125
Homeria	tenuis	monocolpus	1	0	large colpi	80
Ixia	capillaris	monocolpus	1	0	thin colpi	61.25
Ixia	maculata	monocolpus	1	0	large colpi	80.625
Ixia	paucifolia	monocolpus	1	0	large colpi	90.75
Ixia	rapunculoides	monocolpus	1	0	large colpi	60.375
Ixia	scillaris	monocolpus	1	0	large colpi	54.75
Lapeirousia	fabricii	monocolpus	1	0	large colpi	127.125
Lapeirousia	falcata	monocolpus	1	0	large colpi	98.75
Lapeirousia	jacquinii	monocolpus	1	0	large colpi	134.375
Lapeirousia	micrantha	monocolpus	1	0	large colpi	92

Micranthus	alopecuroides	monocolpus	1	0	large colpi	92.625
Moraea	anomala	monocolpus	1	0	large colpi	98.5
Moraea	Barkeriae	monocolpus	1	0	large colpi	91.25
Moraea	edulis	monocolpus	1	0	large colpi	103.25
Moraea	fugax	monocolpus	1	0	large colpi	107.5
Moraea	papilionaceae	monocolpus	1	0	large colpi	83.25
Moraea	textilis	monocolpus	1	0	large colpi	121.875
Moraea	unguilata	monocolpus	1	0	large colpi	58.75
Romulae	atranda	monocolpus		0	large colpi	79.125
Romulae	cruciata	monocolpus	1	0	large colpi	76.875
Romulae	rosea	monocolpus	1	0	large colpi	104.875
Sparaxis	elegans	monocolpus	1	0	large colpi	105.375
Thereianthus	bracteolatus	monocolpus	1	0	large colpi	92.75
Tritonia	crispa	monocolpus	1	0	large colpi	110
Tritonia	lineata	monocolpus	1	0	large colpi	126.125
Tritonia	seavigera	monocolpus	1	0	large colpi	129
Tritoniopsis	nemorosa	monocolpus	1	0	large colpi	100.375
Tritoniopsis	nervosa	monocolpus	1	0	large colpi	112.5
Tritoniopsis	parviflora	monocolpus	1	0	large colpi	95.25
Tritoniopsis	ramosa	monocolpus	1	0	large colpi	85.625
Synnotia	variegata	monocolpus	1	0	large colpi	108.375
Watsonia	marginata	monocolpus	1	0	large colpi	113.125
Watsonia	meriana	monocolpus	1	0	large colpi	175.75
Watsonia	stokoei	monocolpus	1	0	large colpi	128.625
Witsenia	maura	monocolpus	1	0	closed colpi	157

genus	species	ornamentation	colpi	pori	distinctness	notes	size µm
leaceae							
Aulax	cancellata	perforate	0	3	triangulaporate		75
Brabeium	stellatifolium	psilate	0	3	triangulaporate		52
Leucodendron	arcuatum	psilate	0	3	triangulaporate		82
Leucodendron	brunioides	reticulate	0	3	triangulaporate		57
Leucodendron	chamelaea	psilate	0	3	triangulaporate		58
Leucodendron	dubium	psilate	0	3	triangulaporate		56
Leucodendron	glaberrimum	psilate	0	3	triangulaporate		57
Leucodendron	loranthifolium	psilate	0	3	triangulaporate		70
Leucodendron	nitida	reticulate	0	3	triangulaporate		63
Leucodendron	pubescens	perforate	0	3	triangulaporate	projectate	56
Leucodendron	rubrum	perforate	0	3	triangulaporate		65
Leucodendron	salignum	perforate	0	3	triangulaporate	projectate	47
Leucodendron	spissifolium	reticulate	0	3	triangulaporate		48
Leucospermum	calligerum	reticulate	0	3	triangulaporate	projectate	64
Leucospermum	reflexum	striate-reticulate	0	3	triangulaporate	projectate	79

Leucospermum	truncatum	reticulate	0	3	triangulaporate	projectate	68
Mimotes	hirtus	psilate	0	3	triangulaporate		56
Paranomis	bolusii	psilate	0	3	triangulaporate		48
Paranomis	bracteolaris	reticulate	0	3	triangulaporate		36
Paranomis	spicatus	perforate	0	3	triangulaporate		55
Paranomis	tomentosus	reticulate	0	3	triangulaporate		50
Protea	acaulos	reticulate with raised pole	3	0	triangulacolate		39
Protea	acuminata	psilate	0	3	triangulaporate		33
Protea	angustata	psilate with indented pole	3	3	triangulacolate		38
Protea	caffra	striate-reticulate	0	3	triangulaporate		47
Protea	cynaroides	psilate	0	3	triangulaporate		58
Protea	glabra	psilate	0	3	triangulaporate		35
Protea	laevis	psilate with indented pole	0	3	triangulaporate		39
Protea	laurifolia	psilate with indented pole	0	3	triangulaporate		47
Protea	nitida	psilate	0	3	triangulaporate		35
Protea	pendula	psilate	3	3	triangulacolate		32
Protea	pityphylla	psilate with indented pole	0	3	triangulaporate		50
Protea	punctata	psilate	0	3	triangulaporate		40
Protea	recondita	psilate with indented pole	0	3	triangulaporate		43
Protea	repens	psilate	3	3	triangulacolate		39
Protea	subvestita	reticulate	0	3	triangulaporate		60
Protea	witzenbergiana	psilate with indented middle	0	3	triangulaporate		42
Serruria	aemula	psilate	0	3	triangulaporate		64
Serruria	aithonii	reticulate	0	3	triangulaporate		60
Serruria	cygnea	psilate	0	3	triangulaporate		61
Serruria	furcellata	reticulate	0	3	triangulaporate		66
Serruria	leipoldtii	reticulate	0	3	triangulaporate	projectate	56
Serruria	millefolia	psilate	0	3	triangulaporate		52
Sorocephalus	lanatus	reticulate	0	3	triangulaporate		43
Spatalla	caudata	psilate	0	3	triangulaporate		42
Spatalla	confusa	reticulate	0	3	triangulaporate		39
Spatalla	incurva	psilate	0	3	triangulaporate		37
Spatalla	tulbaghensis	striate-reticulate	0	3	triangulaporate		42

genus	species	ornamentation	annulus	ulcus	ulcus membrane	size μm
Restionaceae						
Cannomois	congesta	rugulate	thick	1	smooth	96.625
Cannomois	dregei	reticulate	thick	1	smooth	99.375
Cannomois	nitida	perforate	thick	1	smooth	92.875
Cannomois	parviflora	reticulate	thick	1	smooth	93.375
Cannomois	scirpoides	reticulate	thin	1	smooth	80.375
Cannomois	virgata	psilate	thin	1	smooth	82.375
Chondropetalum	albo-aristatum	reticulate	thick	1	granules	98.75
Chondropetalum	capitatum	rugulate	thick	1	smooth	90.75

Chondropetalum	hookerianum	psilate	thick	1	smooth	70.5
Chondropetalum	insigne	psilate	thick	1	smooth	59
Chondropetalum	macrocarpum	psilate	thin	1	granules	93
Chondropetalum	nitidum	psilate	thin	1	granules	99.625
Elegia	capensis	reticulate	thin	1	smooth	56.75
Elegia	neesii	reticulate	thick	1	smooth	69.125
Elegia	parviflora	reticulate	thick	1	smooth	53.375
Hypodiscus	aristatus	psilate	thick	1	smooth	55.5
Hypodiscus	binatus	psilate	thick	1	smooth	58.25
Hypodiscus	neesii	reticulate	thick	1	smooth	73.625
Hypodiscus	squamosus	reticulate	thick	1	smooth	58.25
Leptocarpus	distichus	reticulate	thick	1	smooth	72.125
Restio	bifurcus	reticulate	thin	1	smooth	105.875
Restio	cincinnatus	psilate	thin	1	smooth	53
Restio	curviramis	psilate	thick	1	smooth	72.125
Restio	cuspidatus	reticulate	thin	1	smooth	71.375
Restio	filiformis	reticulate	thick	1	smooth	75.75
Restio	fraternus	reticulate	thick	1	smooth	57.625
Restio	fruticosus	reticulate	thick	1	granules	106.75
Restio	gaudichaudianus	reticulate	thin	1	smooth	84.875
Restio	gossypinus	reticulate	thin	1	smooth	58.75
Restio	monanthus	heterobrochus reticulate	thick	1	smooth	68.75
Restio	nanus	heterobrochus reticulate	thin	1	smooth	64.875
Restio	nodosus	reticulate	thick	1	smooth	78
Restio	occultus	reticulate	thin	1	granules	78.375
Restio	ocreatus	heterobrochus reticulate	thin	1	smooth	68.375
Restio	patens	reticulate	thick	1	granules	90.375
Restio	perplexus	reticulate	thick	1	smooth	81.25
Restio	rhodocoma	psilate	thick	1	smooth	53
Restio	rivulus	psilate	thick	1	smooth	44
Restio	sieberi sieberi	reticulate	thin	1	smooth	56.875
Restio	sieberi venustulus	heterobrochus reticulate	thin	1	smooth	67.25
Restio	strobilifer	psilate	thick	1	granules	84
Restio	triticeus	psilate	thick	1	smooth	91.25
Restio	tuberculatus	reticulate	thick	1	smooth	85
Restio	wallichii	heterobrochus reticulate	thick	1	smooth	61
Thamnocortus	acuminatus	reticulate	thin	1	granules	63.875
Thamnocortus	bachmannii	reticulate	thin	1	smooth	61.125
Thamnocortus	erectus	reticulate	thin	1	smooth	62.625
Thamnocortus	schlechteri	reticulate	thin	1	granules	65
Willdenowia	affinis	reticulate	thick	1	granules	90.5
Willdenowia	arescens	reticulate	thick	1	smooth	70.25
Willdenowia	lucaeana	reticulate	thick	1	granules	76.875
Willdenowia	stokoei	reticulate	thick	1	smooth	83.875
Willdenowia	striata	reticulate	thin	1	granules	67.25

genus	species	ornamentation	exocolpi	endocolpi	size μm
Rutaceae					
<i>Acmadenia</i>	<i>bodkinii</i>	reticulate	3	3	52.3
<i>Acmadenia</i>	<i>flaccida</i>	micro-reticulate	3	3	69.6
<i>Acmadenia</i>	<i>macradenia</i>	micro-reticulate	3	3	50.1
<i>Acmadenia</i>	<i>teretifolia</i>	echinate	3	3	50.3
<i>Adenandra</i>	<i>villosa</i>	striate-reticulate	4	0	115
<i>Agathosma</i>	<i>alpina</i>	striate	3	3	59.6
<i>Agathosma</i>	<i>alticola</i>	striate	3	3	46.5
<i>Agathosma</i>	<i>bisulca</i>	perforate	3	3	36.5
<i>Agathosma</i>	<i>bodkinii</i>	reticulate	3	3	37
<i>Agathosma</i>	<i>craspedota</i>	micro-reticulate	3	3	33.4
<i>Agathosma</i>	<i>crenulata</i>	perforate	3	3	48.3
<i>Agathosma</i>	<i>divariculata</i>	micro-reticulate	3	3	48.5
<i>Agathosma</i>	<i>dregeana</i>	striate	3	3	40.4
<i>Agathosma</i>	<i>giftbergensis</i>	striate	3	3	42.3
<i>Agathosma</i>	<i>krakadouwensis</i>	echinate	3	3	40.9
<i>Agathosma</i>	<i>microcalyx</i>	striate	3	3	45.6
<i>Agathosma</i>	<i>squamosa</i>	psilate	3	3	40.9
<i>Agathosma</i>	<i>stilbecoides</i>	striate	3	3	41.9
<i>Clausena</i>	<i>anisata</i>	reticulate	3	3	60.3
<i>Diosma</i>	<i>acnaephylla</i>	reticulate	3	3	62
<i>Diosma</i>	<i>hirsuta</i>	striate-reticulate	3	3	63
<i>Diosma</i>	<i>meyeriana</i>	striate-reticulate	3	3	74
<i>Euchaetis</i>	<i>elsieae</i>	striate-reticulate	3	3	54.9
<i>Euchaetis</i>	<i>glomerulata</i>	striate	3	3	77
<i>Euchaetis</i>	<i>longibracteata</i>	striate	3	3	62
<i>Macrostylis</i>	<i>deciplens</i>	micro-striate-reticulate	3	3	67.4
<i>Macrostylis</i>	<i>ramulosa</i>	micro-striate-reticulate	3	3	60.3
<i>Macrostylis</i>	<i>squarrosa</i>	micro-striate-reticulate	3	3	52.6
<i>Macrostylis</i>	<i>tenuis</i>	micro-striate-reticulate	3	3	57.6
<i>Phyllosma</i>	<i>capensis</i>	micro-reticulate	3	3	67.4

genus	species	colpous membrane	colpi	endocolpi	notes	size μm
Scrophulariaceae						
<i>Bowkeria</i>	<i>verticillata</i>	s	3	0	geniculate	36.125
<i>Chaenostoma</i>	<i>affine</i>	s	3	0	geniculate	30.125
<i>Diascia</i>	<i>longicornis</i>	s	7	0		34.25
<i>Hemimeris</i>	<i>sabulosa</i>	s	7	0		42.875
<i>Ixianthes</i>	<i>retzioides</i>	s	3	0	geniculate	27.5
<i>Limosella</i>	<i>capensis</i>	s	3	0		56.25

Manulea	laxa	s	3	0	geniculate	18.5
Manulea	rigida	s	3	0	geniculate	19.375
Melasma	sessiliflorum	g	3	0	geniculate	57.875
Nemisia	barbata	s	9	0		44.25
Nemisia	capensis	s	6	0		40.375
Nemisia	cheiranthus	s	6	0		25.25
Nemisia	fruticans	g	6	0		29.125
Nemisia	ligulata	s	6	0		35.25
Nemisia	parviflora	s	7	0		30.5
Oftia	africana	s	4	4	demicolpate	34.875
Phyllopodium	cuneifolium	s	3	3	demicolpate non-	36.125
Polycarena	aurea	s	3	3	geniculate non-	52.5
Polycarena	capensis	s	3	3	geniculate non-	40.25
Polycarena	leipoldtii	s	3	3	geniculate non-	54.5
Polycarena	rariflora	s	3	3	geniculate	35.625
Selago	corymbosa	s	3	3	geniculate	47.125
Selago	forbesii	s	3	3	geniculate	38.625
Sopubia	cana	g	3	3	geniculate	71.5
Sutera	aurantiaca	s	3	0	geniculate	29.5
Sutera	foetida	s	3	0	geniculate non-	29.75
Sutera	halimifolia	s	3	0	geniculate non-	41.25
Sutera	linifolia	s	3	0	geniculate non-	31.25
Sutera	pinnatifida	s	3	0	geniculate	37.25
Sutera	tristis	s	0	4		62.125
Walafrida	paniculata	s	3	0	geniculate non-	38.625
Zaluzianskya	capensis	s	3	3	geniculate non-	42
Zaluzianskya	violacea	s	3	3	geniculate	58