ORCHIDS

OF SOUTH AFRICA | A Field Guide

Steve Johnson
Benny Bytebier

Photography by
Herbert Stärker

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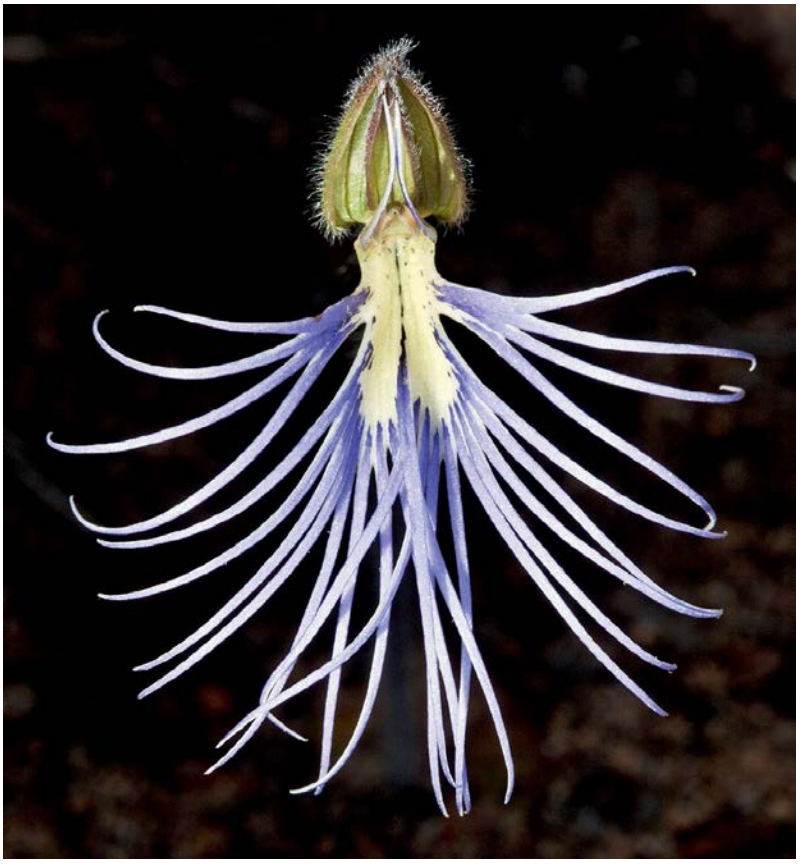

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Published by Struik Nature
(an imprint of Penguin Random House South Africa (Pty) Ltd)
Reg. No. 1953/000441/07
The Estuaries No 4, Oxbow Crescent, Century Avenue, Century City, 7441
PO Box 1144, Cape Town, 8000 South Africa

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First published in 2015 by Struik Nature
1 3 5 7 9 10 8 6 4 2

Publisher: Pippa Parker
Managing editor: Helen de Villiers
Project manager: Sarah Gruft
Editor: Emsie du Plessis
Design director: Janice Evans
Design: Tessa Fortuin & Neil Bester
Proofreader: Tina Mössmer

Reproduction by Hirt & Carter Cape (Pty) Ltd
Printed and bound by Paarl Media, Jan van Riebeeck Avenue,
Paarl, South Africa.

ISBN: 978 1 77584 139 5
E-pub: 978 1 77584 263 7
PDF: 978 1 77584 262 0

Photographic credits: Photographs supplied by Herbert Stärker, with further contributions by:
Uli Ade, Jill Blignaut, Benny Bytebier, Gareth Chittenden, Ruth Cozien, Hildegard Crous,
Lourens Grobler, Karin Hansen, Steve Johnson, Judd Kirkel, Patrick Lane, Bill Liltved, Peter Linder,
Mervin Lotter, Douglas McMurtry, Geoff Nichols, Greg Nicolson, Marc Nicolson, Ted Oliver,
Martin Rautenbach, Peter Swart, Ross Turner, Timo van der Niet, Jan Vlok, Louis Vogelpoel,
Martin von Fintel, Karsten Wodrich, Peter Wragg, Bart Wursten and Helmuth Zelesny.

Cover image: *Ceratandra grandiflora,* Joubertina 15.12.2010
Title page Image: *Bartholina burmanniana*

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PREFACE

It has been more than 30 years since the last publication of a field guide covering the entire South African orchid flora. *Wild Orchids of Southern Africa*, published in 1982, soon went out of print and is now a collector's item. *Orchids of Southern Africa*, a reference work published in 1999, remains indispensable to those who have a copy, but only a few hundred copies remain as the publisher lost most of the stock in an accident soon after the book was launched. *Field Guide to the Orchids of Northern South Africa and Swaziland*, published in 2008, filled some of this gap for the north of the country, whereas *The Cape Orchids: A Regional Monograph of the Orchids of the Cape Floristic Region*, published in 2012, did the same for the Cape region (though with a combined weight of 7kg, the two volumes of the latter hardly constitute a suitable field guide!). One of the major challenges for producing a field guide to South African orchids is that several species are highly elusive, some appearing only every 20–30 years after a fire, and thus difficult to capture in photographic images. This was reflected in the fact that many of the species included in the original *Wild Orchids of Southern Africa* were not represented by photographs or, if they were, only by very poor ones that did not allow for definitive identification.

The situation changed in 2006 when Austrian photographer Herbert Stärker began to make regular visits to South Africa as part of a focused mission to produce high-quality photographic images of orchids in the region. We became acquainted with Herbert through his extraordinary photographic contributions (along with those of Bill Liltved) to *The Cape Orchids* volumes. Thus when Herbert suggested the use of his images for a comprehensive field guide to South African orchids, we readily agreed that the time was right for such a project. Herbert and his wife Helga had also acquired a tremendous amount of new knowledge regarding the distribution, habitat and flowering times of South African orchids during the many years they had spent photographing species in the field.

Orchids of South Africa: A Field Guide is intended for those individuals who enjoy finding and identifying South African orchids in their natural habitat and who want to learn something about their ecology, conservation status and relationship to other orchid species. Of the 473 orchid species known to occur in South Africa, Lesotho and Swaziland, 455 are illustrated in this book. The 18 species that are not featured are very poorly known; approximately half of these have not been seen for more than 50 years and are now presumed to be extinct.

The introductory sections provide information about the physical environment, floral regions and biomes of South Africa. They also provide an overview of the orchid flora, the principles according to which orchids are named, and the structure, reproductive biology and conservation of orchids. We have purposefully omitted a section on cultivation, partly because this is a highly technical topic that is already covered in specialist literature, but mostly because this guide is intended specifically to enhance the appreciation of orchids in their natural habitat.

A population of the Cape orchid *Satyrium carneum* in coastal fynbos vegetation.

ACKNOWLEDGEMENTS

Herbert and Helga Stärker travelled hundreds of thousands of kilometres in search of orchid species to photograph for this field guide, relying on the generous assistance of many botanists, orchid enthusiasts and farmers along the way. Special mention must be made of the extraordinary support provided by Pat Brown, Shane Burns, John Burrows, Gareth Chittenden, Godfrey and Helene Coetzee, Hildegard Crous, Pieter Drake, Erica du Toit, Horst Filter, Graham Grieve, Lourens Grobler, Marcel Jansen, Kevin Joliffe, Judd Kirkel, Frans Krige, Bill Liltved, Mervyn Lotter, Gavin McDonald, Cameron McMaster, Douglas McMurtry, Warren Meyers, Geoff Nichols, Mike O'Connor, Ted Oliver, Tessa Oliver, Martin Rautenbach, John Rourke, Christo Smith, Roger Smith, Sarel Spies, Guy Upfold, Timo van der Niet, Jan Vlok, Martin von Fintel, Courtney Walton and Natasja Wortel.

Herbert Stärker also acknowledges the following for providing the additional photographs needed to illustrate aspects of some of the species in this guide: Uli Ade, Jill Blignaut, Benny Bytebier, Gareth Chittenden, Ruth Cozien, Hildegard Crous, Ezemvelo KZN Wildlife, Lourens Grobler, Karin Hansen, Steve Johnson, Judd Kirkel, Patrick Lane, Bill Liltved, Peter Linder, Mervin Lotter, Cameron McMaster, Douglas McMurtry, Geoff Nichols, Greg Nicolson, Marc Nicolson, Ted Oliver, Martin Rautenbach, Peter Swart, Ross Turner, Timo van der Niet, Jan Vlok, Louis Vogelpoel, Martin von Fintel, Karsten Wodrich, Peter Wragg, Bart Wursten and Helmuth Zelesny.

Steve Johnson wishes to thank Bill Liltved, with whom he worked for almost two decades on *The Cape Orchids* project, Craig Peter, Bruce Anderson, Timo van der Niet and the many other former and current members of his lab who have shared new discoveries of orchid biology; and Kathy Johnson for her vital role as an 'in-house' editor.

Benny Bytebier would like to thank Dirk Bellstedt, Bill Liltved, Peter Linder, Ted Oliver, Tessa Oliver and many other plant enthusiasts for introducing him to South African orchids; Kate and Graham Grieve for proofreading; and Jane Sakwa Makokha for her support and encouragement.

Peter Linder and Hubert Kurzweil granted us permission to use and modify the technical descriptions of South African orchid species that were included in their 1999 publication, *Orchids of Southern Africa*. We also acknowledge the help of Rafaël Govaerts and Denis Filer, the developers of the World Checklist of Selected Plant Families and the Botanical Research and Herbarium Management System (BRAHMS), respectively, as these two resources have greatly simplified the task of collecting and integrating information on South African orchids.

Pippa Parker at Struik Nature enthusiastically adopted this project. We have enjoyed working with her team of Helen de Villiers (Managing Editor), Sarah Gruft (Project Manager), Emsie du Plessis (Editor), Janice Evans (Design Director) and Tessa Fortuin and Neil Bester (typesetting and layout). Publication was made possible through generous sponsorships by the Botanical Society of South Africa, Elizabeth Parker of Elandsberg Nature Reserve and the Botanical Education Trust.

Polystachya pubescens growing in leaf litter on a sandstone boulder in southern KwaZulu-Natal.

SOUTH AFRICAN ORCHIDS: AN OVERVIEW

Most people think of orchids as exotic blooms that hang from trees in tropical rainforests, or occasionally appear for sale in the local supermarket. To the uninitiated, it may therefore come as a surprise to learn that South Africa has close to 500 native orchid species. This is, of course, only a small fraction of the estimated 26,000 orchid species worldwide, but the orchid flora of South Africa is actually rich for a temperate country, exceeding that of the United States and Canada (213 species) and the whole of Europe (182 species). It is also notable that the majority of the orchids found in South Africa, Lesotho and Swaziland are endemic (restricted) to this region. Of the total of 473 orchid species in these three countries, 313 (66%) are found nowhere else.

As is the case in other temperate regions, about 90% of the orchids in southern Africa are terrestrial (growing in the ground) rather than epiphytic (growing on trees or shrubs) or lithophytic (growing on rocks). Owing to their underground tubers, terrestrial orchids are far better equipped than epiphytes or lithophytes to cope with the extremes of seasonal drought, low humidity, fire and winter frost that characterize most temperate regions. And, of course, epiphytes simply cannot exist in treeless habitats, such as the grassland biome that covers vast areas of South Africa.

The southern African region is world famous for its plant diversity. Almost 20,000 plant species are found in South Africa alone, and the greater Cape Floral Region with its estimated 9,000 plant species is considered so extraordinary that it has been recognized as one of only six plant kingdoms worldwide. Plants have undergone rampant diversification in southern Africa due to the wide variety of habitats in the region, ranging from humid coastal forests to craggy mountains. To survive and reproduce, plants in each of these diverse habitats must adapt to their unique soils, climate and pollinator fauna.

From the late seventeenth century onwards, orchid specimens were shipped from South Africa to Europe by various explorer naturalists. These collectors, notably Carl Thunberg, Anders Sparrman and Francis Masson in the eighteenth century and Johann Drège, Christian Ecklon and William Burchell in the nineteenth century, made numerous epic journeys across the southern African continent in search of new plant species. The process of formally describing and naming these specimens was carried out mainly by eminent European botanists of the eighteenth and nineteenth centuries, such as Carl Linnaeus and his students in Sweden, John Lindley in Britain, and Otto Sonder, Rudolf Schlechter and Heinrich Reichenbach in Germany.

The first guides to South African orchids intended for use by the general public (as opposed to specialist botanists) were produced in the late nineteenth and early twentieth centuries by Harry Bolus, a Cape Town stockbroker and amateur botanist. Bolus himself described more new South African orchid species than any other botanist, apart from the prodigious English botanist John Lindley. These extraordinary books, illustrated largely by Bolus's own paintings and drawings of floral dissections, are now valuable Africana and almost unobtainable. Bolus depicted about 300 South African orchid species in his books. The field guide *Wild Orchids of Southern Africa* (1982) by Joyce Stewart, Peter Linder, Ted Schelpe and Tony Hall covered not only South Africa but also the

Terrestrial orchids, such as *Pterygodium inversum*, thrive in seasonal environments.

Lithophytic orchids, such as *Disa comosa*, are specialized for growing on rocks.

A decaying tree festooned with a colony of the epiphytic orchid *Bulbophyllum sandersonii*.

neighbouring countries of Lesotho, Swaziland and Namibia, and listed 433 species. The reference work *Orchids of Southern Africa* (1999) by Peter Linder and Hubert Kurzweil covered the same territory, as well as Botswana, and listed 466 species. It is a testimony to the constant rate of discovery of new species that the present field guide, which covers only South Africa, Lesotho and Swaziland, lists 473 species. New orchid species continue to be discovered and described in South Africa at an average of about one species per year. We have no doubt that the tally of orchid species recorded for South Africa alone will eventually surpass 500, although, sadly, the actual number of species in the wild will inevitably decline as a result of human-induced extinction.

THE PHYSICAL ENVIRONMENT

South Africa is a country of extraordinarily diverse environments, ranging from high mountains through semi-arid plains to humid coastal regions. The most important physical feature is the Great Escarpment, which arcs around the country, separating a high-lying inland plateau from the lower-lying coastal zone. In some places, notably the Cape Fold Mountains and the Drakensberg of KwaZulu-Natal, the escarpment forms a wall of peaks towering up to 3,500m, whereas in other places the drop-off is more gentle. The inland plateau, which includes Lesotho, is highest along the edge of the escarpment and, as a result, rivers drain into the Atlantic Ocean to the west of the watershed and into the Indian Ocean to the east.

Much of South Africa has an ancient, weathered surface with soils that are relatively poor in nutrients. The quartzitic soils of the Cape Fold Mountains, in particular, are extremely low in mineral nutrients, resulting in very slow plant growth. In the east of the country, short 'sourveld' grassland occurs on poor soils, often in high-rainfall regions. Many terrestrial plants, including orchids, rely on symbiotic associations between their roots and fungi to supplement their nutrition.

The other important feature that determines the distribution of vegetation in the region is the greatly contrasting patterns of rainfall. There is a gradient from winter rainfall in the west, based on the passage of frontal systems, to summer rainfall in the east,

The Drakensberg range, source of the Tugela River, is the highest and most dramatic section of the Great Escarpment.

Quartzitic soils are very poor in nutrients, but support a variety of orchids, such as *Disa cornuta*.

The Cape Fold Mountains had their origin in ancient geological upheavals, still evident in the leaning peaks of the Kammanassie range.

The rare orchid *Disa scullyi* is specialized for growing in damp montane grasslands.

based largely on thunderstorm activity. In addition, the total amount of rainfall is highest along the southern and eastern coastal belt, and lowest in the interior and along the western coastal belt.

FLORAL REGIONS

Botanists define floral regions (sometimes called botanical provinces) according to their concentrations of particular plant families and the extent to which plant families, genera and species are endemic (restricted) to those regions. The most notable floral region in South Africa is the Greater Cape Floral Region, which extends in a great L-shape from northern Namaqualand, through the south-western Cape, and as far east as Grahamstown. The Greater Cape Floral Region consists of approximately 9,000 plant species (almost half the total for South Africa), about 69% of which are endemic to the region. For these reasons, most botanists have recognized the Cape flora as one of the world's six floral kingdoms. There are 241 orchid species in the Cape Floral Region (again, about half of the total for the whole of South Africa) and 68% of these are endemic. The Tongaland-Pondoland Floral Region on the east coast is mostly confined to South Africa and, like the Cape Floral Region, is considered a global botanical 'hot spot' on account of its combination of high species diversity, endemism and vulnerability to human-induced habitat transformation. The Eastern Mountain Floral Region, another botanical 'hot spot' with high levels of endemism, has strong affinities to both the Afromontane region of East Africa and the Greater Cape Floral Region. Three other floral regions – Karoo-Namib, Kalahari-Highveld and Zambezian – account for the remaining portion of the flora and also cover large areas of territory north of South Africa's borders.

BIOMES AND VEGETATION TYPES

Unlike floral regions, which are defined by plant species composition, biomes are defined by the structure of their vegetation. Biomes are determined largely by aspects of the physical landscape, most

Vegetation Biomes and Floral Regions of South Africa, Lesotho and Swaziland

Fire consumes fynbos vegetation every 10–30 years, but stimulates many orchid species to flower.

Disa tripetaloides is one of several Cape orchids that occur only on stream banks.

The dainty orchid *Disa maculata* is found in rocky places that are draped in low-lying clouds in summer.

Disa rosea is specialized for growing on mossy cliffs in fynbos.

notably rainfall and soils. Each of the six biomes in South Africa thus represents a set of different ecological challenges that must be overcome by orchids. An understanding of the ecology of biomes is essential for the orchid enthusiast, as the distribution of the various orchid species largely corresponds to those of the biomes to which they have become specialized.

Fynbos

The vegetation of the fynbos biome is evergreen shrubland dominated by proteoid shrubs and ericoid heaths. It is the richest South African biome in terms of plant species – most of the roughly 9,000 plant species in the Cape Floristic Region are found in this vegetation type. Fynbos occurs mostly in the winter-rainfall region, although it also extends to the southern Cape where the rainfall is non-seasonal. Fynbos is typically found in the Cape Fold Mountains on quartzitic soils that are extremely poor in nutrients. Grasses are almost absent, their ecological niche being filled by the reedlike restios; where restios dominate the fynbos vegetation, this is known locally as 'restioveld'. Fires occur at intervals of 10–30 years. Whereas some fynbos plants survive fire by resprouting, many are in fact killed by fire but survive in the form of seeds to produce the next generation.

Fynbos biome orchid genera with the greatest number of species are *Disa*, *Satyrium*, *Holothrix*, *Pterygodium, Corycium* and *Acrolophia*. The genera *Ceratandra*, *Evotella* and *Pachites* are confined to the fynbos biome. The Cape Fold Mountains have a number of very distinctive habitats to which orchids have become specialized. These (with some examples of orchids that occur there) include mossy cliffs (*Disa longicornu* and *Disa rosea*), peaty marshes (*Corycium carnosum*, *Disa atricapilla*, *Disa racemosa*) and streamsides (*Disa tripetaloides*, *Disa uniflora*). Although fynbos has little agricultural value, it has been transformed in many places by invasive alien plants and urban development. As a result, many species, including dozens of orchids, are threatened with extinction.

Another type of shrubland vegetation found in the lowlands and in valleys in the fynbos biome is renosterveld. Unlike true fynbos, renosterveld occurs on relatively rich clay soils. Renosterveld supports a characteristic orchid flora, including orchids such as

Flat succulent leaves, such as those of *Holothrix secunda*, are a distinctive feature of many orchids found in the drier parts of southern Africa.

Satyrium pulchrum is restricted to a few granite outcrops in the succulent Karoo.

Disa spathulata, *Pterygodium catholicum* and *Satyrium erectum*. Since these soils are suitable for the production of wheat and grapes, much of the renosterveld has been claimed for agriculture. As a result, many of the orchids unique to this vegetation are now critically endangered.

Succulent Karoo

This biome is found mainly along the west coast, but narrow strips of succulent Karoo vegetation are also found in the valleys between the Cape Fold Mountains due to the rain shadow. The biome is characterized by low, shrubby vegetation dominated by vygies (Aizoaceae). Fires occur rarely and are not a key aspect of the ecology of plants in this biome. The west coast, particularly Namaqualand, is the richest semi-arid region worldwide in terms of plant diversity and is famed for its mass flowering of annual daisies in early spring. Rainfall is generally very low and occurs in winter. Given the low rainfall, it is surprising that several orchids, such as *Disa karooica*, *Disperis purpurata, Holothrix aspera* and *Satyrium pulchrum* occur in this biome; they generally have succulent leaves that lie flat on the ground.

Nama-Karoo

Vast areas of the interior are covered in a sparse layer of shrubs, most belonging to the daisy family (Asteraceae) – this is known as the Nama-Karoo biome. Rainfall is generally very low and occurs as sporadic thundershowers. The region is mainly utilized for sheep farming and is very poor in orchid diversity.

Grassland

Much of the higher-lying plateau and great escarpment of the central and eastern interior belongs to the grassland biome, which is characterized by the absence of a shrub or tree layer. The grassland biome extends to some areas along the eastern coastal belt. Grasslands in South Africa, particularly those in the mountains and along the coast, are very rich botanically and contain the highest diversity of orchids outside of the

Namaqualand, part of the succulent Karoo biome, is famous for its displays of wildflowers in spring.

Cape Floral Region. The genera *Disa* and *Satyrium* are particularly well represented in this biome, along with *Habenaria*, *Eulophia*, *Disperis* and *Schizochilus*.

A very distinctive orchid habitat in this biome is wetland, which supports a plethora of specialized orchids such as *Disa rhodantha* and *Satyrium hallackii*. Higher-lying grasslands are prone to frost, which limits plant retention of leaves throughout winter. Grassland plants, including orchids, generally recover from fire (a frequent occurrence in this biome) and harsh winter conditions by sprouting from underground storage organs.

Grasslands have been highly transformed with those on richer soils being used extensively for agriculture, especially maize production and cattle grazing, while a significant portion of the higher-rainfall grasslands have been converted into exotic timber plantations. Grasslands in conservation and cattle-grazing areas are generally burnt every two years, or even annually, as a management practice.

Savanna

Savanna is the most common vegetation type in Africa and is well represented in the northern and eastern parts of South Africa. It is characterized by

a grassy layer with scattered trees, notably acacias, which dominate the 'thornveld' type of savanna. Savanna is generally found in frost-free areas on rich soils and annual rainfall is typically low. Savanna plants are adapted to regular fires, which they survive either through fire-resistant bark or by resprouting from underground storage organs.

In terms of botanical diversity, savanna is not as rich as grasslands. Many of the orchids found here are not endemic to South Africa, but also occur further north. The dominant orchid genus in this biome in terms of number of species is *Eulophia,* followed by *Habenaria* and *Bonatea*. Characteristic epiphytic orchids in this biome are *Ansellia africana* and *Mystacidium capense*. Savanna is usually used for cattle and game farming and is relatively well conserved.

Afrotemperate forest

Evergreen afrotemperate forest is the smallest biome in South Africa. It occurs in scattered patches along the escarpment all the way from the Cape Peninsula to the Northern Province, usually in areas that are protected from fire. Interestingly, epiphytic orchids are not found in Cape forests west of Swellendam, presumably because humidity is too low during the summers in this region. There are also many orchids specialized for life in the humus-rich forest floor. These include *Brownleea coerulea, Disperis fanniniae*, *Liparis bowkeri* and *Stenoglottis fimbriata*. Afrotemperate forests were heavily exploited for timber in the past, but are now relatively well protected.

Albany thicket

Thicket vegetation is found mostly in drier river valleys in the Eastern Cape, and generally consists of a tangled impenetrable mass of shrubs and succulents, especially *Aloe* and *Euphorbia*. Fire is not considered an essential part of the ecology of thicket. Thicket has a relatively low plant species diversity and is not particularly rich in orchids. A few *Eulophia* species and some epiphytes, such as *Mystacidium*, occur in this biome.

Indian Ocean coastal belt

This biome covers the largely subtropical climate zone of the east coast of the subcontinent. It includes the fabled Wild Coast, the iSimangaliso Wetland Park (formerly Greater St Lucia Wetland Park) and the

Montane grasslands in the Sehlabathebe National Park in Lesotho support a rich diversity of orchids.

Disa patula in grassland habitat in the foothills of the KwaZulu-Natal Drakensberg.

Large colonies of *Satyrium hallackii* subsp. *ocellatum* occur in wetland habitat in the grassland biome.

The grasslands of the Malolotje National Park in Swaziland contain many rare orchid species.

The most typical vegetation of the savanna biome consists of scattered thorn trees with an underlayer of grasses.

Afrotemperate forest in a sheltered ravine located in the KwaZulu-Natal Drakensberg.

Disperis fanniniae occurs in deeply shaded forest habitat along the eastern escarpment.

Kosi Bay lake system. The vegetation is mostly a mosaic of evergreen forest and fire-prone grassland. The high humidity and absence of a true dry season along the Indian Ocean coast belt mean that the forests support a rich flora of epiphytic orchids, many of which have ranges extending further north to the tropical areas of Africa. The grassland component of this biome also supports a rich orchid flora with distinctive species, such as *Disa caffra*, *Eulophia angolensis* and *Eulophia cucullata*. The biggest threats include coastal developments and mining of coastal sands for minerals.

ORCHID FLORA

With an estimated 26,000 species, orchids comprise the largest family of flowering plants. Most orchids are found in tropical America and Asia. There are, by our estimates, 471 orchid species that are native to South Africa. This number increases very slightly to 473 species when Lesotho and Swaziland are included. These are not big numbers in comparison to some countries in tropical America, such as Ecuador, which has more than 4,000 species. But to place the orchid flora of South Africa in perspective, one must compare it to those of other temperate regions, such as the United States and Canada (213 species) and Europe, extending to the Urals (182 species). Australia has 1,333 species, but this includes a significant number of tropical species found in the north of the country. As is the case in southern Africa, the orchid floras of other temperate regions are dominated by terrestrial orchids. What makes the orchid flora of South Africa truly remarkable is the high percentage of species that are endemic to the country.

There are five major orchid groups worldwide. These are essentially the main branches of the orchid evolutionary tree and are recognized by botanists as subfamilies. The oldest surviving branch (and the one with the most primitive characteristics) is the subfamily Apostasioideae, but this does not have any representatives in South Africa. The Vanilloideae, another group considered to have primitive characteristics, is represented in South Africa by a single species – *Vanilla roscheri*. The Cypripedioideae (slipper orchids) are also not represented in South Africa. The Epidendroideae are by far the richest subfamily worldwide in terms of species, and almost all of the epiphytic genera and some of the terrestrials (notably *Eulophia*, *Liparis* and *Orthochilus*) in South Africa belong to this group, which is characterized by its solid pollen masses (pollinia). The remaining subfamily is the Orchidoideae, a group to which most of the orchids in South Africa (as well as those in temperate America, Europe and Australia) belong. These orchids are almost always terrestrial and are usually characterized by pollen masses that are sectile (consisting of numerous subunits).

Botanical names

Botanical names of plants are known as binomials, as they are based on a unique combination of a genus and species name. A botanical name is only acceptable if it is accompanied by a formal description that could not apply to any other known plant species. *Disa uniflora*, for example, is the unique name for South Africa's most famous orchid. It was coined in 1767 by the Swedish botanist Peter Bergius, who was under the mistaken impression that plants of this species only ever produce one flower. It should be noted that the genus name is always capitalized, but not the species name. The name can also be abbreviated as *D. uniflora*, following the first mention of the full name. Occasionally, botanists will formally recognize geographical variation within a species by describing subspecies. For example, longer-spurred populations of *Satyrium stenopetalum* east of Swellendam have been described as subspecies *stenopetalum*, whereas shorter-spurred populations west of Swellendam have been described as subspecies *brevicalcaratum*. Varieties are similar, but do not have to be geographically separate. We also emphasize that the decision about whether or not to recognize different forms as distinct species is a matter of judgement. For example, some botanists recognize as many as eight *Stenoglottis* species, but here we recognize only four.

Few things frustrate the amateur plant enthusiast more than the propensity of botanists to change plant names. Although it may seem capricious, the renaming of plants is carried out according to a logical set of rules, with a bit of 'wiggle room' for interpretation. For example, botanists accept that a genus (and all other formal higher-level groupings, such as a tribe, family, order etc.) must contain all the species descended from a common ancestor. When it was recently discovered through molecular analysis that the *Eulophia* lineage (or branch of the evolutionary tree) contained not only all of the *Eulophia* species, but also all of the *Acrolophia* and *Oeceoclades* species, a decision was taken to place some *Eulophia* species into the genus *Orthochilus*, so that in the new classification, *Eulophia, Acrolophia, Oeceoclades* and *Orthochilus* each represent their own distinct lineages. In other cases, when faced with such situations, botanists opt to transfer all of the species from one genus to another. For example, all species in the genus *Schizodium* were transferred to *Disa* when it was realised that *Schizodium* species actually belong to the *Disa* lineage. Other cases are much harder to resolve. For example, it was recently suggested that all species of *Corycium* should be placed in *Pterygodium*, as species belonging to both genera

Albany thicket vegetation in the Eastern Cape.

Diminutive plants of *Holothrix parviflora* flowering beneath a giant *Euphorbia* in thicket vegetation.

The epiphyte *Mystacidium capense* is often abundant in thicket vegetation.

Large stands of *Eulophia angolensis* can still be found in moist grassland habitat along the Indian Ocean coastal belt.

Eulophia cucullata occurs in grassland habitat along the Indian Ocean coastal belt and further north into Africa.

Vegetation in the Indian Ocean coastal belt is typically a mosaic of grassland and forest.

were shown to be intermingled in the orchid evolutionary tree; however, there is uncertainty surrounding the genus name that should be applied to this merged group. This is because the name for a genus is derived from the identity of the 'type species' and, in this case, the type species for *Pterygodium* – *Pterygodium alatum* – does not seem to be closely related to the rest of the group. We therefore decided to keep the existing names for *Pterygodium* and *Corycium* species in this guide, even though they are likely to change again in the future.

Another reason for renaming species is the discovery that the specimen on which the original description was based actually belongs to another species that was named earlier. For example, in 1782 Carl Linnaeus's son described a species, *Disa grandiflora*, which was later realized to be the same as the *Disa uniflora* described by fellow Swede Peter Bergius in 1767. *Disa grandiflora* is therefore considered a synonym of *Disa uniflora*, as the older name generally has priority in botany, even though *Disa grandiflora* (the large-flowered Disa) seems more appropriate as a name. This situation is not uncommon, since botanists work in different countries or institutions and give new names to species that have already been described in another country or in a publication that they have not come across. For example, the wide-ranging species *Eulophia horsfallii* has no fewer than 25 synonyms! It can also arise when species are highly variable across their distribution, as is the case with *Satyrium bracteatum*, which has 11 synonyms. It should be noted that botanists are not under any obligation to accept the description of a 'new species'. If it is deemed that the 'new species' is not sufficiently distinct from an already-named species, then its name simply becomes a synonym of that established species. To make things easier for the reader, we have included synonyms in cases where

Forest encircling a pan in the Indian Ocean coastal belt is the habitat of the rare orchid *Vanilla roscheri*.

a binomial combination has changed since the publication of *Wild Orchids of South Africa* (1982).

We have not used common names in this book. The main reason is simply that, to the best of our knowledge, very few South African orchids have distinct common names. Instead, many names seem to refer broadly to groups of similar species. For example, the common name 'ewwa-trewwa' is given to a wide range of species in the genus *Satyrium*. The common name 'moederkappie' is used even more loosely to refer to a suite of *Disperis* and *Pterygodium* species with bonnet-shaped flowers.

Satyrium bracteatum is a highly variable orchid species; it has been given numerous names, all of which are now considered synonyms.

Disa uniflora plants frequently have more than one flower, despite the Latin name meaning 'one-flowered'.

Orchid genera represented by two or more species in South Africa, Lesotho and Swaziland. Apart from these 32 genera, there are a further 22 genera represented by a single species.			
Genus	**Species in South Africa, Lesotho and Swaziland**	**Species endemic to South Africa, Lesotho and Swaziland**	**Species endemic to the Cape Floral Region**
Disa	144	128	88
Satyrium	41	33	23
Habenaria	30	11	0
Eulophia	28	9	0
Disperis	26	18	6
Holothrix	23	19	7
Pterygodium	19	19	15
Corycium	14	12	8
Orthochilus	12	8	2
Polystachya	11	2	0
Bonatea	10	3	0
Schizochilus	8	7	0
Acrolophia	7	7	4
Mystacidium	7	6	0
Brachycorythis	7	1	1
Ceratandra	6	6	6
Brownleea	6	3	0
Angraecum	6	1	0
Huttonaea	5	5	0
Nervilia	5	0	0
Stenoglottis	4	2	0
Aerangis	4	0	0
Bulbophyllum	4	0	0
Oeceoclades	4	0	0
Tridactyle	4	0	0
Liparis	3	2	1
Microcoelia	3	0	0
Bartholina	2	2	0
Pachites	2	2	0
Cynorkis	2	1	0
Diaphananthe	2	1	0
Cyrtorchis	2	0	0
Orchid genera represented in South Africa, Lesotho and Swaziland by a single species:			
Acampe, Ansellia, Bolusiella, Calanthe, Centrostigma, Cheirostylis, Corymborkis, Didymoplexis, Dracomonticola, Evotella, Gastrodia, Jumellea, Margelliantha, Neobolusia, Oberonia, Platycoryne, Platylepis, Rangaeris, Rhipidoglossum, Vanilla, Ypsilopus, Zeuxine			
Orchid genera that are endemic to South Africa, Lesotho and Swaziland:			
Bartholina, Ceratandra, Dracomonticola, Evotella, Huttonaea, Pachites			

Roots of *Stenoglottis longifolia* have a spongy velamen layer that absorbs water and nutrients.

Polystachya ottoniana is an epiphyte with a sympodial growth pattern – it produces a chain of pseudobulbs, each formed at the base of a shoot that eventually stops growing.

Cyrtorchis arcuata is an epiphyte with a monopodial growth pattern – the shoots keep growing indefinitely.

ORCHID STRUCTURE

Roots, stems and leaves (vegetative parts)

Orchids usually have simple, unbranched roots. In the epiphytic species, the roots creep over the bark of the host tree and absorb water and nutrients through a spongy layer known as the velamen. The velamen is usually white when dry and turns green when wet. Most orchids, particularly terrestrial ones, have symbiotic associations between their roots and fungi, which provide the plant with mineral nutrients and even carbohydrates from the very first stages of seed germination. Some orchids have no green leaves and rely entirely on fungi for supplying mineral nutrients and carbohydrates. Two examples featured in this guide are *Didymoplexis verrucosa* and *Gastrodia sesamoides*.

Thickened roots of orchids often serve as storage for carbohydrates and are known as tubers. This is particularly important for terrestrial orchids that are often dormant in a leafless state during dry periods of the year. Some of these root tubers can resemble testes and the name 'orchid' is in fact derived from the Greek word *orkhis,* meaning testicle. Orchid root tubers are replaced each year.

Many orchids store carbohydrates in swollen parts of the stem known as pseudobulbs. These are common among epiphytic orchids and are most pronounced in the genera *Bulbophyllum* and *Polystachya*, but are also found in some terrestrial orchids, notably *Eulophia* species. Most of the terrestrial orchid species in South Africa have simple, upright stems, which are replaced annually.

Leaves of these terrestrial species are usually soft in texture and are arranged spirally around the stem. Some *Holothrix* and *Satyrium* species that grow on the arid margins of the Karoo have thickened, succulent leaves that lie flat on the ground. Other orchids, notably *Acrolophia* species and most epiphytes, have leaves with a very hard, leathery surface that helps to prevent water loss. A few of the epiphytic orchids have leaves that are reduced to scales. Some of these, such as *Vanilla roscheri,* rely on their green stems for photosynthesis, whereas others, such as *Mystacidium gracile,* rely on their dense clusters of green, photosynthetically-active roots.

There are two types of growth forms and associated branching patterns in orchids. In most orchids, including all of the terrestrial species, growth is sympodial, meaning that a shoot stops growing when mature and is replaced by a new shoot which emerges from the base. Epiphytic orchids with this growth pattern, such as *Bulbophyllum* and *Polystachya*, often have several shoots adjacent to each other in a chain-like formation, frequently with pseudobulbs at the base of each stem. In a much smaller number of orchids, including *Cyrtorchis*, *Mystacidium* and *Tridactyle*, growth is monopodial, meaning that a shoot keeps growing indefinitely, and pseudobulbs are always absent.

Flowers and seeds

Orchid flowers are usually borne in groups known as inflorescences, although some species, such as *Bartholina burmanniana*, produce solitary flowers. The inflorescence is usually unbranched, but there are some exceptions, such as species of *Acrolophia* that have branched inflorescences. In epiphytes with sympodial growth, the inflorescence is either produced at the end of a stem (terminal position) or from its side (lateral position), whereas epiphytes with monopodial growth always produce inflorescences from the side

of a stem. In most terrestrial species, the inflorescence is produced at the end of a single stem, but some species of *Disa* and *Satyrium* produce a 'fertile' (flowering) stem adjacent to a 'sterile' (non-flowering) stem.

Orchids have some of the most complex flowers of all plants and the details of their structure can be bewildering, even to experienced botanists. However, the basic structure of the orchid flower is essentially like that of any lily, in consisting of three outer sepals and three inner petals. One of the features that make orchid flowers unique is that one of their petals (the lip) is usually highly modified and serves as a landing platform and guide for pollinators. This specialization of the lip also makes orchid flowers bilaterally symmetrical, as opposed to the radial symmetry of most other lily-type flowers that have three identical petals. The lip starts as the uppermost petal during development, but in most cases as the flower matures, it twists around 180° so that the lip occupies the lowermost position of the flower. This process is called resupination and orchid flowers with the lip lowermost are referred to as 'resupinated'. The lip is usually modified to produce a spur, which can be as long as 20cm in the case of some *Bonatea* species. Pollinators typically place their tongue in the spur in search of nectar. The genus *Satyrium* is unique among all orchids in having two spurs derived from the lip, which is also unusual in being uppermost (non-resupinate) on the flower and shaped into a hood. In *Disa* and *Brownleea* species, it is the median sepal, rather than the lip, that is spurred and shaped into a hood.

In some orchids, the petals, and more rarely the sepals, can be highly divided. In *Acrolophia* and *Eulophia*, the surface of the lip is often sculptured with a prominent central crest (irregular ridge) and numerous papillae. In *Disa* species that were previously placed in the genus *Herschelia*, such as *Disa lugens*, the lip is often highly divided and even beard-like. Similarly, in *Bartholina* species, the lip is highly divided and spider-like. In *Bonatea* and *Habenaria* species, the lateral petals and the lip are often deeply divided, with some lobes even fused to the sepals. In a striking departure from the general tendency in orchids for the lip to be the showiest floral part, *Brownleea* flowers have a lip that is reduced to a tiny vestigial filament, and *Disperis* flowers have a lip that is mostly hidden within the flower.

In orchids, male and female reproductive structures, including the anther and stigma, are fused into a structure known as a column; the structure and shape of the column can be a valuable clue for identification. For example, species in the genera *Bonatea* and *Habenaria* often have a column with two distinct stigma lobes that protrude from the flower. In *Pachites* and *Satyrium*, the column is shaped like a pillar. In epidendroid orchids (of the subfamily Epidendroideae) the column usually has a distinctive anther cap.

If one is ever in any doubt as to whether a flowering plant is an orchid or not, the best clue lies in the structure of the pollen. Orchid pollen is not loose and powdery; instead, it is packaged into masses known as pollinia. These packages have a sticky pad (the viscidium), which becomes glued to the body of the pollinator. If you swipe your finger over a flower or prod it with a toothpick and a pollen package emerges, then it is almost certain that you have found an orchid, as only two plant families – the orchids and the milkweeds – have pollen that comes in the form of pollinia. Orchid pollinia are either inserted whole into a stigma cavity, or break up into small pieces that adhere to the surface of the sticky pad-like stigma.

The large pseudobulbs of *Eulophia petersii* enable this orchid to survive in seasonally dry savanna habitats.

Each plant in this colony of spider orchids (*Bartholina burmanniana*) produces a single flower.

The flowering shoot of *Satyrium longicauda* is accompanied by a much smaller non-flowering shoot that emerges alongside it.

Orchid pollen is packaged into pollinia. Here a *Cyrtothyrea* beetle carries the pollinia of *Eulophia parviflora*.

Wind disperses these dustlike seeds being released from the capsules of *Eulophia speciosa*.

Once fertilized by pollen, orchid flowers produce fruit containing thousands of dust-like seeds. These seeds are dispersed in the wind or very occasionally, as in the case of *Disa uniflora*, by floating on water. Orchid seeds are unusual among flowering plants in that they lack storage tissue and must rely on fungal associations to provide them with the nutrition required to develop into a seedling.

ORCHID REPRODUCTIVE BIOLOGY

Flowering times

The best months to see orchids in flower will differ between the winter- and summer-rainfall regions, and also between the coast and the mountains. In the winter-rainfall region, peak flowering for orchids is during October, November and December in the mountains, and during September in the lowlands. In the summer-rainfall region, flowering of orchid species in the higher-lying grasslands peaks in December and January, whereas in the grasslands of the Indian Ocean coastal belt and the lower-lying savanna regions, flowering tends to be earlier with a peak in October. Flowering of epiphytic orchids tends to be more evenly distributed throughout the year.

Response to fire

Many terrestrial orchids have become adapted to fire, which is an integral part of the ecology of many of South Africa's biomes. Indeed, some terrestrial orchids in the fynbos biome have developed a specialized strategy of flowering only in the first year after a fire. Incredibly, this means that such orchids may wait up to 30 years before flowering. It is believed that by flowering immediately after fire, these orchids gain the advantage of releasing their seeds into an environment that is ideal for seedling establishment, as it is relatively free of competition from other plants. This flowering strategy is particularly evident among orchids that occur in marshes, as the vegetation in this habitat grows particularly rapidly and chokes out smaller plants. Some orchids in the fynbos biome will flower for two or three years after a fire and then cease flowering until after the next fire, whereas others, such as *Disa ferruginea*, will flower even in very mature fynbos vegetation.

Pollination (sexual reproduction)

In his 1862 book *On the various contrivances by which British and Foreign orchids are fertilised by insects, and on the good effect of intercrossing*, Charles Darwin showed convincingly that the complexity

A blue-banded *Amegilla* bee prepares to sip nectar from the flowers of *Disa versicolor*.

Fires in the Cape fynbos often trigger mass flowering of orchids, such as *Pterygodium acutifolium*.

of orchid flowers reflects various modifications for pollination. Many orchids lack nectar in their flowers and dupe their pollinators by mimicking the flowers of other plants. For example, *Disa pulchra* is an excellent mimic of the flowers of *Watsonia lepida* with which it grows in the grassland region. In general, pollinators make fleeting visits to orchid flowers and are not easy to observe.

The first discoveries of pollinators for South African orchids were in the late 1800s, when Stellenbosch chemist Rudolf Marloth discovered that the mountain pride butterfly pollinates the red-flowered orchids *Disa ferruginea* and *Disa uniflora*. To date, pollinators have been documented for more than 100 South African orchid species. Where information on pollinators is available, we have included it in the ecology notes for each species in this guide.

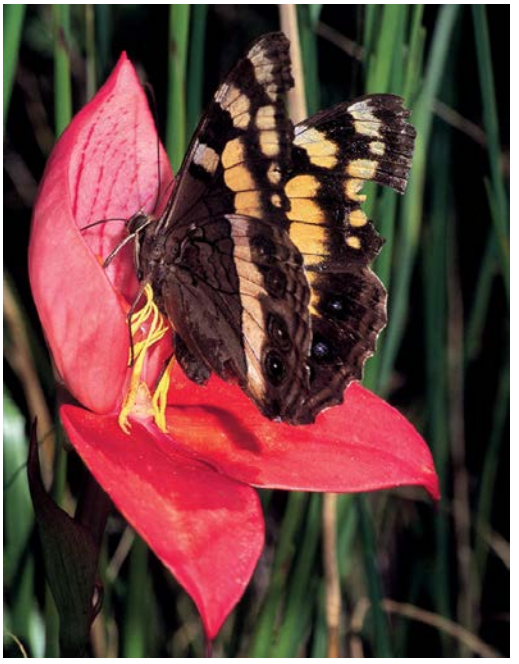
Bees are the most important pollinators of orchids and probably pollinate around 50% of South African orchid species. Some bees that play an important role (with examples of orchids they pollinate) include the large carpenter bees (*Disa racemosa*, *Eulophia speciosa*), blue-banded bees (*Disa versicolor*, *Satyrium sphaerocarpum*) and leafcutter bees (*Disa tenuifolia*, *Eulophia streptopetala*). A particularly important group is that of the oil-collecting bees, which pollinate oil-secreting orchid species in the genera *Ceratandra*, *Corycium*, *Disperis*, *Huttonaea* and *Pterygodium*. Orchid flowers pollinated by oil-collecting bees tend to be yellowish or white and have a pungent, soapy odour.

Wasp pollination of orchids is much less common in South Africa than in Australia. A particularly interesting case is *Disa sankeyi*, which is pollinated by spider-hunting wasps.

Many orchids with small, pungent flowers are pollinated by flies. Examples include *Disa obtusa*, *Satyrium bicallosum* and *Schizochilus zeyheri*. The particularly unpleasant 'rotten meat' smell

Not all Cape orchids require fire to stimulate flowering. *Disa ferruginea* is usually seen flowering in mature fynbos vegetation.

Disa pulchra (right) does not produce nectar, but attracts pollinators through mimicry of the nectar-producing species *Watsonia lepida* (left).



Disa uniflora is pollinated exclusively by the large mountain pride butterfly, *Aeropetes tulbaghia*, which has a predilection for red flowers.

A rather bizarre pollination system is exhibited by *Disa sankeyi* – it emits scent that attracts spider-hunting wasps.

The flowers of *Disa obtusa* have a pungent odour and are pollinated by bibionid flies.

Pterygodium dracomontanum is one of many South African orchid species that are specialized for pollination by oil-collecting *Rediviva* bees.

of *Satyrium pumilum* attracts carrion flies. Small scarab beetles pollinate the yellow or cream flowers of *Ceratandra grandiflora*, *Orthochilus ensatus*, *Orthochilus welwitschii* and *Satyrium microrrhynchum*.

It has been estimated that 50% of all African orchid species are pollinated by moths, although the figure for South African orchids is probably closer to 30%. Pollination by hawkmoths, large energetic insects that hover while feeding, is very common among epiphytic orchids with long-spurred white flowers, such as *Cyrtorchis arcuata* and *Mystacidium capense*. Similarly, many terrestrial orchids with long-spurred white or pale-green flowers, such as *Bonatea speciosa, Disa cooperi*, *Habenaria epipactidea* and *Satyrium longicauda,* are pollinated by hawkmoths. These insects fly for a short period after dusk, which explains why the orchids they pollinate often release a heady, sweet scent at that time of day. Smaller moths that settle while feeding have also been reported to pollinate orchids, such as *Satyrium bicorne,* that have pale flowers with relatively short spurs.

Orchids that occur in habitats that are not conducive to insect activity may self-pollinate. For example, *Disa glandulosa*, *Disa rosea* and *Disa vaginata* are all self-pollinating species that occur in shady, mossy rock clefts in the Cape Fold Mountains. The most infamous self-pollinating South African orchid is *Disa bracteata,* which has invaded large areas of Australia, presumably because its ability to self-pollinate allows it to produce large numbers of seeds without relying on insect availability. Another weedy, self-pollinating species that rapidly colonizes disturbed ground is *Disa woodii*, found in the eastern part of South Africa.

Vegetative (asexual) reproduction

Vegetative reproduction, which occurs through the proliferation of tubers at the end of long stolonoid (runner-like) roots, is found in some South African terrestrial orchids. Examples include *Disa harveyana*, *Pterygodium catholicum* and *Satyrium odorum*. The latter species is particularly prone to vegetative reproduction in areas where its oil-collecting bee pollinators are scarce or absent.

Hybridization

Orchids are famous for the ease with which they can hybridize. Worldwide there are more than 100,000 officially-named horticultural hybrids (known as grexes) resulting from artificial crosses among more than 5,000 orchid species and their hybrids. Even in the case of *Disa*, a genus containing just a few species that can be cultivated, more than 350 artificial hybrids have been recorded. The tremendous floral variation that can be obtained from hybridization is integral to the selective breeding of new orchid cultivars.

In their natural habitats, orchids are usually prevented from hybridizing – they may occur in different locations, flower at different times, have different pollinators, or place pollen on different parts of the body of pollinators, and thus are unlikely to exchange pollen. Nevertheless, pollinators do sometimes transfer pollen between different orchid species, giving rise to natural hybrids. These can be confusing to anyone trying to make an identification, particularly when the hybrids are backcrossed (when offspring are produced by cross-fertilization between hybrids and one or both of their parent species) resulting in a 'hybrid swarm' of plants that cover the full continuum of variation between species. The best-documented cases of hybrid swarms involve various Cape *Satyrium* species, notably *S. coriifolium* and *S. carneum* at some coastal sites, and *S. erectum*, *S. coriifolium* and *S. bicorne* at inland sites. Extensive hybridization and backcrossing can also occur between *Disa atricapilla* and *Disa bivalvata*, which share the same marsh habitats in the Cape Fold Mountains. In most cases, natural hybridization is a rare event and, even if the resulting hybrid plants reach maturity, they may not produce seeds if their flowers are too different from those of their parents to attract pollinators or place pollen on their bodies. Confirmed cases of natural hybridization are mentioned in the ecology notes for species in this book, and some of the most commonly encountered natural hybrids are illustrated on page 523.

ORCHID CONSERVATION

While researching this field guide, we became acutely aware of the dire conservation status of many of the South African orchid species. We would often arrive at a locality where a population had been well-documented in the past (for example, in herbarium records), only to find that the orchid had completely disappeared because the habitat had been totally transformed by urban development, invasive plants, livestock or cultivation of crops. It is a sobering fact that thousands upon thousands of orchid populations countrywide have been decimated by human-induced transformation of the environment. Some species have not been seen for more than a century and are considered to be extinct. The survival of many other species is hanging by a thread.

Official figures (the IUCN Red List of Threatened Species) prepared by the South African National Biodiversity Institute (SANBI) indicate that 70 species are threatened with extinction and a total of 140 species – roughly one quarter of the orchid flora – are of conservation concern. These figures are only approximate as there is very little data available, particularly for orchids that occur in remote localities or that flower only after fire and are thus seldom seen. Accurate monitoring of orchid

Hawkmoths pollinate many South African orchid species, including *Satyrium longicauda*, which attaches its pollinia to the tongue of these insects.

Disa woodii has bright yellow flowers, but does not depend on pollinators as it is capable of autonomous self-fertilization.

A hybrid (deep pink flowers) growing behind its parent plants, *Satyrium corriifolium* (orange flowers) and *Satyrium erectum* (light pink flowers), in the Western Cape mountains.

The critically endangered *Satyrium rhodanthum* is one of several grassland orchid species threatened by cattle grazing and commercial forestry operations.

populations is a valuable activity, which can be carried out by amateur orchid enthusiasts. One successful example is the long-term monitoring of *Disa barbata* on the Cape west coast by a team of botanists and amateur orchid enthusiasts. Much good work in this respect has been carried out in South Africa by CREW (Custodians of Rare and Endangered Wildflowers), a partnership between SANBI, the Botanical Society of South Africa and the KZN Biodiversity Stewardship Programme.

The greatest threat to orchid populations is habitat transformation, particularly due to urban development, agriculture (crop cultivation and farming with livestock), commercial forestry and alien plant invasions. Threats to different biomes vary – many of the documented extinctions or near extinctions in the Cape region have arisen due to urban development along the coast, crop cultivation and alien plant invasions; however, in the grasslands, commercial forestry and livestock farming are the major causes of habitat loss. Grazing by livestock, unless severe, does not always harm orchid populations, but conversion of grassland to pasture, as is the case with most dairy farming, leads to rapid loss of orchids especially if accompanied by the use of fertilizers. Direct collection of orchids from the wild, either by orchid enthusiasts or individuals harvesting for purposes of traditional medicine, has not yet threatened orchid populations to the same degree as transformation of their habitat. One exception is KwaZulu-Natal where the harvesting of orchids for traditional medicine occurs on a much larger scale.

In theory, the formally protected areas in South Africa, Swaziland and Lesotho should provide protection for many orchid species. In reality, most of these protected areas were established for the conservation of large mammals and are situated in the savanna biome, which is relatively poor in orchid species diversity. There is a critical need for more formal protection of orchid-rich vegetation types, such as renosterveld and lowland fynbos in the Cape region, and montane grasslands in the eastern part of South Africa. Existing nature reserves, such as Verloren Vallei in Mpumulanga, Malolotje in Swaziland and Sehlabathebe in Lesotho, play a vital role in the protection of grassland orchid species.

Orchids worldwide have special status in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). According to this international agreement, orchids listed in Appendix II (which includes all of the South African species) may not be shipped between countries without a special permit. Furthermore, orchids are protected by the laws and ordinances of the various provinces in South Africa, according to which they may not be collected in the wild without a permit, and such permits are generally issued only for scientific studies.

Apart from its being illegal, there is very little point in digging out orchids and trying to cultivate them, as it generally leads to the death of the plant and robs other people of the opportunity to enjoy the plant in its natural habitat. Individuals interested in growing orchids should contact their local orchid society, and can purchase exotic hybrids or even take on the challenge of growing South African orchid species from seeds obtained from nursery-grown plants. However, nothing, in our opinion, surpasses the thrill of discovering and photographing wild orchids in their natural habitats.

FLORAL PARTS OF ORCHIDS

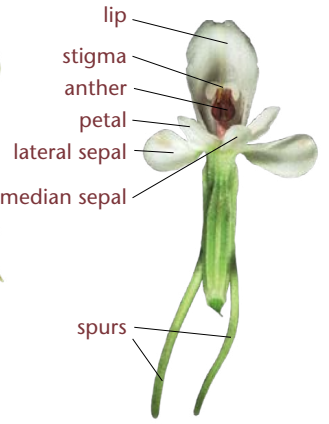
The labelled photographs on these pages illustrate the typical structure of flowers of various genera.

Orchidoid orchids

Bonatea

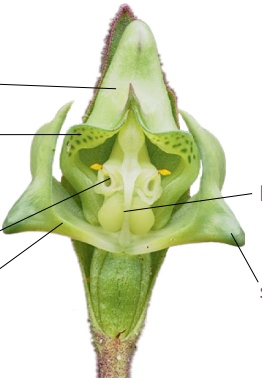
Habenaria

Satyrium



Disa

Disperis

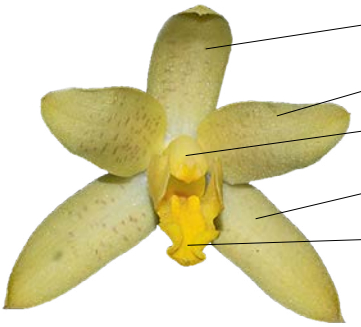


Huttonaea

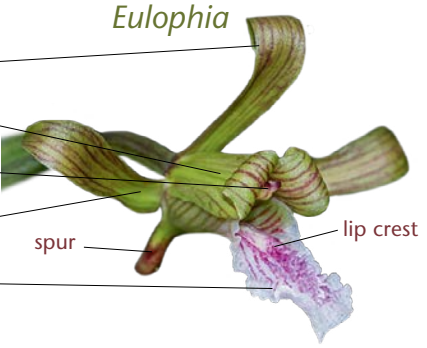
Corycium

Epidendroid orchids

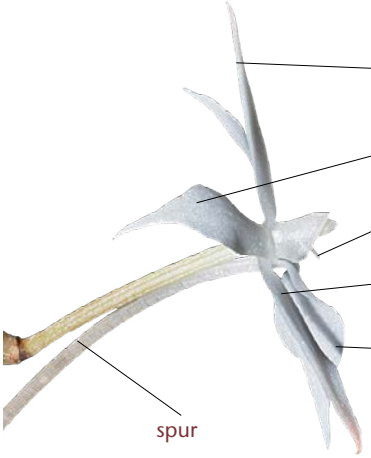
Ansellia



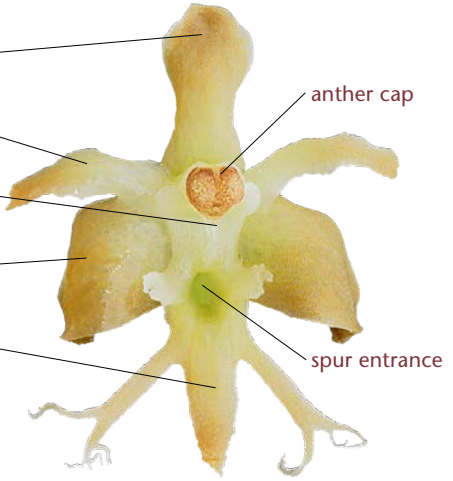
Eulophia



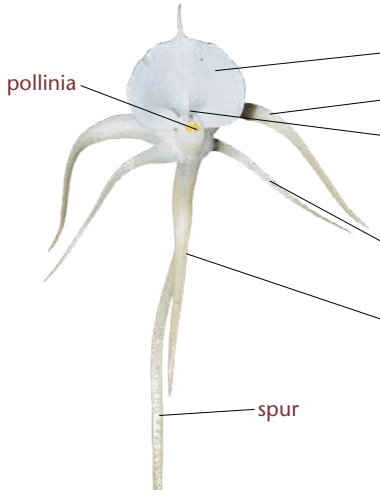
Aerangis



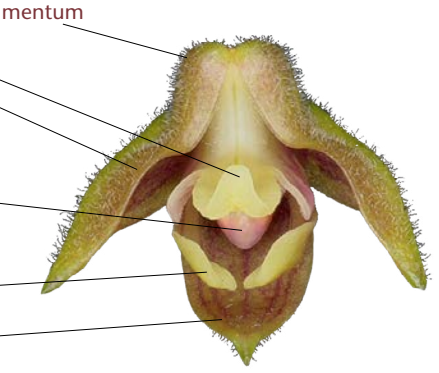
Tridactyle



Angraecum



Polystachya



Species in the orchid flora of South Africa that are not featured in this field guide, either because they have not been seen for many decades, or because no suitable illustrative material could be located.	
Species	**Last confirmed sighting**
Corycium tricuspidatum	1977
Disa brevipetala	1942
Disa cedarbergensis	1987
Disa ecalcarata	1947
Disa forcipata	1897
Disa forficaria	1966
Disa hircicornis	1936
Disa newdigateae	c.1931–1935
Disa welwitschii	c.1931
Habenaria stenorhynchos	1894
Habenaria ciliosa	2014
Holothrix culveri	1890
Holothrix macowaniana	1892
Holothrix micrantha	1925
Nervilia renschiana	Unconfirmed
Oberonia disticha	2010
Pterygodium connivens	1976
Pterygodium newdigateae	c.1895

Left: *Disa forficaria* was last seen in 1966 in the mountains of the Western Cape.
Right: *Disa newdigateae* is considered to be extinct as the last sighting of this orchid was during the late nineteenth century.

HOW TO USE THIS BOOK

This guide is intended to facilitate the identification of orchids in their natural habitat and provide the user with some information regarding their ecology.

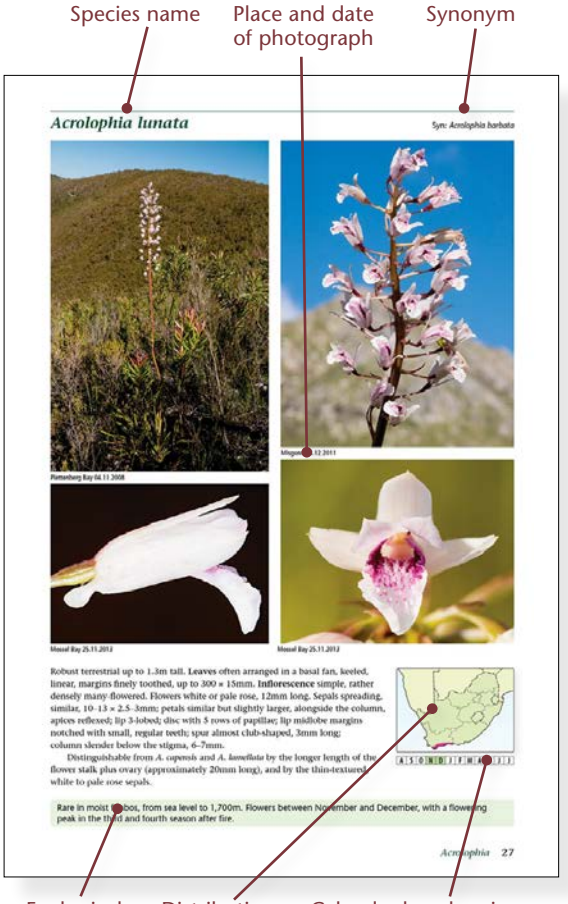
We use the currently accepted scientific name for each orchid species. The genera are listed alphabetically and species are arranged alphabetically within each genus. If the species was featured under a different name in *Wild Orchids of Southern Africa* (1982), *Orchids of Southern Africa* (1999), *Field Guide to the Orchids of Northern South Africa and Swaziland* by Douglas McMurtry, Lourens Grobler, Jolisa Grobler and Shane Burns (2008), or *The Cape Orchids: A Regional Monograph of the Orchids of the Cape Floristic Region* by Bill Liltved and Steve Johnson (2012), then this alternative name (the synonym) is given after the current name. Both the current name and the synonym are listed in the index.

Orchid identification is much easier when the search for a name can be narrowed down to the genus level. Genera tend to have quite distinctive features. For example, *Satyrium* is the only orchid genus with two floral spurs. We therefore encourage readers to familiarize themselves with the section on the basic structure of orchid flowers (in conjunction with the accompanying labelled photographs of orchid flowers) and the brief generic descriptions (in conjunction with photographs of representative species) that are provided in the introductory section to this guide. As an additional tool for identification, we provide a technical key to the genera at the back of the guide.

We have designed this guide so that readers should be able to identify particular species using the photographs, descriptions, maps and flowering-time bars in the species accounts. When selecting photographs, we have tried to illustrate the whole plant in its habitat, the inflorescence, and close-ups of the flowers from both front and side views, with particular attention to diagnostic characters. Different colour forms of flowers and close-ups of leaves are also given in cases where these could be useful for identification. The place and date of each photograph is given below the images. The maps show the extent of the known distribution of each taxon, shaded pink if they are endemic to the region covered by the guide and green if they are more widespread, but it should be understood that not all of the shaded area is necessarily suitable habitat for the taxon; in addition, most orchids have patchy distributions, with some populations separated by hundreds of kilometres. Similarly, the calendar bar shows the range of recorded flowering times, but individual plants may occasionally be found in flower outside of these typical periods.

A brief description is provided to confirm tentative identifications based on the visual aids. Parts of the plant are described from the stem up to the inflorescence, and from the outer parts of the flower to the inner parts. Descriptions of each flower part, such as the lip, are separated by semi-colons, and cover the shape and then size of the part. In cases where similar species could be confused, we have highlighted their most obvious differences in a section of text following the description. Where more than one subspecies or variety are found in the region covered by this guide, they are listed separately after the description of the species, together with an explanation of how to distinguish between them. In cases where only one subspecies or variety of a species is found in the region, this is indicated in the text below the description of the species. We have tried to keep specialized botanical terminology to a minimum, but where use of a term is unavoidable, an explanation of its meaning is provided in the glossary at the end of the book.

The ecological notes give an indication of the abundance of the species, its particular habitat, altitudinal range, pollinators (if known), natural hybrids, and whether fire is required for flowering.



ORCHID GENERA OF THE REGION

Acampe

A genus of eight species, mostly centred in Asia, with a single species in Africa.

Robust, monopodial epiphytes with a stout stem. Leaves in 2 opposite rows, leathery to slightly succulent, folded together lengthwise. Inflorescences compact, usually branched, arising from among the leaves, 1–many-flowered. Flowers non-resupinate, small to medium-sized, fleshy. Sepals and petals similar, free. Lip with a pouch, side lobes usually small.

Acrolophia

A genus of seven species, endemic to South Africa and largely centred in the Cape Floral Region, with one species extending into KwaZulu-Natal.

Terrestrial herbs with short rhizomes and fleshy roots; stems without pseudobulbs. Leaves in 2 rows, often forming a fan, folded lengthwise, leathery. Inflorescence terminal, simple or branched, laxly to rarely densely few- to usually many-flowered. Flowers resupinate or not, medium-sized. Sepals and petals similar, free. Lip more or less 3-lobed, with dense to sparse papillae; spur short, usually present.

Acrolophia is closely related to *Eulophia*, but distinguishable by the terminal inflorescence, the 2-ranked leaves and the lack of pseudobulbs and corms.

Aerangis

A genus of 57 species largely endemic to Africa, with the exception of one species, which extends to Sri Lanka. Four species occur in South Africa.

Epiphytic, monopodial herbs with a short, unbranched, woody stem. Leaves in 2 rows, strap-shaped and widening towards the tip, unequally bilobed, fleshy to leathery, usually with noticeable net-like venation. Inflorescences 1 to several, arising from among or below the leaves, few- to many-flowered. Flowers white, star-shaped. Sepals and petals similar, free. Lip usually wider than sepals and petals, with an elongated nectar-producing spur.

Angraecum

A genus of 222 species largely endemic to Africa, with the exception of one species, which is found in Sri Lanka. Its centre of diversity is in Madagascar where 138 species occur. There are six species in South Africa.

Epiphytic, monopodial herbs with short or long stems. Leaves in 2 rows, unequally bilobed at the tip, very variable in size. Inflorescences arising from among or below the leaves, 1–many-flowered. Flowers very variable in size. Sepals and petals similar, free. Lip distinctly concave and spurred. Rostellum divided into 2 broad lobes.

Ansellia

A genus with only one species, which is endemic to Africa.

Epiphytic herbs with upward-pointing, basket-like roots and erect, cane-like stems up to 1m tall. Leaves alternate, folded, thin but tough, on upper half of stem, lost with age. Inflorescence terminal, branched, laxly many-flowered. Flowers large, showy and very variable in size, shape and coloration throughout its range, green to yellow and usually prominently spotted with brown to maroon. Sepals and petals similar. Lip 3-lobed, with 2 or 3 callus ridges on the midlobe.

Bartholina

A genus of two species confined to the Western, Eastern and Northern Cape, and southern Namibia.

Terrestrial herbs. Leaves solitary, round, lying flat on the ground. Inflorescence single-flowered; flower stalk minutely hairy, leafless. Flowers with petals and lip white to mauve, sepals greenish. Sepals erect and hairy. Lip relatively large, fan-like, much-divided and spurred.

Bartholina shares its flower structure and several vegetative features with *Holothrix*, indicating a close relationship to that genus.

Bolusiella

A genus of four species endemic to Africa, with one species occurring in South Africa.

Very small, monopodial epiphytes; stemless or with very short, woody stem. Leaves succulent, usually

laterally compressed. Inflorescences arising from among or below the leaves, many-flowered; bracts largely obscuring the flowers. Flowers non-resupinate, small, white. Sepals and petals similar. Lip simple or 3-lobed; spur cylindrical.

Bonatea

A genus of 13 species largely endemic to Africa, with the exception of one species, which extends into the Arabian Peninsula. There are 10 species in South Africa.

Robust, terrestrial herbs. Leaves at the base or along the stem, sometimes withered at flowering time. Inflorescence terminal, unbranched, lax to dense, 2–many-flowered. Flowers resupinate, green and white. Sepals unequal; median sepal free, forming a hood with upper petal lobes; lateral sepals reflexed, united at the base with the lower petal lobes, the lip and the stigmatic arms. Petals deeply 2-lobed. Lip 3-lobed from a short, narrow base; spur with a tooth in front of the spur mouth.

Bonatea is similar to *Habenaria*, but is distinguishable by the hood-like central rostellum lobe and the presence of a tooth in front of the spur mouth.

Brachycorythis

A genus of 36 species, of which 24 are found in Africa and 12 in Asia. Seven species occur in South Africa.

Terrestrial herbs with an erect, often densely leafy stem. Leaves cauline, spear-shaped. Inflorescence terminal, with flowers subtended by bracts similar to the cauline leaves, and partially obscuring lowermost flowers, many-flowered. Flowers resupinate. Sepals free. Petals fused to the column at the base. Lip projecting forward, with the limb boat-shaped or spurred, and the blade flattened, entire or 2- or 3-lobed.

Brownleea

A genus of eight species endemic to Africa, with six species occurring in South Africa.

Slender, terrestrial herbs. Leaves 1–3 along the stem. Inflorescence a dense head or a lax spike, 1–many-flowered. Flowers white to mauve, often spotted with darker mauve. Median sepal fused with the petals to form a spurred hood; lateral sepals free. Lip minute, erect in front of the stigma.

Due to the spurred median sepal, *Brownleea* is superficially similar to *Disa*, but is distinguishable by the petals, which are fused to the median sepal, and the erect, almost obscure lip.

Bulbophyllum

A pantropical genus consisting of 1,877 species, of which 291 occur in Africa and four in South Africa.

Epiphytic, or sometimes lithophytic, sympodial herbs on long or short, creeping and often branched rhizomes; pseudobulbs spheroidal to conical, often sharply angled, clustered or well-spaced, with 1 or 2 terminal leaves. Leaves leathery to fleshy. Inflorescence lateral from the base of the pseudobulb, 1–many-flowered, erect or hanging, usually with sessile flowers on opposite sides of the stalk or rarely with all flowers arising from a single point; flower-bearing part of the stalk often swollen and flattened. Flowers usually small, often fleshy. Sepals unequal; lateral sepals fused to the column foot to form a chin-like extension. Petals smaller than sepals, linear. Lip much smaller than sepals, hinged, curved, entire, without a spur. Pollinia 4, in pairs.

Calanthe

A genus of 209 species, centred mainly in Asia. Three species occur in Africa and one in South Africa.

Terrestrial herbs with a short, leafy stem, obscurely swollen into a pseudobulb. Leaves usually large, pleated. Inflorescence simple, arising from among the leaves, many-flowered. Flowers often large and showy. Sepals and petals similar. Lip spurred, fused at the base to the column, with a distinct callus or crest near the base, 3-lobed with the midlobe usually 2-lobed.

Centrostigma

A genus of three species, restricted to continental Africa south of the Equator, with one species occurring in South Africa.

Robust, terrestrial herbs with a leafy stem. Leaves linear to spear-shaped, grading apically into the floral bracts. Inflorescence terminal, lax, 4–20-flowered. Flowers resupinate, medium-sized to large, white, cream or green. Sepals unequal; median sepal hooded; lateral sepals spreading. Petals similar to the lateral sepals, but smaller. Lip united with the column at the base, spurred, deeply 3-lobed with the side lobes fringed.

Centrostigma is very similar to *Habenaria*, but is distinguishable by the longitudinal division of the stigmatic arms.

Ceratandra

A genus of six species, endemic to the western and southern parts of the Cape Floral Region of South Africa.

Terrestrial herbs with slender to fairly robust stems. Leaves numerous, linear, forming a basal rosette as well as spaced along stem. Inflorescence terminal, lax to dense, 6–many-flowered. Flowers resupinate or not. Median sepal fused to the petals; lateral sepals concave. Lip spatula-shaped, with or without appendage; blade more or less anchor-shaped, semi-circular, often with a small callus.

Cheirostylis

A genus of 52 species centred mainly in Australasia and tropical Asia, with three species occurring in Africa and one in South Africa.

Terrestrial herbs with short, erect stems arising from a creeping base rooting at the nodes. Leaves thin-textured. Inflorescence terminal, dense, hairy, many-flowered. Flowers small. Sepals, petals and lip joined to form a funnel-shaped flower. Lip with a pouch at the base; apex more or less 2-lobed.

Corycium

A genus of 14 species restricted to South Africa with the exception of two species, which extend to Malawi and southern Tanzania.

Slender to robust terrestrial herbs. Leaves few to many, on the stem. Inflorescence usually dense, many-flowered. Flowers resupinate or very rarely not. Median sepal almost always fused to the petals and forming a hood; lateral sepals free to fused at the base. Lip fused basally to the column, bearing an appendage that usually overarches the column to a varying extent.

Corymborkis

A genus of six species, of which two occur in Africa, one in South Africa.

Terrestrial herbs with short, branching rhizomes and erect, reed-like stems up to 2m tall. Leaves arranged spirally, pleated, dark green. Inflorescences arising from among the leaves or terminal, few- to many-flowered. Flowers white to greenish-white, often fragrant. Sepals, petals and lip similar and very narrow, only the lip widening towards the tip.

Cynorkis

A genus with 156 species endemic to Africa. Its centre of diversity is in Madagascar, where 103 species occur. Two species are found in South Africa.

Terrestrial herbs, often with glandular-hairy stems. Leaves 1–few, basal. Inflorescence lax or dense, 1–many-flowered. Flowers resupinate, small. Sepals free, unequal. Petals erect, smaller than the sepals, often converging with the median sepal to form a hood. Lip entire, 3- or 5-lobed, spurred at the base.

Cyrtorchis

A genus of 18 species endemic to Africa, centred mainly in West and Central Africa. Two species occur in South Africa.

Epiphytic, or more rarely lithophytic, monopodial herbs with elongated, woody, usually erect, sometimes branched stems. Leaves strap-shaped, leathery to slightly succulent, equally or unequally bilobed, in 2 opposite rows. Inflorescences arising from among the leaves, arching, 5–15-flowered, with conspicuous bracts. Flowers resupinate, white, turning yellow or orange with age, sweet-scented. Sepals and petals similar, strongly recurved at the tips. Lip with a spur that is broader at the mouth and tapering towards the apex.

Diaphananthe

A genus of 33 species endemic to Africa with two species occurring in South Africa.

Epiphytic, monopodial herbs with woody, erect to hanging stems. Leaves leathery or fleshy, unequally bilobed; blades flat to folded lengthwise. Inflorescences several to many, arising from among or below the leaves, few- to many-flowered. Flowers often semi-transparent, whitish to yellow-green. Sepals and petals similar, or petals wider and shorter than sepals. Lip usually wider than long, spurred at the base, with a prominent, tooth-like callus in the throat of the spur. Column stout with both pollinia attached to a common viscidium by separate stipes.

Diaphananthe is similar to *Rhipidoglossum*, but is distinguishable by the conspicuous tooth in the mouth of the spur and by the pollinia, which are both attached to a single viscidium by separate stipes.

Didymoplexis

A genus of 17 species, centred mainly in Asia and the Pacific islands. Two species occur in Africa, one in South Africa.

Slender terrestrial herbs lacking chlorophyll, with erect, unbranched stems. Leaves reduced to scales. Inflorescence terminal, 1–many-flowered. Flowers non-resupinate, white to cream, short-lived, unspurred, with flower stalk elongating rapidly after pollination. Sepals and petals fused shortly at the base. Lip free, often lobed.

Disa

A genus of 183 species, with its centre of diversity in the Cape Floral Region. Largely endemic to Africa, with the exception of one species, which extends into the Arabian Peninsula. There are 143 species in South Africa and one species, *Disa intermedia*, is endemic to Swaziland.

Terrestrial, rarely epiphytic or lithophytic herbs, occasionally producing sterile shoots. Leaves along the stem or at the base, green at flowering time, rarely developing before or after flowering. Inflorescence simple, sometimes head-like, 1–many-flowered. Flowers usually resupinate. Median sepal hooded and spurred. Lip usually narrow.

A large and variable genus that has been expanded over the last few decades through the inclusion of the genera *Herschelia(nthe)*, *Monadenia* and *Schizodium*, which were shown to be part of the *Disa* lineage.

Disperis

A genus of 78 species almost completely confined to Africa, with the exception of one species, which occurs in Asia. There are 26 species in South Africa.

Small and slender terrestrial herbs. Leaves 1–5, sometimes reduced and sheathing, alternate or in a single opposite pair, arising from the base or along the stem, sometimes purple beneath. Inflorescence often 1-sided, 1–many-flowered. Flowers resupinate. Median sepal fused to the petals and often forming a hood or spur; lateral sepals spreading, each with a spur or pouch. Lip ascending inside the hood and usually consisting of a narrow claw, lip blade and an appendage of varying shape.

Some species are difficult to identify as the most distinctive character, namely the lip and its appendage, is hidden within the hood or spur.

Dracomonticola

A genus consisting of a single species restricted to the Drakensberg region of the Eastern Cape, KwaZulu-Natal and Lesotho.

Small and slender lithophytic or terrestrial herbs. Leaves solitary at the base. Inflorescence almost head-like, slightly nodding, few-flowered. Flowers with sepals similar; petals about half as long as sepals. Lip broadly spear-shaped, with obscure side lobes and a slight pouch at the base.

Eulophia

A genus of 167 species with its centre of diversity in Africa, where 125 species occur, 28 of which are found in South Africa.

Terrestrial herbs with leaf-bearing shoot next to flower-bearing stem. Leaves absent to fully developed at flowering time, thin-textured to sometimes leathery or succulent. Inflorescence lateral, erect, simple or rarely branched, few- to many-flowered. Flowers usually resupinate at flowering time. Sepals similar, free. Lip usually 3-lobed, with crests of lamellae, papillae or low, rather warty ridges, with or without a basal sac or a conical to cylindrical spur.

The closely related genus *Orthochilus* is comprised of species that were, until recently, included in *Eulophia*.

Evotella

A genus consisting of a single species endemic to the Western Cape.

Terrestrial herbs. Leaves linear to spear-shaped, cauline. Inflorescence fairly dense, many-flowered. Flowers resupinate, cup-shaped. Median sepal and petals fused; lateral sepals spreading. Lip with undivided, 2-lobed, elongate appendage.

Gastrodia

A genus of 65 species, centred mainly in Asia. Six species occur in Africa, with one species naturalized in South Africa.

Terrestrial herb lacking chlorophyll, with thick, fleshy rhizomes. Leaves reduced to small, membranous scales. Inflorescence lax, 1- to many-flowered. Flowers resupinate or not, on a distinct stalk, often nodding. Sepals and petals mostly fused into a tube, free lobes much shorter than the tube. Lip free, 3-lobed, mobile.

Habenaria

A genus of 839 species, distributed throughout the world's tropical and subtropical regions, with 239 species occurring in Africa and 30 occurring in South Africa.

Slender to robust terrestrial herbs. Leaves 1 or 2 and then flat on the ground or more often many spaced along the stem, with lowermost 2 or 3 smaller, those above much larger and then grading into floral bracts. Inflorescence terminal, lax to dense, few- to many-flowered. Flowers almost always resupinate, mostly green, yellowish-

green or green and white. Sepals free. Petals entire or 2-lobed. Lip 3-lobed or less often undivided, with a long or short spur. Stigma split in two and often on conspicuously forward-projecting processes.

Holothrix

A genus of 46 species, largely endemic to continental Africa, with the exception of two species, which extend into the Arabian Peninsula. There are 23 species that occur in South Africa.

Slender terrestrial or lithophytic herbs. Leaves 1 or 2, round or egg-shaped, flat on the ground, sometimes withered before flowering time. Inflorescence erect, simple, usually hairy, with or without bracts, usually 1-sided or more or less 1-sided. Flowers small. Sepals similar, sometimes fused. Petals entire or fringed. Lip spurred, usually 3–many-lobed.

Holothrix shares its flower structure and several vegetative features with *Bartholina*, indicating a close relationship to that genus.

Huttonaea

A genus of five species endemic to South Africa and Lesotho.

Terrestrial herbs. Leaves 2, upper leaf often smaller. Inflorescence lax, 1–25-flowered. Flowers resupinate, white to pale green, often marked with purple. Median sepal erect; lateral sepals larger and spreading. Petals larger than sepals, with a claw at the base, expanding above into a fringed blade. Lip spreading, broad and conspicuously fringed, without a spur.

Jumellea

A genus of 60 species endemic to Africa, with its centre of diversity in Madagascar. Only one species occurs in South Africa.

Epiphytic or lithophytic, monopodial herbs with upright, woody stems, branching and bearing roots only near the base. Leaves leathery, unequally bilobed at the tip, arranged in 2 rows. Inflorescences arising from among the leaves, single-flowered. Flowers large, white. Sepals and petals similar, narrow, reflexed to spreading. Lip diamond-shaped; claw with a central ridge; spur slender.

Liparis

A genus of 425 species with a worldwide distribution. There are 69 species in Africa, of which 43 occur in Madagascar and the Western Indian Ocean islands, and three in South Africa.

Terrestrial or epiphytic herbs, usually with pseudobulbs. Leaves 1–4, more or less pleated and usually thin-textured. Inflorescence erect, terminal, few- to many-flowered. Flowers resupinate, mostly rather small, green to lime, becoming orange with age. Median sepal much narrower than lateral sepals, which are united in the lower half behind the lip. Petals reflexed, often linear. Lip simple or 2-lobed, firmer than sepals.

Margelliantha

A genus of six species endemic to continental Africa, with one species occurring in South Africa.

Epiphytic, monopodial herbs with short stems. Leaves leathery, in 2 opposite rows, unequally bilobed at tip. Inflorescences lateral, arising from among the leaves, 3–12-flowered. Flowers bell-shaped, white to yellow or pale green. Sepals and petals free. Lip concave, lacking a callus, spurred at the base, with the spur spherical or pouch-shaped.

Microcoelia

A genus of 31 species endemic to Africa, with three species occurring in South Africa.

Leafless, epiphytic, monopodial herbs, usually with conspicuous, often long, branched roots. Stem usually very short but occasionally long. Inflorescences concentrated on apical part of stem, few- to many-flowered. Flowers small to minute, white, often with a green to orange tinge. Sepals and petals similar, free to fused at the base. Lip free, entire to 3-lobed; spur spherical to cylindrical.

Mystacidium

A genus of 10 species endemic to Africa, with seven species occurring in South Africa.

Small, epiphytic, monopodial herbs with very short stems and many roots. Leaves in 2 opposite rows, strap-shaped, leathery. Inflorescences several, simple, arising from among or below the leaves, 1–13-flowered. Flowers resupinate, small, white or pale

green. Sepals similar. Petals smaller than sepals. Lip 3-lobed, without a callus; midlobe sharply deflexed, with a long, tapering, often curved spur.

Some species cannot easily be distinguished solely on morphological characters and can be separated by flowering times only.

Neobolusia

A genus of three species endemic to continental Africa, of which one species occurs in South Africa.

Slender, terrestrial herbs. Leaves 1–3 near the base and several sheathing leaves on the stem, grading into the floral bracts. Inflorescence simple, lax to fairly dense, 1–12-flowered. Flowers resupinate, few to many. Sepals and petals similar. Lip with a callus at the base and wavy edges, without a spur.

Nervilia

A genus of 69 species found in the tropics and subtropics of Africa, Asia and Australasia, with 17 species in Africa, five in South Africa.

Terrestrial herbs. Leaves solitary, heart-shaped or almost circular, stalked, pleated. Inflorescence simple, 1–many-flowered. Flowers resupinate. Sepals and petals similar, free. Lip 3-lobed in the basal part, entire or fringed, variously keeled or crested on upper surface, without a spur.

The various species can be difficult to identify as leaves and flowers do not generally occur at the same time.

Oeceoclades

A genus of 40 species with its centre of diversity in Madagascar. Largely endemic to Africa, with the exception of one species, *Oeceoclades maculata*, which has become a weed in tropical parts of the Americas. Three species are found in South Africa and one species, *Oeceoclades quadriloba*, is found in Swaziland.

Terrestrial or rarely epiphytic, sympodial herbs with aerial pseudobulbs. Leaves 1–3, mostly folded lengthwise, usually with a stalk, often variegated. Inflorescence lateral, simple or branched, few- to many-flowered. Flowers resupinate, small to medium-sized. Sepals and petals similar, free. Lip 4-lobed, sometimes obscurely so, with crest of transverse or longitudinal ridges at the entrance to the spur.

Orthochilus

A genus of 34 species, of which 32 occur in Africa, 12 in South Africa.

Terrestrial herbs with leaf-bearing shoot next to flower-bearing stem. Leaves absent to fully developed at flowering time, pleated, thin-textured to sometimes leathery. Inflorescence lateral, simple, usually dense to almost spherical, usually many-flowered; bracts persistent, often conspicuous. Flowers mostly nodding, not opening widely, uniformly coloured, sometimes with conspicuous, differently coloured disc or papillae on the lip. Sepals and petals similar. Lip 3-lobed, with papillose ridges in basal half, often ending in scattered papillae or warts on the midlobe; spur cylindrical to club-shaped, or absent.

Similar to *Eulophia*, and previously included as part of that genus, but distinguishable by the usually head-like inflorescence with bell-shaped, nodding flowers, by the petals and sepals that are similar in size, shape and colour, and by the papillate distal crest of the lip.

Pachites

A genus of two species endemic to the Western Cape.

Slender to fairly robust terrestrial herbs. Leaves cauline, narrow, the lower spreading and the upper erect. Inflorescence terminal, 3–25-flowered. Flowers non-resupinate. Sepals and petals similar and free. Lip slender, flat, entire or with minute side lobes, without a spur.

Platycoryne

A genus of 19 species endemic to Africa, with only one species occurring in South Africa.

Slender, terrestrial herbs. Leaves basally tufted or on the stem. Inflorescence terminal, often a fairly dense head, few- to many-flowered. Flowers resupinate, mostly yellow, orange or greenish. Sepals free, with the median sepal forming a hood together with the petals, which are entire. Lip entire or 3-lobed; spur cylindrical or slightly club-shaped.

Platycoryne is similar to *Habenaria*, but distinguishable by the short, dense inflorescence, the orange-yellow flowers and by the midlobe of the rostellum, which overtops the anthers.

Platylepis

A genus of 19 species, of which nine occur in Africa, one in South Africa.

Terrestrial herbs with creeping stems rooting at the nodes; erect, flowering portion of the stem leafy. Leaves with a stalk. Inflorescence terminal and congested, many-flowered; bracts often glandular-hairy. Flowers resupinate. Sepals free. Petals partly attached to the median sepal to form a shallow hood. Lip basally fused to the column, pouch-shaped at the base.

Polystachya

A genus of 237 species distributed throughout the world's tropical regions. Its centre of diversity is in Africa, where 220 species occur, 11 of these in South Africa.

Epiphytic or rarely lithophytic, sympodial herbs, with the stems mostly forming pseudobulbs at the base. Leaves 1–6, thin-textured or leathery. Inflorescence terminal, simple or branching, 1–many-flowered; inflorescence and flower stalk often hairy. Flowers non-resupinate, occasionally hairy on the outside. Median sepal free; lateral sepals fused to each other and to the foot of the column, forming a more or less prominent chin-like extension. Lip 3-lobed, hinged at its base to the column foot, sometimes bearing a callus or hairs on its surface, without a spur.

Pterygodium

A genus of 20 species endemic to Africa, with 19 species occurring in South Africa.

Slender to robust terrestrial herbs. Leaves along the stem. Inflorescence terminal, 1–many-flowered. Flowers resupinate or not, shallowly hooded, usually strongly scented. Median sepal fused to the petals. Lip with or without side lobes, bearing an elongate appendage.

Rangaeris

A genus of five species endemic to continental Africa, with one species occurring in South Africa.

Epiphytic or lithophytic, monopodial herbs with a woody stem. Leaves leathery, in 2 opposite rows, often folded lengthwise and bilobed at the tip. Inflorescences arising from among lower leaves, 4–15-flowered. Flowers star-shaped, small to medium-sized, white turning orange with age. Sepals and petals similar, spreading. Lip broader than the sepals and petals, with a long spur. Column short; pollinia attached to a single viscidium by individual stipes.

Rhipidoglossum

A genus of 35 species endemic to Africa, with one species occurring in South Africa.

Epiphytic, monopodial herbs with erect to hanging, woody stems. Leaves leathery or fleshy, flat to folded lengthwise, unequally bilobed at the tip. Inflorescences several to many, arising from among or below the leaves, few- to many-flowered. Flowers often semi-transparent, whitish to yellow-green. Sepals and petals similar, or petals wider and shorter than sepals, spreading. Lip spreading, usually wider than long, spurred at the base, with the tooth-like callus in the throat of the spur obscure or absent. Column stout, pollinia attached to separate viscidia by individual stipes.

Rhipidoglossum is similar to *Diaphananthe* and, until recently, the two were considered one genus; it is distinguishable by the reduced or absent tooth in the mouth of the spur and by the pollinia, which are attached to separate viscidia by individual stipes.

Satyrium

A genus of 91 species, of which 88 occur in Africa and three in Asia. There are 41 species in South Africa.

Terrestrial herbs, occasionally producing sterile shoots. Leaves usually cauline but occasionally 1 or 2 flat on the ground; sheaths on the flowering stem split to the base to fully tubular. Inflorescence few- to many-flowered, with erect, spreading or reflexed bracts. Flowers non-resupinate. Sepals and petals similar, often basally fused or attached to the lip to form a tube. Lip forming a hood over the column, tip often extended into an erect or reflexed flap; spurs 2, elongate or pouch-shaped, rarely missing.

The former genus *Satyridium* contained a single species, which is now included in *Satyrium.*

Schizochilus

A genus of 11 species almost exclusively found in montane and subalpine grasslands of southern and south-central Africa, with eight species occurring in South Africa.

Slender, often flexuose, terrestrial herbs. Leaves linear, mostly clustered at the base. Inflorescence lax to dense, mostly nodding, few- to many-flowered. Flowers small to minute, white, yellow, mauve or a combination of these colours. Sepals and petals similar but petals smaller than sepals. Lip as long as the sepals, spurred, 3-lobed with the side lobes smaller than the midlobe.

Stenoglottis

A genus of four species endemic to continental Africa, with all four occurring in South Africa, its centre of diversity.

Lithophytic and occasionally epiphytic or terrestrial herbs. Leaves in a basal rosette, variously dotted with brown or purple. Inflorescence terminal, erect, lax to dense, few- to many-flowered. Flowers resupinate, white to mauve, often darkly spotted. Sepals and petals similar, but petals slightly shorter and wider. Lip 3–5-lobed, sometimes spurred.

Due to the substantial variation that occurs within some species, several forms have been proposed as new species and, as a result, the genus requires taxonomic revision.

Tridactyle

A genus of 47 species endemic to Africa, with four species occurring in South Africa.

Epiphytic or lithophytic, monopodial herbs forming untidy clumps; stems simple or branching, often lax and straggly. Leaves in 2 opposite rows, alternate, fleshy or leathery, unequally bilobed at the tip. Inflorescences simple, arising from among or below the lower leaves, 2–many-flowered. Flowers in 2 rows, cream to yellow or green. Sepals and petals similar, elongated, pointed, but petals slightly narrower. Lip usually 3-lobed; spur cylindrical, slender, entrance often flanked by a pair of calli.

Vanilla

A genus of 108 species distributed throughout the world's tropical regions. There are 24 species in Africa, with one species occurring in South Africa. The Central American *Vanilla planifolia* is widely cultivated for the natural flavouring extracted from its fermented fruits.

Climbing lianas with roots at the stem nodes; stems succulent, green, leafy or leafless. Leaves fleshy, elliptic, sessile or with a short stalk. Inflorescence lateral or sometimes terminal, few- to many-flowered. Flowers large, often bell-shaped. Sepals and petals free, petals often with a median keel on the outside. Lip decorated with calli or hairs. Pods long and narrow.

Ypsilopus

A genus of five species, endemic to Africa, with one species occurring in South Africa.

Epiphytic, monopodial, erect or hanging herbs with short, sometimes compressed, woody stems. Leaves narrow, usually grass-like, stiff, arranged in a fan. Inflorescences slender, arising from below the leaves, arching to hanging, 1–12-flowered. Flowers white, small and star-shaped. Sepals and petals similar, reflexed. Lip without a callus, flat, obscurely 3-lobed, with a long, slender spur from the base. Column erect, stout; pollinia 2, joined by a slender, Y-shaped stipe to a single, small viscidium.

Zeuxine

A genus of 74 species found in tropical and subtropical Africa, Asia and Australasia. There are seven species in Africa, with one in South Africa.

Terrestrial herbs with an erect, leafy stem. Leaves with or without a stalk, linear to egg-shaped. Inflorescence terminal, lax or dense, few- to many-flowered. Flowers non-resupinate, scarcely opening. Sepals and petals similar, petals converging with the median sepal to form a hood. Lip fiddle-shaped, with a pouch and 2 calli at the base.

Acampe pachyglossa

Syn: *Acampe praemorsa*

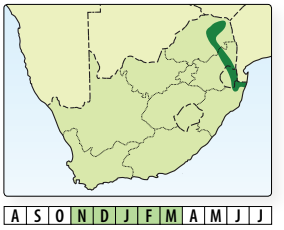
Kaapmuiden 19.01.2012

Kaapmuiden 06.02.2012

Kaapmuiden 06.02.2012

Kaapmuiden 25.02.2013

Robust, often clump-forming epiphyte with stout roots 6–8mm in diameter and somewhat woody stems, up to 300 × 10mm. **Leaves** in 2 opposite rows, succulent, unequally bilobed, up to 120–200 × 15–30mm. **Inflorescence** lateral, branched, compact, up to 150mm long, 15–25-flowered. **Flowers** fleshy, sepals and petals yellow barred with red, lip white with a few reddish spots; 15–20mm in diameter. Sepals 9–12 × 5–6mm; petals 8–10 × 3–4mm; lip 3-lobed, irregularly thickened, 9–11 × 5mm, with a sac at the base; column stout, 2mm tall.



Restricted to a few hot and humid localities, but often locally abundant, usually along streams, from near sea level to 700m. Flowers between November and March.

Acrolophia bolusii

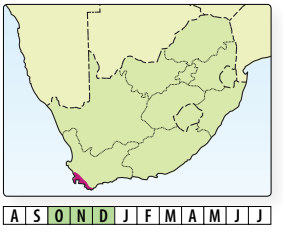
Cape Peninsula 24.10.2006

Cape Peninsula 08.11.2007

Cape Peninsula 28.11.2007

Robust terrestrial 300–800mm tall. **Leaves** overlapping, linear, up to 300 × 15mm. **Inflorescence** branched, laxly many-flowered. **Flowers** non-resupinate, petals and sepals brownish, lip dull yellow or white, margins occasionally suffused with mauve; 10mm wide. Sepals and petals spreading, similar, 6–7 × 2.5–3mm; lip broadly egg-shaped, often recurved, 6–9 × 6–7mm; lip margins upcurved and notched with regular, rounded teeth; disc with 10–20 slender, tall papillae; spur conical, 1mm long; column below stigma stout, 3mm tall.

Distinguishable from *A. cochlearis* by the absence of a basal constriction on the lip, shorter spur and longer sepals. The two species have little geographical overlap.



Found on coastal sandy flats or rarely on gravelly hills, from near sea level to 50m, but occasionally up to 450m. Flowers between October and December.

Acrolophia capensis

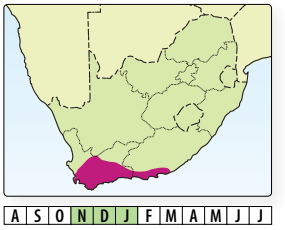
Cape Peninsula 30.11.2008

Still Bay 21.12.2012

Oudtshoorn 17.12.2013

Cape Peninsula 30.11.2008

Robust terrestrial 150–800mm tall. **Leaves** keeled, linear, up to 450 × 15mm. **Inflorescence** simple or more commonly with up to 10 branches, laxly few- to many-flowered. **Flowers** rather variable, sepals and petals green to purplish-brown, lip white with purple callus and side lobes; 10–15mm long. Sepals spreading, 9–13 × 2.5–3mm; petals slightly wider, alongside the column, with apices reflexed; lip 3-lobed; disc with 5–7 rows of papillae; spur almost club-shaped, 1.5–2.5mm long; column below stigma slender and laterally flattened, 5–6mm long; anther cap with 2 prominent lateral horns.



Distinguishable from *A. lamellata* by the smaller flowers and different flowering time. Distinguishable from *A. lunata* by the shorter length of the flower stalk plus ovary (10–15mm long), and thick-textured, green to purplish-brown sepals.

Widespread in fynbos, from near sea level to 2,000m. Flowers between November and January.

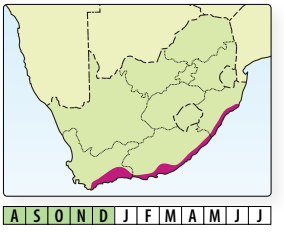
Acrolophia cochlearis

Mossel Bay 03.11.2007

KZN south coast 31.08.2013

Mossel Bay 01.12.2013

Robust terrestrial up to 1m tall. **Leaves** overlapping, keeled, linear, up to 400 × 15mm. **Inflorescence** with up to 5 branches, laxly to rarely densely many-flowered. **Flowers** non-resupinate, sepals and petals brownish; lip dull yellow; 7mm long. Sepals spreading, similar, 5–6mm long; median sepal slightly shorter; lip very obscurely 3-lobed, basally constricted, deeply concave with regular, round-toothed margin; disc more or less densely papillate with 3–5 rows of papillae; spur pouch-shaped, 1.5mm long; column below stigma stout, 2mm tall.



Distinguishable from *A. bolusii* by the presence of a basal constriction on the lip, longer spur and shorter sepals. The two species have little geographic overlap. Distinguishable from *A. micrantha* by the absence of side lobes on the lip and by the non-resupinate flowers.

Widespread in sand in coastal fynbos and scrub, from near sea level to 850m. Pollinated by plasterer bees. Flowers between late August and December.

Acrolophia lamellata

Syn: *Acrolophia capensis* var. *lamellata*

Cape Peninsula 28.10.2006

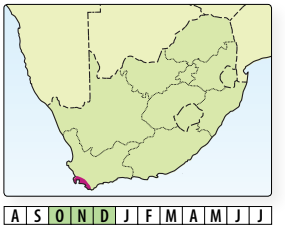
Cape Peninsula 08.11.2007

Cape Peninsula 29.10.2008

Cape Peninsula 28.10.2007

Cape Peninsula 30.09.2010

Robust terrestrial 150–830mm tall. **Leaves** often in a basal fan, keeled, linear to spear-shaped, margins finely toothed, up to 200 × 15mm. **Inflorescence** usually simple, occasionally with several branches; laxly many-flowered. **Flowers** with sepals and petals green to purplish-brown, lip midlobe white, side lobes purple; 7mm long. Sepals equal, spreading, 13–20 × 3–4mm; petals slightly wider, alongside the column, apices reflexed; lip 3-lobed; disc with 5–7 rows of papillae; midlobe somewhat recurved with margins notched with small, regular teeth; spur slender to club-shaped, 3–5mm long; column below stigma slender and laterally flattened, 8mm long; anther cap with 2 prominent lateral horns.



Distinguishable from *A. capensis* by the larger flowers and different flowering time. Distinguishable from *A. lunata* by the shorter length of flower stalk plus ovary (10–15mm long), and thick-textured, green to purplish-brown sepals.

Found in coastal sandy areas, from near sea level to 400m. Flowers mainly in October, but up to December.

Acrolophia lunata

Syn: *Acrolophia barbata*

Plettenberg Bay 04.11.2008

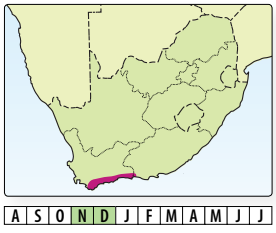
Misgund 14.12.2011

Mossel Bay 25.11.2013

Mossel Bay 25.11.2013

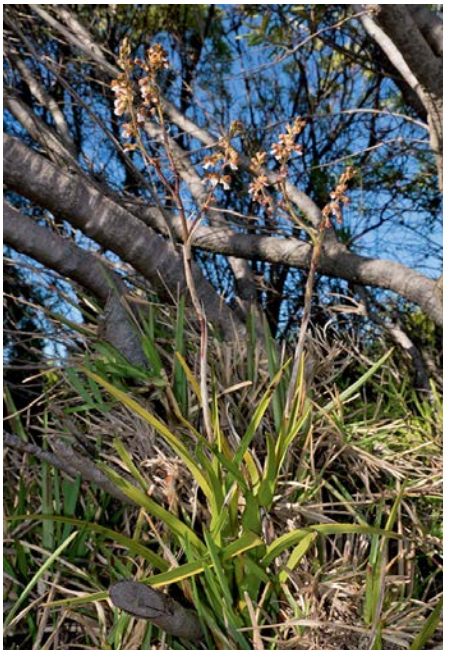
Robust terrestrial up to 1.3m tall. **Leaves** often arranged in a basal fan, keeled, linear, margins finely toothed, up to 300 × 15mm. **Inflorescence** simple, rather densely many-flowered. **Flowers** white or pale rose, 12mm long. Sepals spreading, similar, 10–13 × 2.5–3mm; petals similar but slightly larger, alongside the column, apices reflexed; lip 3-lobed; disc with 5 rows of papillae; lip midlobe margins notched with small, regular teeth; spur almost club-shaped, 3mm long; column slender below the stigma, 6–7mm long.

Distinguishable from *A. capensis* and *A. lamellata* by the longer length of the flower stalk plus ovary (approximately 20mm long), and by the thin-textured, white to pale rose sepals.



Rare in moist fynbos, from sea level to 1,700m. Flowers between November and December, with a flowering peak in the third and fourth season after fire.

Acrolophia micrantha



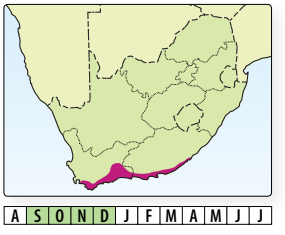
Betty's Bay 19.10.2013

Betty's Bay 09.10.2011

Betty's Bay 09.10.2008

Robust terrestrial 250–600mm tall. **Leaves** overlapping, keeled, linear, margins smooth or finely toothed, up to 300 × 145mm. **Inflorescence** with up to 5 branches, laxly many-flowered. **Flowers** with sepals and petals purplish-green or brown, lip white, lip side lobes purplish; 7mm long. Sepals and petals similar, 4–5 × 1.5–3mm; lip distinctly 3-lobed; disc with 3 rows of erect papillae; lip midlobe margins notched with small, regular teeth; spur pouch-shaped, 1.5mm long; column stout below the stigma, 1–2mm tall.

Distinguishable from *A. cochlearis* by the distinct side lobes of the lip and by the resupinate flowers.



Mostly near the coast, from near sea level to 350m. Flowers between September and December.

Acrolophia ustulata

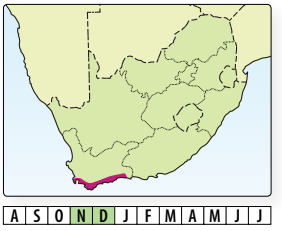
Mossel Bay 26.11.2012

Mossel Bay 25.11.2013

Mossel Bay 06.12.2003

Mossel Bay 25.11.2013

Slender terrestrial 20–100mm tall. **Leaves** overlapping, almost folded together, linear to spear-shaped, up to 50 × 5mm. **Inflorescence** simple, 3–10-flowered. **Flowers** uniformly coloured, dark maroon or rarely greenish-yellow, 8mm long. Sepals and petals similar, 7–8.5 × 2.5–3mm; lip obscurely 3-lobed; lip midlobe reflexed, densely and coarsely covered with nipple- or wart-like projections, except along the margins; lip side lobes point upwards; column slender, 6mm long.



Very rare in sand in fynbos, from near sea level to 750m. Flowers between November and December, after fire, with a peak in the second year after fire.

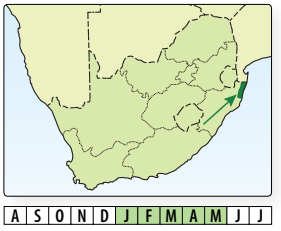
Aerangis kirkii

KZN north coast 07.03.2014

KZN north coast 07.03.2014

KZN north coast 02.10.2012

Slender epiphyte with woody stem 10–50mm long and roots 1–2mm in diameter. **Leaves** 2–7, dark to greyish-green, spear-shaped with apex widest, unequally bilobed, up to 150 × 30mm. **Inflorescences** lateral, 1 to several, up to 170mm long, 2–6-flowered. **Flowers** spreading, white with a pink-tinged spur. Sepals and petals similar, 16–28mm long and 5–7mm wide; lip oblong, 16–20 × 7–8mm, with apex tapering to a long tip; spur thread-like, hanging, 60–75mm long.



Very rare in coastal bush and riverine forest, from near sea level to 200m. Flowers between January and May.

Aerangis mystacidii

Eshowe 15.02.2013

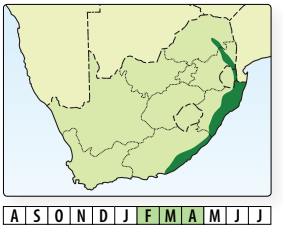
Eshowe 25.02.2011

KZN north coast 11.04.2013

Eshowe 15.02.2011

Fairly robust epiphyte with woody stems up to 30mm long. **Leaves** spear-shaped, unequally bilobed, lobes rounded to tapering, 30–150 × 12–25mm. **Inflorescences** lateral, 1 to several, horizontal or hanging, 100–200mm long, 4–15-flowered. **Flowers** white. Sepals and petals similar, spreading to reflexed, 6–13 × 2–5mm; median sepal arched over the column; lip oblong-elliptic, tapering to a pointed apex, deflexed, 7–12 × 3–6mm; spur slender, 50–80mm long.

Distinguishable from *A. somalensis* by the shorter spur.



Fairly common in subtropical coastal and submontane forests, from sea level to 800m. Flowers between February and April.

Aerangis somalensis

Tzaneen 12.03.2013

Tzaneen 09.03.2013

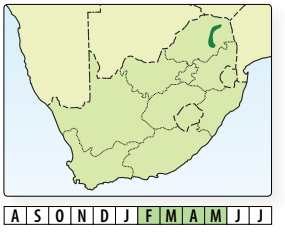
Tzaneen 18.11.2012

Tzaneen 09.03.2013

Tzaneen 09.03.2013

Fairly robust epiphyte with woody stem up to 15mm long. **Leaves** 2–6, spear-shaped, often with wavy margins, deeply and almost equally bilobed, lobes blunt to tapering, grey-green with a raised darker reticulation on the upper surface, 45–110 × 20–30mm. **Inflorescences** lateral, 1 to several, 100–200mm long, 4–17-flowered. **Flowers** white. Sepals and petals similar, reflexed, 8–14 × 3–7mm; median sepal arching over the column; lip narrowly oblong, rounded to tapering, 9–15 × 4–7mm; spur slender, 100–120mm long.

Distinguishable from *A. mystacidii* by the longer spur.



Rare in riverine forest, from 600–1,200m. Flowers between February and May.

Aerangis verdickii

Tzaneen 03.01.2014

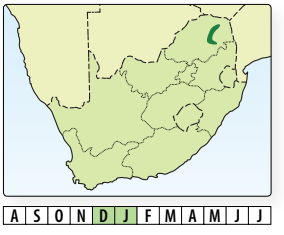
Tzaneen 03.01.2014

Tzaneen 03.01.2014

Tzaneen 03.01.2014

Robust epiphyte with woody stems up to 40mm long. **Leaves** strap-shaped, widest at distal end and narrowing towards the base, unequally bilobed, lobes rounded to tapering, margins wavy, 50–200 × 20–50mm. **Inflorescences** lateral, 1 to several, 200mm long, 4–12-flowered. **Flowers** white with an ivory to cream spur. Sepals unequal, median erect, arching over the column, 11–20 × 4–8mm, laterals deflexed, twisted to face backwards, 16–21 × 3–5mm; petals reflexed, 14–20 × 6–8mm; lip deflexed, 16–18 × 6–9mm; spur 120–160mm long.

Var. *verdickii* is widespread south of Rwanda and is the only variety occurring in South Africa.



Very local in rather dry woodland and montane forests, from 600–900m. Flowers between December and January.

Angraecum chamaeanthus

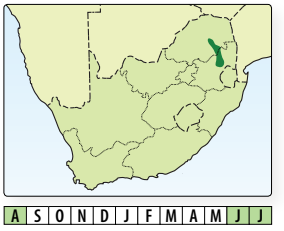
Kaapsehoop 06.07.2013

Graskop 12.08.2012

Kaapsehoop 06.07.2013

Kaapsehoop 06.07.2013

Minute twig epiphyte with stems less than 10mm long. **Leaves** 3–6, strap-shaped to elliptic, rather fleshy, 9–22 × 5mm. **Inflorescences** lateral, 1 to several, up to 20mm long, 5–12-flowered. **Flowers** white. Sepals 1.5 × 1mm; petals and lip slightly smaller; spur conical to spherical, 1.5mm long.



Localized and often abundant, but mostly overlooked, in montane forests, from 1,300–1,700m. Flowers between June and August.

Angraecum conchiferum

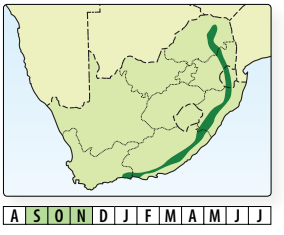
Graskop 20.09.2010

Graskop 20.09.2010

Graskop 04.07.2013

Graskop 10.09.2013

Slender, hanging epiphyte with stems up to 300mm long, branching and often tangled. **Leaves** 8–16, adjacent, narrowly strap-shaped, unequally bilobed, 30–60 × 4–8mm. **Inflorescences** 1 to several, lateral, opposite leaves; flower stalk 20–30mm long, slender, single-flowered. **Flower** non-resupinate, sepals, petals and spur cream to yellowish-green, lip white. Sepals and petals similar, spreading, 25–30 × 2–4mm; lip very broadly egg-shaped, concave, shortly tapering to a long tip or with apiculus up to 7mm long, 12 × 10mm; spur tapering, 30–45mm long.



Rare, but may be locally common in cool, moist forests, often on yellowwood trees, from 200–1,600m. Flowers between September and November.

Angraecum cultriforme

KZN north coast 16.01.2013

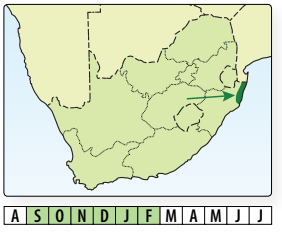
KZN north coast 29.01.2013

KZN north coast 22.03.2013

KZN north coast 29.01.2013

KZN north coast 11.02.2013

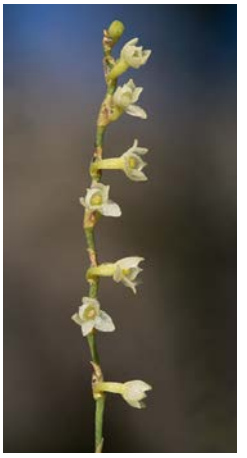
Slender epiphyte with stems up to 250mm long. **Leaves** in 2 rows, linear to strap-shaped, very unequally bilobed with each of the lobes tapering to a point, dull green, often suffused with yellow-bronze, 50–60 × 5–8mm. **Inflorescences** 1 to several, lateral, opposite leaves, 1–4-flowered. **Flowers** pale salmon. Sepals and petals similar, somewhat reflexed, 6.5–10 × 2.5–3mm; lip deeply concave with margins and apiculus reflexed, 7 × 3mm; spur club-shaped, 14–15mm long.



Localized, in deep shade in coastal forest, often near the ground, from near sea level to 250m.
Flowers between September and February.

Angraecum pusillum

Umtamvuna 27.06.2013



Umtamvuna 10.06.2013

Umtamvuna 26.06.2013

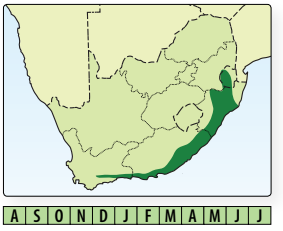
Wilderness 30.08.2013

Umtamvuna 16.11.2011

Wilderness 30.08.2013

Dwarf epiphyte with erect stems up to 25mm long. **Leaves** 5–10, grass-like, linear, rounded, thin, in a dense terminal cluster on the stem, 40–160 × 3–4mm. **Inflorescences** several, lateral, emerging below leaves, up to 100mm long, laxly 4–15-flowered. **Flowers** white to cream. Sepals and petals similar, 1.2–1.5 × 1mm, with apices reflexed; lip deeply hooded, 2.3 × 1.5mm, 1.5mm deep; spur pouch-shaped, 1mm long.

Distinguishable from *A. sacciferum* by the white to cream flowers and inflorescence with up to 15 flowers.



Scattered and localized, often overlooked due to its small size, growing in temperate forests, from near sea level to 1,500m. Flowers at different times in various localities, according to the timing of rainfall.

Angraecum sacciferum

Heidelberg (Western Cape) 17.01.2011

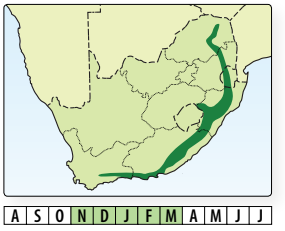
Graskop 13.12.2012

Heidelberg (Western Cape) 03.03.2011

Heidelberg (Western Cape) 03.03.2011

Dwarf twig epiphyte with erect stems up to 40mm long. **Leaves** 4–8, stiff, nearly erect, flat, linear to strap-shaped, obscurely and unevenly bilobed, 20–60 × 3–7mm. **Inflorescences** 1 to several, lateral, emerging below leaves, 1–5-flowered. **Flowers** lime-green. Sepals spreading, 3–4 × 1.5mm, with apices slightly reflexed; petals flat, 2–3 × 1mm; lip deeply hooded, 2–3mm × 1mm, 2–2.5mm deep; spur pouch-shaped, rounded, sometimes club-shaped, 2mm long.

Distinguishable from *A. pusillum* by the lime-green flowers and inflorescence with up to 5 flowers.



Localized, but often abundant in cool, moist forests, from near sea level to 1,800m. Flowers between November and March.

Angraecum stella-africae

Syn: *Angraecum* sp. aff. *rutenbergianum*

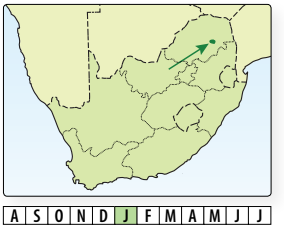
Vumba (Zimbabwe) 15.01.2004

Tzaneen 25.01.1976

Vumba (Zimbabwe) 15.01.2004

Tzaneen 23.02.2014

Slender epiphyte with erect stems 10–15mm long. **Leaves** 5 or 6, spreading horizontally, greenish-grey, linear, 30–50 × 6–7mm. **Inflorescences** 1 or 2, arising below the leaves, single-flowered. **Flower** greenish-white. Sepals somewhat reflexed, 15–18 × 4–5mm; petals similar to sepals, but narrower and shorter, 10–15 × 2–3mm; lip egg-shaped, flat, 13–20 × 12–14mm; spur 120–150mm long.



Very rare in forests, grows on *Englerophytum magalismontanum*, from 1,300–1,500m. Flowers in January.