

An analysis of the orchid flora of Mt Mulanje, Malawi

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ABSTRACT

The composition of the orchid flora of Mt Mulanje, Malawi, is analysed. The altitudinal distribution of the orchids, the distribution of the terrestrial and epiphytic species and the extralimital distribution of the species is assessed for both genera and subfamilies (after the systematic concept of Dressler 1981). The altitudinal distribution of species endemic to Malawi is also assessed. The terrestrial species show a significant increase with altitude whereas the epiphytic species are more dominant at the lower levels. A similar increase is also found in the species endemic to Malawi. An analysis of the distributions shared with other African countries reveals that most species also occur in Zambia, Zimbabwe and East Africa, whereas significantly fewer species are shared with Angola, southern Africa, Moçambique, Zaïre and West Africa. Most species shared with tropical African countries are found on the lower slopes of Mt Mulanje.

UITTREKSEL

Die samestelling van die orgidee-flora van Mt Mulanje, Malawi, word ondersoek. Die verspreiding van die orgideë bo seevlak, die verspreiding van die terrestriële en epifitiese spesies, en die verspreiding van die spesies buite Mt Mulanje word vir genusse sowel as subfamilies (volgens die sisteem van Dressler 1981) bepaal. Die verspreiding bo seevlak van die soorte endemies aan Mt Mulanje word ook ondersoek. Die aantal terrestriële spesies neem aansienlik toe met hoogte bo seevlak, terwyl epifitiese spesies meer dominant laer af is. Spesies endemies aan Malawi toon 'n soortgelyke toename. 'n Analise van die verspreidings toon dat die meeste soorte ook in Zambië, Zimbabwe en Oos-Afrika voorkom. Minder spesies word egter met Angola, suidelike Afrika, Mosambiek, Zaïre en Wes-Afrika gedeel. Die meeste spesies wat ook in tropiese Afrika voorkom, word teen die onderste hange van Mt Mulanje aangetref.

INTRODUCTION

The Mulanje massif (Figure 1) is an isolated mountain block in the southeastern corner of Malawi. The massif is comparatively small, covering only about 640 km² (Eastwood 1988; measured at the 800 m contour). From the surrounding plains at around 600–700 m the steep slopes rise abruptly to plateaux at 1 800–2 000 m, which are divided by ridges and peaks of up to 3 000 m. The slopes and the plateaux offer a wide variety of different habitats, ranging from lowland rain forests (Figure 2A) and savanna woodland (Figure 2B) to montane grassland (Figure 2C) and seepage areas overlying bare rock (Figure 2D). Almost the entire mountain massif is now a Forest Reserve, but very few of the lowland forests at the base of the mountain and on the lower slopes are left following the planting of tea and coffee.

The botanical exploration of Mt Mulanje began in 1891 (Chapman 1962) when Alexander Whyte made the first extensive collections. The earliest extensive botanical survey of the mountain was that of Chapman (1962) on the vegetation and the plant communities of Mt Mulanje, in which also climatological, geological and soil data were accumulated. Particularly the forest flora has since then attracted a great deal of attention, and has been the subject of several exhaustive publications (most notably Dowsett-Lemaire 1988).

The orchid flora of Mt Mulanje is one of the richest in Malawi and is especially rich in terrestrial species.

Although the orchid flora of the whole of Malawi has been written up already (La Croix *et al.* 1991; epiphytic orchids only: La Croix *et al.* 1983; Morris 1970), neither a local orchid flora of Mt Mulanje nor a complete checklist are available to date. However, some detailed information on the distribution of orchids on the massif was given in the orchid flora of Malawi (La Croix *et al.* 1991) as well as by Chapman (1962), Dowsett-Lemaire (1988) and in some taxonomic papers.

As Mt Mulanje is relatively isolated and may be a halfway station between the eastern highlands of Zimbabwe and the large upland areas of Nyika and southern Tanzania, an analysis of the composition of the orchid flora of Mt Mulanje is of interest. Consequently, special attention is paid to the altitudinal distribution of orchids, to the distribution of terrestrial and epiphytic species, to the distribution of the species in other African countries, and to the distribution of species endemic to Malawi. It may be somewhat premature for an analysis of this kind as the data base may be incomplete, but it is unlikely that further records will affect the main results of the study. The mountain massif has been divided into four altitudinal zones:

- 1, Mulanje base; this area comprises lowland rain forests in the adjacent parts of the surrounding plain as well as the foothills; it is now largely confined to forest patches in cultivated land; approximately up to 900 m;
- 2, slopes and gorges; savanna woodland and mid-altitude to afromontane forests; approximately 900–1 900 m;
- 3, plateaux; grassland and afromontane forest; approximately 1 700–2 300 m;
- 4, peaks and ridges above the plateaux.

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FIGURE 1.—Map of the Mt Mulanje Massif. Major settlements, ●; peaks, ▲; mountain huts, ■; R, rivers. Dotted lines indicate footpaths. Tea Estates and other localities: 1, Lujeri Estate; 2, Likhubula Forest Station; 3, Chikatali Estate; 4, Esperanza Estate; 5, Pwazi Estate; 6, Mlanje Boma; 7, Limbuli Estate; 8, Mimosa Estate; 9, Boma Cottage; 10, Chisambo.

RESULTS AND DISCUSSION

The orchid flora

A total of 173 orchid species in 45 genera have been recorded on Mt Mulanje (Tables 1, 2). A recent enumeration of orchids has also been provided for the Nyika Plateau in northern Malawi (Williamson 1979), and some comparisons between Mulanje and Nyika are made below. However, such comparisons are somewhat problematic as low-lying areas were not included in Williamson's (1979) study.

Almost all of the southern African terrestrial orchid genera are represented on Mt Mulanje. Most of them reveal affinities to the orchid floras of South Africa and south central Africa where the largest concentration of species as well as most of the related species are found (*Disa*, *Brownleea*, *Satyrium*, *Disperis*, *Schizochilus*, *Neobolusia*, *Stenoglottis*). *Disa*, *Disperis* and *Satyrium* are rather poor in species numbers on Mt Mulanje when compared to Nyika, which is probably partly due to the considerably larger grassland area on Nyika. As far as *Disa* is concerned, the watershed between the rivers Zaïre and Zambesi which includes the Nyika Plateau is generally rich in Disinae and was considered an important centre of the subtribe (Linder 1983). As in most other African countries the large pantropical genera *Habenaria* and

Eulophia are well represented on Mt Mulanje. *Eulophia* (20 species) is the largest terrestrial orchid genus, followed by *Habenaria* (14 species) and *Satyrium* (12 species; Tables 1, 3). This is in contrast to the Nyika Plateau where *Habenaria* as well as *Disa* and *Satyrium* outnumber *Eulophia* (Williamson 1979). However, the abundance of low-lying areas on Mt Mulanje partly accounts for the predominance of *Eulophia*. Only six species of the largely Madagascan genus *Cynorkis* occur on Mt Mulanje. Several other terrestrial orchid genera occur with a single or few species, including the palaeotropical genus *Nervilia*, the primarily Asian genus *Calanthe*, the cosmopolitan genera *Liparis* and *Malaxis*, and the southern African elements *Herschelianthe* and *Monadenia*. It is interesting that one largely terrestrial species belongs to the primarily epiphytic genus *Polystachya*.

It is interesting to note that three terrestrial orchid genera, *Bonatea*, *Centrostigma* and *Pterygodium*, occurring in southern and East Africa do not occur on Mt Mulanje. *Pterygodium*, although well represented in South Africa and also occurring in Tanzania, has not yet been collected in Malawi or central Africa. *Corycium*, closely related to *Pterygodium* and with a similar distribution (well represented in South Africa, also known in Tanzania; P. Cribb pers. comm.) has only recently been discovered in a rather restricted area on Mt Mulanje (Kurzweil, unpublished). Possibly the lack of *Pterygodium* in central

Africa is similarly the result of under-collecting of certain areas. Further terrestrial genera which occur in Malawi but have not yet been found on Mt Mulanje are *Zeuxine*, *Epipactis*, *Epipogium*, and *Phaius*.

Because of the occurrence of lowland forests at the base of the mountain and on the lower slopes, an abundance of epiphytes have been recorded in the past, although some species have been recorded before the expansion of the

tea and coffee plantations and may since have disappeared. The epiphytic orchids mainly belong to the genera *Polystachya*, *Bulbophyllum*, *Aerangis*, *Angraecum*, *Cyrtorchis*, *Diaphananthe*, *Tridactyle* and their allies, although epiphytic orchids are also known in some primarily terrestrial genera (*Disa*, *Brownleea*, *Stenoglottis*). *Liparis* is represented by terrestrial as well as epiphytic species. The largest epiphytic genera are the predominantly African genus *Polystachya* (20 species) and the large pantropical



FIGURE 2.—Various habitats on Mt Mulanje. A, lowland forest; B, savanna woodland; C, plateau grassland, *Satyrium trinerve* in the foreground; D, seepage area on bare rock, here colonized by *Satyrium rhynchantoides*.

TABLE 1.—The genera represented on Mt Mulanje, their systematic position, worldwide number of species as well as number of species recorded on the mountain massif, and their overall distribution (classification after Dressler 1981, number of species after La Croix *et al.* 1991).

Subfam. Spiranthoideae	
Tribe Erythrodeae	
Subtribe Tropidiinae	<i>Corymborkis</i> (6-7/1; pantr)
Subtribe Goodyerinae	<i>Platylepis</i> (10/1; Afr)
Subfam. Orchidoideae	
Tribe Orchideae	
Subtribe Orchidinae	
	<i>Brachycorythis</i> (30/1; palaeotr)
	<i>Schwartzkopffia</i> (2/1; Afr)
	<i>Neobolusia</i> (4/1; Afr)
	<i>Schizochilus</i> (10/1; Afr)
	<i>Holothrix</i> (56/3; Afr)
Subtribe Habenariinae	<i>Cynorkis</i> (120-130/6; Mad)
	<i>Habenaria</i> (500/14; pantr)
	<i>Platycoryne</i> (17/2; Afr)
	<i>Roeperocharis</i> (5/1; Afr)
	<i>Stenoglottis</i> (3/1; Afr)
Tribe Discaeae	
Subtribe Disinae	
	<i>Brownleea</i> (7/3; Afr)
	<i>Disa</i> (121/6; Afr)
	<i>Herschelianthe</i> (16/1; Afr)
	<i>Monadenia</i> (16/1; Afr)
Subtribe Satyriinae	<i>Satyrium</i> (100/12; Afr)
Subtribe Coryciinae	<i>Corycium</i> (14/1; Afr)
	<i>Disperis</i> (70-80/3; Afr)
Subfam. Epidendroideae	
Tribe Gastrodieae	
Subtribe Nerviliinae	<i>Nervilia</i> (60-70/4; palaeotr)
Subtribe Gastrodiinae	<i>Didymoplexis</i> (20/1; As)
Tribe Arethuseae	
Subtribe Bletinae	<i>Calanthe</i> (200/1; As)
Tribe Malaxideae	<i>Liparis</i> (250/3; c)
	<i>Malaxis</i> (300/1; As)
Tribe Epidendreae	
Subtribe Eriinae	<i>Stolzia</i> (15/2; Afr)
Subtribe Bulbophyllinae	<i>Bulbophyllum</i> (1000/15; pantr)
Subfam. Vandoideae	
Tribe Polystachyeae	
Tribe Vandaeae	
Subtribe Sarcanthinae	<i>Acampe</i> (10/1; As)
Subtribe Angraecinae	<i>Angraecum</i> (100-150/6; Mad)
	<i>Jumellea</i> (45/2; Mad)
Subtribe Aerangidinae	<i>Aerangis</i> (50/7; Afr)
	<i>Angraecopsis</i> (10/3; Afr)
	<i>Bolusiella</i> (6/2; Afr)
	<i>Calypstrochilum</i> (2/1; Afr)
	<i>Cyrtorchis</i> (16/4; Afr)
	<i>Diaphanthe</i> (40/5; Afr)
	<i>Eggingia</i> (2/1; Afr)
	<i>Microcoelia</i> (27/2; Afr)
	<i>Mystacidium</i> (9/1; Afr)
	<i>Rangaeris</i> (5/1; Afr)
	<i>Tridactyle</i> (35-40/7; Afr)
	<i>Ypsilopus</i> (4/1; Afr)
Tribe Cymbidieae	
Subtribe Cyrtopodiinae	
	<i>Ansellia</i> (1/1; Afr)
	<i>Eulophia</i> (200/20; pantr)
	<i>Oeceoclades</i> (30/1; pantr)

c = cosmopolitan; pantr = pantropical; palaeotr = palaeotropical; Afr = primarily African; Mad = primarily Madagascan; As = primarily Asian

genus *Bulbophyllum* (15 species; Tables 1, 3). Several of the species have their southern-most and western-most limits of distribution in Malawi (see also Dowsett-Lemaire 1989). Comparatively few of the African epiphytic genera are not found on the mountain (e.g. *Chamaeangis*, *Solenangis*, *Ancistrorrhynchus*). The epiphytic genera

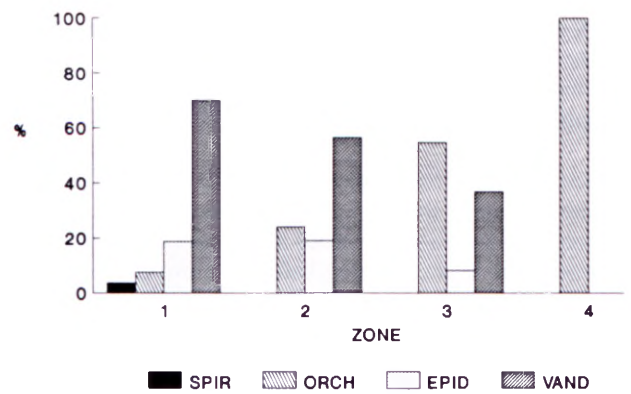


FIGURE 3.—Distribution of subfamilies in the zones 1-4.

belonging to the tribe Vandae clearly outnumber all other epiphytic genera, which, however, may partly also be the result of extensive taxonomic splitting in this tribe.

The systematic position of the genera found on Mt Mulanje is shown in Table 1. The classification follows Dressler (1981) throughout. All of the orchid subfamilies are represented except the non-African Cyripedioideae and Apostasioideae. However, the subfamily Spiranthoideae is very poorly represented (Table 4), and is confined to the base of the mountain (Figure 3). The three remaining subfamilies Orchidoideae, Epidendroideae and Vandoideae are rich in species, and all their African tribes and subtribes except Vanilleae and Epipogieae (both Epidendroideae) are represented. The percentage of Orchidoideae increases significantly with altitude, and all of the orchids found in zone 4 belong to this subfamily (Figure 3). Evidently the two subfamilies Epidendroideae and Vandoideae are less dominant at higher levels than they are in zone 1.

Terrestrial and epiphytic species

Whereas the overall percentage of terrestrial and epiphytic species on the mountain is almost equal (51% and 49%, respectively), significant altitudinal differences exist (Table 2 and Figure 4). Only 30% of the species grow terrestrially at the Mulanje base, but the terrestrial species account for 44% in zone 2 and for 61% in zone 3. The orchids in zone 4 are exclusively terrestrial. Evidently, the percentage of epiphytic orchids decreases with altitude.

Extralimital distribution of the species

The Africa-wide distributions of the species recorded on Mt Mulanje were arranged after zones as well as after

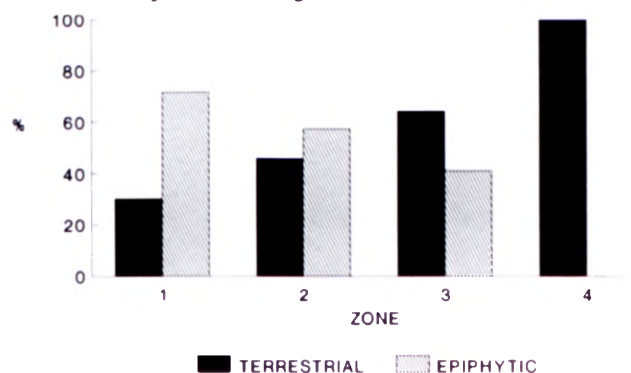


FIGURE 4.—Percentage of terrestrial and epiphytic orchids in zones 1-4.

TABLE 2.—The number of orchid species recorded on Mt Mulanje, the number of terrestrial and epiphytic species and their altitudinal distribution. The altitudinal distribution and the distribution of terrestrial and epiphytic species is also summarized for the subfamilies and for the whole orchid family. An asterisk indicates taxa with species which may be epiphytic or terrestrial

Genus	Mt Mulanje	Zone 1	Zone 2	Zone 3	Zone 4
<i>Acampe</i>	1 (ep)	1			
<i>Aerangis</i>	7 (ep)	6	7	1	
<i>Angraecopsis</i>	3 (ep)	1	3	3	
<i>Angraecum</i>	6 (ep)	1	3	3	
<i>Ansellia</i>	1 (ep)	1	1		
<i>Bolusiella</i>	2 (ep)	1		1	
<i>Brachycorythis</i>	1 (t)		1	1	
<i>Brownleea*</i>	3 (1 ep/3 t)		1/1	1/3	0/2
<i>Bulbophyllum</i>	15 (ep)	7	13	2	
<i>Calanthe</i>	1 (t)		1		
<i>Calyptrochilum</i>	1 (ep)	1	1		
<i>Corycium</i>	1 (t)			1	
<i>Corymborkis</i>	1 (t)	1			
<i>Cynorkis</i>	6 (t)		4	5	1
<i>Cyrtorchis</i>	4 (ep)	3	4		
<i>Diaphananthe</i>	5 (ep)	3	2	1	
<i>Didymoplexis</i>	1 (t)	1			
<i>Disa*</i>	6 (1 ep/6 t)		1/1	1/5	0/2
<i>Disperis</i>	3 (t)	1	2	1	
<i>Eggelingia</i>	1 (ep)		1		
<i>Eulophia</i>	20 (t)	6	16	4	
<i>Habenaria</i>	14 (t)	1	11	6	
<i>Herschelianthe</i>	1 (t)			1	1
<i>Holothrix</i>	3 (t)		3	3	1
<i>Jumellea</i>	2 (ep)		1	2	
<i>Liparis*</i>	3 (2 ep/2 t)	1/2	2/2	1/1	
<i>Malaxis</i>	1 (t)		1		
<i>Microcoelia</i>	2 (ep)	2	1		
<i>Monadenia</i>	1 (t)			1	1
<i>Mystacidium</i>	1 (ep)		1	1	
<i>Neobolusia</i>	1 (t)			1	
<i>Nervilia</i>	4 (t)		4	1	
<i>Oeceoclades</i>	1 (t)	1	1		
<i>Platycoryne</i>	2 (t)	2	2		
<i>Platylepis</i>	1 (t)	1			
<i>Polystachya*</i>	20 (20 ep/1 t)	6/0	19/1	8/1	
<i>Rangaeris</i>	1 (ep)		1		
<i>Roeperocharis</i>	1 (t)			1	
<i>Satyrium</i>	12 (t)		2	9	1
<i>Schizochilus</i>	1 (t)			1	1
<i>Schwartzkopffia</i>	1 (t)		1		
<i>Stenoglottis*</i>	1 (ep/t)		1	1	
<i>Stolzia</i>	2 (ep)		1	2	
<i>Tridactyle</i>	7 (ep)	4	5	2	
<i>Ypsilopus</i>	1 (ep)		1	1	
Subfam. Spiranthoideae	2 (t)	2 (t)			
Subfam. Orchidoideae*	58 (3 ep/58 t)	4 (t)	29 (3 ep/29 t)	40 (3 ep/40 t)	10 (t)
Subfam. Epidendroideae*	27 (19 ep/9 t)	10 (8 ep/3 t)	23 (16 ep/8 t)	6 (5 ep/2 t)	
Subfam. Vandoideae*	86 (65 ep/22 t)	37 (30 ep/7 t)	68 (51 ep/18 t)	27 (23 ep/5 t)	
Total Orchidaceae	173 (87 ep/91 t)	53 (38 ep/16 t)	120 (70 ep/55 t)	73 (31 ep/47 t)	10 (t)

subfamilies and are shown in Table 5. The figures for the zone 4 and those for the subfamily Spiranthoideae are evidently statistically less reliable than the others as the number counted is rather low ($n=10$ and $n=2$, respectively).

Within Malawi, the highest number of species is shared with the remaining parts of the Southern Region (particularly the Zomba Plateau) where 80% of all Mulanje species occur. Sixty eight percent of orchids are shared with the Northern Region. The comparatively high species number in the Northern Region is mainly due to the occurrence of two orchid-rich areas, the Viphya Plateau and the Nyika Plateau. Only 44% of the species from Mulanje have also been recorded from the Central Region. Sixty-six to 77%

TABLE 3.—The ten largest genera occurring on Mt Mulanje. The number of species follows La Croix *et al.* (1991)

Genus	No. of species
<i>Eulophia</i>	20
<i>Polystachya</i>	20
<i>Bulbophyllum</i>	15
<i>Habenaria</i>	14
<i>Satyrium</i>	12
<i>Aerangis</i>	7
<i>Tridactyle</i>	7
<i>Angraecum</i>	6
<i>Disa</i>	6
<i>Cynorkis</i>	6

TABLE 4.—The division of orchid genera and species on Mt Mulanje according to subfamilies. The classification follows Dressler (1981). Numbers of genera and species after La Croix *et al.* (1991)

Subfamily	Genera	Species
Spiranthoideae	2 (4.4%)	2 (1.2%)
Orchidoideae	17 (37.8%)	58 (33.5%)
Epidendroideae	7 (15.5%)	27 (15.6%)
Vandoideae	19 (42.2%)	86 (49.7%)

of the orchids found on Mt Mulanje also occur in Zambia, East Africa and Zimbabwe, while considerably fewer species are shared between Mt Mulanje and Angola, southern Africa, Moçambique, Zaïre and West Africa. The figure for Madagascar is, as could be expected, the lowest.

Most orchids shared with tropical, continental African countries occur in zone 1, and their number successively decreases with altitude on Mt Mulanje (Table 5). The sharp rise in zone 4 in the orchids shared with Madagascar is noteworthy although it may partly also be the result of a low overall number of species ($n=10$). This is to a lesser extent also found in the orchids shared with West Africa. It is also interesting that the tropically widespread species are most common in zone 1, but they are missing in zone 4.

The Spiranthoideae are represented by widespread species only (Table 5). Rather surprisingly, the shared distributions are similar in the two subfamilies Orchidoideae and Vandoideae. The Epidendroideae stand out due to the high percentage of species shared with Madagascar, East and West Africa, and their low percentage of species shared with southern Africa. This is obviously the result of the distribution of *Bulbophyllum* to which the majority of the Epidendroideae on Mt Mulanje belong. The Epidendroideae are also significantly more frequently tropically widespread in their distribution than Orchidoideae and Vandoideae.

TABLE 5.—Percentages of the orchids shared with other African countries, arranged after zones 1–4 as well as after subfamilies (classification after Dressler 1981). Records in tropical Africa after La Croix *et al.* (1991); in southern Africa from Stewart *et al.* (1982)

	S	C	N	Zam	Zim	Ang	SA	Moc	EA	Mad	Zai	WA	Trop
Total Orchidaceae	80	44	68	66	75	33	35	46	77	8	29	33	23
Zone 1	87	55	74	81	85	49	43	70	89	11	53	51	38
Zone 2	84	54	72	68	75	35	36	47	74	6	43	35	25
Zone 3	77	50	68	56	62	19	40	33	70	4	27	18	14
Zone 4	50	—	30	40	40	10	40	10	50	20	20	20	—
Subfam. Spiranthoideae	100	—	50	100	100	100	100	100	100	50	100	100	100
Subfam. Orchidoideae	64	40	64	62	72	24	34	38	76	3	38	19	10
Subfam. Epidendroideae	78	41	78	70	74	33	18	55	85	18	44	59	33
Subfam. Vandoideae	88	50	70	67	76	37	39	48	46	7	41	35	26

S = Malawi, Southern Region excluding Mt Mulanje; C = Malawi, Central Region; N = Malawi, Northern Region; Zam = Zambia; Zim = Zimbabwe; Ang = Angola; SA = southern Africa; Moc = Moçambique; EA = East Africa; Mad = Madagascar; Zai = Zaïre; WA = West Africa; Trop = percentage of species which are widespread in tropical Africa.

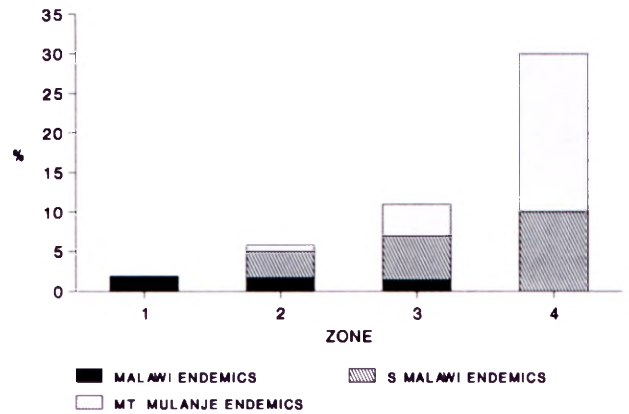


FIGURE 5.—Percentage of endemic species in zones 1–4.

Endemic species

A list of endemic species is given in Table 6. Four species are endemic to Mt Mulanje, three of them being terrestrial. A further six species recorded on Mt Mulanje are endemic to the South Region, and two of the species are endemic to Malawi. It is interesting to note that the percentage of endemic species increases with altitude (Figure 5). This is, however, due to the increase of the S Malawi and the Mt Mulanje endemics, whereas the overall Malawi endemics decrease with altitude.

The number of endemics on Mt Mulanje is considerably lower than on the Nyika plateau where 18 'forms of life' (probably varieties, subspecies and species) are thought to be endemic including six species (Williamson 1979).

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TABLE 6.—Species endemic to Malawi recorded on Mt Mulanje

	Endemic to	
	Malawi	Mt Mulanje
<i>Holothrix johnstonii</i> Rolfe		x
<i>Cynorkis brevicealcar</i> Cribb		x
<i>C. buchananii</i> Rolfe		x
<i>Brownleea mulanjiensis</i> Linder		x
<i>Polystachya songaniensis</i> Williamson		x
<i>P. minima</i> Rendle		x
<i>P. johnstonii</i> Rolfe		x
<i>P. lawrenceana</i> Kraenzl.		x
<i>P. purpureobracteata</i> Cribb & I. la Croix		x
<i>Aerangis distincta</i> J. Stewart	x	
<i>Angraecopsis malawiensis</i> Cribb	x	
<i>Eulophia monticola</i> Rolfe		x

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APPENDIX: A PROVISIONAL CHECKLIST

The species recorded on Mt Mulanje are listed in alphabetical order. The nomenclature follows La Croix *et al.* (1991) throughout. Most of the geographical names are indicated in the map provided (Figure 1). Habitats: e, epilithic or epiphytic; t, terrestrial; gr, grassland; lf, lowland and mid-altitude forest; ma, marsh or bog; mf, montane or submontane forest; pi, pine plantation; ro, on or among rocks; sa, savanna woodland; se, seepage area. Altitudinal zones: 1, Mulanje base; 2, slopes; 3, plateaux; 4, peaks and ridges. Locality and literature references: 1, La Croix *et al.* (1983); 2, La Croix *et al.* (1991); 3, Morris (1970); 4, Dowsett-Lemaire (1988); 5, Herbarium in Zomba (MAL); 6, Stewart (1980); 7, Chapman (1962); 8, Stewart & La Croix (1987); 9, Cribb (1978); 10, Linder (1985); 11, Cribb & Stewart (1985); 12, Linder (1980); 13, Wood (1982); 14, Cribb (1979); 15, Summerhayes (1962); 16, pers. obs. (collecting numbers are given in case of new records only).

- Acampe praemorsa* (Roxb.) Blatter & McCann, e, lf, sa; zone 1, Limbuli stream and Chitakali Estate, 3; Ruo River, 1, 2; Esperanza Estate, 4; Mimosa Estate and Likhubula Valley, 1
- Aerangis*
- alcicornis* (Reichb. f.) Garay, e, lf; zones 1 & 2, Phalombe Gorge, 1, 3, 6
- appendiculata* (De Wild.) Schltr., e, lf, sa; zone 2, Crater, 3, 6
- distincta* Stewart & La Croix, e, lf; zones 1 & 2, Phalombe Gorge, 8; Mimosa Estate, 2; zone 3, Chambe Plateau, 2
- kotschyana* (Reichb. f.) Schltr., e, lf, sa; zone 1, Phalombe Plain, 1, 3; zone 2, Little Ruo Basin, 6
- mystacidii* (Reichb. f.) Schltr., e, lf, sa; zone 1, 1, 2, 3, 4, 6; zone 2, Crater, 4; Likhubula Forest Station, 2, 3, 6; Lichenya River, 2, 3
- splendida* Stewart & La Croix, e, lf; zones 1 & 2, Ruo Gorge, 2, 4, 8; Limbuli stream, 8
- verdickii* (De Wild.) Schltr., e, sa; zone 1, Limbuli Estate, 2
- Angraecopsis*
- amaniensis* Summerh., e, lf, sa; zone 2, Likhubula Valley, 3
- malawiensis* Cribb, e, lf, mf; zone 2, Little Ruo Plateau, 1, 2; Crater, 2, 4
- parviflora* (Thouars) Summerh., e, lf; zone 1, 1, 3, 4; zone 2, Crater, 2, 3, 4; Ruo Gorge, 1, 2, 3, 4; Likhubula Valley, 3; Chisongeli and Lichenya, 4
- Angraecum*
- aff. angustipetalum* Rendle, e; locality unknown, 2, 3
- chamaeanthus* Schltr., e, mf; zones 2 & 3, 2, 3, 4
- conchiferum* Lindl., e, mf; zone 3, Lichenya and Sombani Plateaux, 2, 3
- cultriforme* Summerh., e, lf; species identity doubtful (La Croix *et al.* 1991); zone 1, 1, 2, 3
- sacciferum* Lindl., e, mf; zone 2, Crater, Likhubula Valley, 3; Chisongeli, 4; zone 3, 1, 2, 3, 4
- stella-africae* Cribb, e, sa; zone 2, Ruo Gorge, 2
- Ansellia africana* Lindl., e, lf; zones 1 & 2, Lower Ruo River, 1
- Bolusiella*
- iridifolia* (Rolfe) Schltr. subsp. *picea* Cribb, e, mf; zone 3, 1, 2, 4
- maudae* (Rolfe) Schltr., e, lf, sa; zone 1, 1
- Brachycorythis pleistophylla* Reichb. f. subsp. *pleistophylla*, t, gr, sa; zones 2 & 3, Lichenya Path and Chambe Plateau, 2
- Brownleea*
- maculata* Cribb, e/t, mf; zone 2, Ruo Gorge, 2; zone 3, 1, 2, 9
- mulanjiensis* Linder, t, gr; zone 3, Madzeka Plateau, 2, 10; Chinzama Plateau, 2; zone 4, Sapatwa peak, 2, 10
- parviflora* Harv. ex Lindl., t, gr; zones 3 & 4, Lichenya Plateau and Thuchila Path, 2; Chinzama Plateau, 16

- Bulbophyllum
 elliotii *Rolfe*, e, sa; zones 1 & 2, 1, 2, 3
 encephalodes *Summerh.*, e, lf, sa; zone 1, Pwazi River, 3; Lujeri Estate, 2; zone 2, Ruo Gorge, 1, 3
 fuscum *Lindl.* var. *melinostachyum* (*Schltr.*) *J.J. Vermeulen*, e, lf, sa; zones 1 & 2, Likhubula Valley and Fort Lister, 2
 gravidum *Lindl.*, e, lf, sa; zone 2, Ruo Gorge, 1, 2, 3, 4
 humblotii *Rolfe*, e, lf; zone 1, 1, 2, 3
 intertextum *Lindl.*, e, lf; zone 2, Ruo Gorge, 1, 2, 3, 4; Crater, 3, 4; Chisongeli, 4
 josephii (*Kuntze*) *Summerh.*, e, lf, sa; zone 2, SE slopes, 2; foothills, 3; Ruo Gorge, 1, 3, 4; Chisongeli, 4
 longiflorum *Thouars*, e, lf; zone 1, 1, 2, 3; zone 2, Mlanje Boma, 3
 maximum (*Lindl.*) *Reichb. f.*, e, sa; zone 1, 1, 2, 3, 4; zone 2, Ruo Gorge, 4
 oreonastes *Reichb. f.*, e, lf, sa; zone 2, 1, 3; probably misidentified and is in fact *B. fuscum* *Lindl.* (*La Croix et al.* 1991)
 rugosibulbum *Summerh.*, e, sa; zone 2, 1, 2
 sandersonii (*Oliv.*) *Reichb. f.*, e, lf, mf, sa; zone 2, Ruo Gorge, 3, 4; Chisongeli, 4; Likhubula River, 2, 3; Limbuli stream and Sombani Path, 3; zone 3, Chambe Plateau, 3; Chisongeli and Lichenya Plateau, 4
 scaberulum (*Rolfe*) *H. Bol.*, e, lf, sa; zone 2, 1, 2
 stolzii *Schltr.*, e, mf; zone 3, 2, 4
 unifoliatum *De Wild.* var. *infracarinatum* (*Williamson*) *J.J. Vermeulen*, e, lf; zones 1 & 2, Ruo Gorge, 1, 2, 3, 4
 Calanthe sylvatica (*Thouars*) *Lindl.*, t, lf; zone 2, Lichenya Path, 2
 Calyptrochilum christyanum (*Reichb. f.*) *Summerh.*, e, lf, sa; zone 1, 1, 2, 3, 4; zone 2, Likhubula Valley, 2, 3; Ruo Gorge, 2, 3, 4
 Corycium dracomontanum *Parkman & Schelpe*, t, gr; zone 3, Sombani Plateau, 16 (*Kurzweil 1492*, NBG!)
- Corymborkis corymbis *Thouars*, t, lf; zone 1, Lichenya Forest, 2, 7; Ruo Estate, 2; zone 2, Crater, 2
- Cynorkis
 anacamptoides *Kraenzl.*, t, gr, ma, se; zone 2, Lichenya Path and Likulezi Path, 2; zone 3, Chinzama Plateau, 2; Chambe Plateau and Ruo Gorge, 3
 brevicar *Cribb*, t, se; zones 3 & 4, 2, 11, 16
 buchananii *Rolfe*, t, se, pi; zone 3, Lichenya and Madzeka Plateaux, 2; Chambe Plateau, 5
 hanningtonii *Rolfe*, t, lf, mf, pi, sa; zone 2, Boma Path, 2, 3; Likhubula Valley and Limbuli stream, 3; Sombani Path, 16
 kassneriana *Kraenzl.*, t, mf, pi; zones 2 & 3, Lichenya Path, 2, 16; Chambe Plateau, 2, 3; Sombani Path, 16
 kirkii *Rolfe*, t, lf, gr, se; zone 2, Likhubula Valley, 3; Sombani Path, 16; Lichenya Path, 16, 5; zone 3, Thuchila Plateau, 16; Chambe Plateau, 5
- Cyrtorchis
 arcuata (*Lindl.*) *Schltr.*
 subsp. *variabilis* *Summerh.*, e, lf, sa; zone 1, 1, 2, 3
 subsp. *whytei* (*Rolfe*) *Summerh.*, e, lf, sa; zones 1 & 2, Likhubula Valley, 2, 3; Crater, Pwere stream, Limbuli stream, Pwazi River and Chapaluka stream, 3
 crassifolia *Schltr.*, e, sa; zone 2, 1, 2, 3
 praetermissa *Summerh.*, e, sa; zones 1 & 2, 1, 2, 3, 4
 ringens (*Reichb. f.*) *Summerh.*, e, lf, mf, sa; zone 1, Lujeri Estate, 3; zone 2, Ruo Gorge, 2, 3, 4; Likhubula River, Crater and Sombani Path, 3; Chisongeli, 4
- Diaphanthe
 fragrantissima (*Reichb. f.*) *Schltr.*, e, lf, sa; zone 1, 1, 2, 3, 4; zone 2, Crater, 4
 rutila (*Reichb. f.*) *Summerh.*, e, lf; zone 1, Lower Ruo River, 1, 2; Lichenya forest, 2; Chisambo, 4
 stolzii *Schltr.*, e, lf; zone 2, Crater, Limbuli stream and Lujeri Estate, 3; Ruo Gorge, 1, 2, 3, 4; Chisongeli, 2, 4
 subsimplex *Summerh.*, e, mf; zone 3, Lichenya Plateau, 1, 2, 4
 xanthopollinia (*Reichb. f.*) *Summerh.*, e, lf, mf, sa; zone 1, Lower Ruo River, 1, 2
- Didymoplexis africana *Summerh.*, t, lf; zone 1, Lujeri Estate, 2
- Disa
 aconitoides *Sond.* subsp. *concinna* (*N.E.Br.*) *Linder*, t, gr, ma, sa; zone 3, Chambe Plateau, 2, 5; Thuchila Plateau, 16
 erubescens *Rendle* subsp. *erubescens*, t, gr, ma; zone 3, 2, 16
 fragrans *Schltr.*, t, se; zone 3, Lichenya Plateau, 2
 ochrostachya *Reichb. f.*, t, gr, ma; zone 4, Saptwa peak, 2
 perplexa *Linder*, t, ma; zone 3, Lichenya, Chinzama, Sombani and Madzeka Plateaux, 2, 16
 saxicola *Schltr.* e/t, ro, se; zone 2, Sombani Path, 16; zone 3, Lichenya and Madzeka Plateaux, 2; zone 4, Saptwa and Chilemba peaks, 5
- Disperis
 anthoceros *Reichb. f.*, t, mf, sa; zone 2, Limbuli stream, 3
 dicrochila *Summerh.*, t, mf, pi; zone 3, Chambe, Thuchila and Madzeka Plateaux, 2
 leuconeura *Schltr.*, t, lf; zones 1 & 2, Likhubula Valley, Esperanza Estate, 2
- Eggelingia clavata *Summerh.*, e, lf; zone 2, Ruo Gorge, 1, 2, 4
- Eulophia
 callichroma *Reichb. f.*, t, sa; zone 2, Likhubula Valley, 2
 clavicornis *Lindl.* var. *nutans* (*Sond.*) *A.V. Hall*, t, gr, ma; zones 2 & 3, 2
 cucullata (*Afzel. ex Swartz*) *Steud.*, t, gr, ma, sa; zones 1–3, 2
 eylesii *Summerh.*, t, sa; zone 2, Phalombe Gorge, Likulezi Path and Likhubula Valley, 2
 fridericii (*Reichb. f.*) *Hall*, t, sa; zone 2, Likhubula Valley, 2
 horsfallii (*Bateman*) *Summerh.*, t, lf; zone 1, Lujeri Estate, 2
 livingstoniana (*Reichb. f.*) *Summerh.*, t, gr, ma, sa; zones 1 & 2, 2
 longispala *Rendle*, t, sa; zone 2, Likhubula Valley, 2
 macrantha *Rolfe*, t, under bamboo; zone 1, Limbuli and Ruo Estates, 2
 monticola *Rolfe*, t, gr; zone 3, Lichenya Plateau, 2; Chambe Plateau, 5
 norlindhii *Summerh.*, t, sa; zones 1 & 2, Lichenya Path and Phalombe Gorge, 2
 nyasae *Rendle*, t, sa; zone 2, 2
 odontoglossa *Reichb. f.*, t, gr, sa; zone 2, Lichenya, Sombani and Chapaluka Paths, 2
 rara *Schltr.*, t, gr; zone 2, Chambe, Chapaluka and Lichenya Paths, 2
 rolfeana *Kraenzl.*, t, sa; zone 2, Likhubula Valley, 2
 seleensis (*De Wild.*) *Butzin*, t, sa; zone 2, Likhubula Valley, 2; Sombani Path, 5
 streptopetala *R. Br. ex Lindl.*, t, lf, mf, sa; zones 2 & 3, 2, 16
 subsaprophytica *Schltr.*, t, sa; zone 2, Likhubula Valley, 2
 venulosa *Reichb. f.*, t, sa; zones 1 & 2, Likhubula Valley, 2
 zeyheri *Hook. f.*, t, gr; zone 2, Lichenya Path, 2
- Habenaria
 amoena *Summerh.*, t, sa; zone 2, Likhubula Valley, 2
 cornuta *Lindl.*, t, gr, sa; zones 2 & 3, Sombani Path, 2
 disparilis *Summerh.*, t, sa; zone 2, 2
 humilior *Reichb. f.*, t, gr; zone 3, Thuchila Plateau, 2
 macrandra *Lindl.*, t, lf; zone 2, Ruo Gorge, Crater, 2
 macrostele *Summerh.*, t, gr, se; zone 2, Lichenya and Sombani Paths, 2; zone 3, Thuchila and Chambe Plateaux, 5; Chinzama, Lichenya, Sombani and Madzeka Plateaux, 16
 malacophylla *Reichb. f.*, t, lf; zone 2, Ruo Gorge, 5
 myodes *Summerh.*, t, sa; zone 2, 2, 15
 nyikana *Reichb. f.* subsp. *nyikana*, t, sa; zone 2, Likhubula Valley, 2; zone 3, Madzeka Plateau, 5
 petitiana (*A. Rich.*) *Dur. & Schinz*, t, lf, mf; zones 2 & 3, Lichenya Path, 2; zone 3, Thuchila Plateau, 5
 praestans *Rendle*, t, gr, sa; zones 2 & 3, Lichenya Path, 2; Sombani Path, 16
 tentaculigera *Reichb. f.*, t, sa; zone 2, Sombani Path, 16 (*Kurzweil 1413*, NBG!)
- trilobulata *Schltr.*, t, lf, sa; zone 1, Likhubula Valley, 2
 welwitschii *Reichb. f.*, t, gr; zone 3, 2
- Herschelianthe baurii (*H. Bol.*) *Rauschert*, t, gr; zone 3, 2; zone 4, 7
- Holothrix
 johnstonii *Rolfe*, t, se; zone 2, Likhubula Valley and Lichenya Path, 5; zone 3, 2, 3; zone 4, Path to Saptwa, 3
 longiflora *Rolfe*, t, gr, sa, se; zone 2, Lichenya Path, 2; Sombani Path, 16; zone 3, 2, 3, 7
 orthoceras (*De Wild.*) *Reichb. f.*, t, lf, mf; zone 2, Lichenya Path, 2; Likhubula Valley, 2, 3; zone 3, Chambe Plateau, 3
- Jumellea
 filicornoides (*De Wild.*) *Schltr.*, e, lf, sa; zone 2, Crater, 2, 3; Chisongeli, 2; Likhubula Valley, 3; zone 3, 1
 usambarensis *Wood*, e, mf; zone 2, Chisongeli, 4; slopes below Lichenya, 13; zone 3, 1, 2, 3, 4
- Liparis
 bowkeri *Harv.*, t/e, lf, mf, sa; zone 1, 1; zone 2, Ruo Gorge, 1, 2, 3; Lichenya Path and Likhubula Valley, 2; Sombani Path and slope above Mlanje Village, 16; zone 3, 1, 2, 3
 caespitosa (*Thouars*) *Lindl.*, e, lf, mf; zone 2, 1, 2
 nervosa (*Thunb.*) *Lindl.*, t, gr, sa; zones 1 & 2, Lichenya Path, 2
- Malaxis weberbaueriana (*Kraenzl.*) *Summerh.*, t, lf, mf; zone 2, Ruo Gorge, 2
- Microcoelia
 exilis *Lindl.*, e, lf; zones 1 & 2, 1, 2
 moreauae *L. Jonsson*, e, lf; zone 1, 1, 2
- Monadenia brevicornis *Lindl.*, t, gr; zone 3, Lichenya and Madzeka Plateaux, 2; Chinzama and Sombani Plateaux, 16; Thuchila

- Plateau, 5; zone 4, Thuchila-Sombani divide, 16; Chilemba and Saptwa peaks, 5
- Mystacidium tanganyikense *Summerh.*, e, mf; zone 2, Crater, 3; Chisongeli, 4; zone 3, 1, 2, 3, 4
- Neobolusia stolzii *Schltr.*, t, gr, se; zone 3, Lichenya Path, 2; Chambe, Sombani and Chinzama Plateaux, 16
- Nervilia
 adolphii *Schltr.*, t, sa; zone 2, Lichenya Path, 2
 pectinata *Cribb*, t, lf, mf; zones 2 & 3, Ruo gorge, 2
 kotschy (Reichb. f.) *Schltr.*, t, sa; zone 2, Likhubula Valley, 2
 shirensis (*Rolfe*) *Schltr.*, t, sa; zone 2, Likhubula Valley, 2
- Oeoclaudes maculata (*Lindl.*) *Lindl.*, t, lf; zones 1 & 2, Likhubula Valley, 2
- Platycoryne
 mediocris *Summerh.*, t, gr, se; zones 1 & 2, Likhubula Valley, 2
 pervillei *Reichb. f.*, t, gr; zone 1, Lujeri Estate, 2; Limbuli Estate, 5; zone 2, Thuchila and Lichenya Paths, 5
- Platylepis glandulosa (*Lindl.*) *Reichb. f.*, t, lf; zone 1, Lujeri Estate, 2
- Polystachya
 adansoniae *Reichb. f.*, e, sa; zone 2, 1, 2
 albescens *Ridley* subsp. *imbricata* (*Rolfe*) *Summerh.*, e, lf, sa; zone 1, 1, 3; zone 2, Crater, 2, 4; Ruo Gorge, 1, 2, 3, 4; Chisongeli, 4
 brassii *Summerh.*, e, sa; zones 2 & 3, 1, 2, 3
 campyloglossa *Rolfe*, e, mf; zone 2, Ruo Gorge, 1; Lichenya Path, 2
 cultriformis (*Thouars*) *Spreng.*, e, lf, mf; zone 2, Ruo Gorge, 1, 2, 4
 fusiformis (*Thouars*) *Lindl.*, e, lf, mf, sa; zone 1, 1; zone 2, Ruo Gorge, 2, 3, 4; Likhubula Valley, 3; Chisongeli, 4
 greatrexi *Summerh.*, e, lf, sa; zone 1, Limbuli Estate, 2; zone 2, SE slopes, 1, 2; Crater, 4
 heckmanniana *Kraenzl.*, e, mf; zone 2, SE slopes, 2; Ruo Gorge, 1, 2, 4; Chisongeli, 4; zone 3, 2; Lichenya Plateau, 4
 johnstonii *Rolfe*, e on *Xerophyta* sp.; zone 3, 1, 2, 3
 lawrenceana *Kraenzl.*, e, ro, sa; zone 2, Thuchila Path, 2
 minima *Rendle*, e, sa; zone 2, SE slopes, 2
 modesta *Reichb. f.*, e, sa; zones 1 & 2, 1, 2
 purpureobracteata *Cribb & I. la Croix*, e, lf, mf; zone 2, Chisongeli and Ruo Gorge, 2
 simplex *Rendle*, e, lf, sa; zone 2, Ruo Gorge, 1, 2, 4
 songaniensis *Williamson*, e/t, gr, se; zone 2, Boma Path, 2; zone 3, Lichenya Plateau, 2
 stuhlmannii *Kraenzl.*, e, lf, sa; zone 2, Crater, 2
 tessellata *Lindl.*, e, lf, ro, sa; zone 1, 1; Limbuli stream, Pwazi River, Chitakali and Mimosa Estates, Pwere stream, 3; Esperanza Estate and Chisambo, 4; zone 2, Likhubula Valley, 1, 2, 3; Crater and Ruo Gorge, 1, 2, 3, 4; Sombani Path, 2
 transvaalensis *Schltr.*, e, mf, ro; zone 3, 1, 2, 3, 4
 villosa *Rolfe*, e, lf, mf, sa; zones 1 & 2, 1, 2; zone 2, Likhubula Valley, 3; zone 3, Chambe Plateau, 3
 zambesiaca *Rolfe*, e, lf, ro, sa; zone 2, Ruo Gorge and SE slopes, 2; Chisongeli, 4; Boma Path, 3; zone 3, 1, 2, 3, 4
- Rangaeris muscicola (*Reichb. f.*) *Summerh.*, e, lf, sa; zone 2, Crater, 2, 3, 4; Ruo Gorge, 1, 2, 3, 4; Likhubula Valley, 3; Chisongeli, 4
- Roeperocharis wentzeliana *Kraenzl.*, t, gr; zone 3, Chinzama, Madzeka and Lichenya Plateaux, 2; Sombani Plateau, 5
- Satyrium
 aberrans *Summerh.*, t, gr; zone 3, Madzeka Plateau, 2
 amblyosaccos *Schltr.*, t, gr; zone 3, Lichenya Plateau, 2
 anomalum *Schltr.*, t, sa; zone 2, Lichenya Path, 2; Sombani Path, 16
 breve *Rolfe*, t, ma, se; zone 3, Lichenya Plateau, 2
 chlorocorys *Rolfe*, t, gr; zone 3, Lichenya Plateau, 2; Chinzama, Madzeka and Sombani Plateaux, 16
 ecalcaratum *Schltr.*, t, ro; zone 4, 2
 macrophyllum *Lindl.*, t, gr, sa, se; zone 3, Sombani, Thuchila and Chambe Plateaux, 2
 neglectum *Schltr.*, t, gr, ma; zone 2, Lichenya Path, 2; zone 3, Thuchila Plateau, 2; Sombani Plateau, 16
 oliganthum *Schltr.*, t, gr; zone 3, Lichenya, Chambe and Sombani Plateaux, 2
 rhynchantoides *Schltr.*, t, gr, se; zone 3, 3, 16
 shirensis *Rolfe*, t, gr, se; zone 3, Lichenya, Thuchila, Sombani and Madzeka Plateaux, 2
 trinerve *Lindl.*, t, gr, ma; zone 3, Lichenya Plateau, 2; Thuchila, Madzeka and Sombani Plateaux, 16
- Schizochilus sulphureus *Schltr.*, t, gr, se; zones 3 & 4, 2, 12, 16
- Schwartzkopffia lastii (*Rolfe*) *Schltr.*, t, sa; zone 2, Likhubula Valley, 2, 16; Lichenya Path, 2
- Stenoglottis fimbriata *Lindl.*, e/t, lf, mf, sa; zone 2, Crater, 3, 4; Chisambo, Ruo Gorge and Chisongeli, 4; Likhubula Valley, 5; Sombani Path, 16; zone 3, Lichenya Plateau, 4; Thuchila Plateau, 5
- Stolzia
 compacta *Cribb* subsp. *purpurata* *Cribb*, e, lf, mf; zone 2, Ruo Gorge, 2; Chisongeli, 4; zone 3, 1, 2, 4, 14
 repens (*Rolfe*) *Summerh.*, e, lf, mf, sa; zone 3, 1, 2, 3, 4
- Tridactyle
 anthomaniaca (*Reichb. f.*) *Summerh.*, e, sa; zone 1, 1, 2
 bicaudata (*Lindl.*) *Schltr.*, e, lf, sa; zone 1, 1, 2, 3, 4; zone 2, Crater and Ruo Gorge, 3, 4; Chisongeli, 4; Limbuli stream and Chambe Path, 3
 inaequilonga (*De Wild.*) *Schltr.*, e, lf, mf, sa; zone 2, Ruo Gorge, 2, 3; Chisongeli, 4; zone 3, 1, 2, 3, 4
 tricuspis (*H. Bol.*) *Schltr.*, e, mf, sa; zone 3, 2, 3
 tridactylites (*Rolfe*) *Schltr.*, e, lf; zone 1, 1, 2, 3, 4; zone 2, Ruo Gorge, 2, 3, 4; Likhubula Valley, 2, 3; Chisongeli, 4
 tridentata (*Harv.*) *Schltr.*, e, sa; zone 1, 1; zone 2, Likhubula Valley, 2, 3; Limbuli Estate and Sombani Path, 3
 verrucosa *Cribb*, e, ro; zone 2, Chisongeli, 2, 4
- Ypsilopus erectus (*Cribb*) *Cribb & Stewart*, e, mf, sa; zone 2, Lichenya Path, 2; zone 3, 1, 2, 3, 4

The following species apparently do not occur:

- Aerangis brachycarpa (*A. Rich.*) *Dur. & Schinz*; zone 2, Ruo Gorge, 1; zone 3, Chambe Plateau, 1. The specimens are considered to be either *A. distincta* or *A. splendida* (*Stewart & La Croix* 1987; *La Croix et al.* 1991).
- Bulbophyllum oxypterum (*Lindl.*) *Reichb. f.*; 3. The plant belongs to *B. sandersonii* (*La Croix et al.* 1983: 53).