

A synopsis of the genus *Disperis* Sw. (Orchidaceae)

Hubert KURZWEIL

Compton Herbarium, South African National Biodiversity Institute, 7735 Claremont (South Africa)

Current Address: Singapore Botanic Gardens, 1 Cluny Road, 259569 Singapore

kurzweil_43@yahoo.co.uk

John C. MANNING

Compton Herbarium, South African National Biodiversity Institute, 7735 Claremont (South Africa)

manning@sanbi.org

ABSTRACT

An infrageneric classification is provided for the genus *Disperis* Sw. (Orchidaceae, Orchidoideae, Diseae), with a complete enumeration of all species. The genus comprises 74 species of deciduous herbs that grow largely terrestrially in forest, scrub and grassland. Two subgenera are recognised in this study. Subgenus *Dryorkis* comprises 44 species found largely in the tropics and subtropics of Africa, Madagascar and Asia and is defined by a deeply bilobed lip appendage and possibly by apomorphic, baculate pollen. In addition, in many species the lateral sepals are basally fused and the rostellum arms are simple and not twisted. Subgenus *Disperis* comprises 30 species mainly in southern Africa and is defined by an entire lip appendage and usually twisted rostellum arms. Within these subgenera some well defined groups of morphologically similar and presumably related species can be distinguished but the existence of several unusual species makes it premature to propose them as formal taxa. They are consequently recognised as “informal groups”. Subgenus *Disperis* appears to be a monophyletic group but the phylogenetic status of subgenus *Dryorkis* is not clear at present. The taxonomic value of several vegetative and floral structures is briefly discussed.

KEY WORDS

Orchidaceae,
Disperis,
subgeneric classification.

RÉSUMÉ

Synopsis du genre Disperis Sw. (Orchidaceae).

Une classification infragénérique est présentée pour le genre *Disperis* Sw. (Orchidaceae, Orchidoideae, Diseae) avec une énumération complète de toutes les espèces. Le genre comprend 74 espèces d'herbacées décidues principalement terrestres croissant en milieux forestiers, dans des fourrés ou en savane. Deux sous-genres sont reconnus. Le sous-genre *Dryorkis* comprend 44 espèces, principalement de régions tropicales et subtropicales d'Afrique, de Madagascar et d'Asie. Il est défini par un appendice profondément bilobé et un pollen baculé vraisemblablement apomorphique. De plus, chez plusieurs

MOTS CLÉS
Orchidaceae,
Disperis,
classification infragénétique.

espèces les sépales latéraux sont fusionnés à la base et les bras du rostellum sont simples et non tordus. Le sous-genre *Disperis* comprend 30 espèces surtout d'Afrique du Sud. Il est défini par un appendice entier et un rostellum avec des bras habituellement tordus. Dans les deux sous-genres on peut reconnaître certains groupes bien définis d'espèces morphologiquement proches et vraisemblablement apparentées. Cependant il existe plusieurs « formes » singulières qu'il semble prématuré de reconnaître formellement en tant que taxa. Nous considérons qu'elles forment des « groupes informels ». Le sous-genre *Disperis* est apparemment un groupe monophylétique, mais le statut phylogénétique du sous-genre *Dryorkis* reste incertain. La valeur taxonomique de plusieurs structures végétatives et florales est brièvement discutée.

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INTRODUCTION

The genus *Disperis* was established by SWARTZ (1800) to accommodate a number of species of terrestrial orchids from the Western Cape of South Africa with highly distinctive flowers, characterised by spurred lateral sepals and a reflexed lip bearing a more or less complex appendage (Fig. 1D-F, H). As a result of its unique floral structure, the genus has almost always been recognised as distinct, and its circumscription has seldom been disputed. An exception is THOUARS (1809), who segregated a few of the tropical species into the genus *Dryorkis* on the basis of

their lip structure. Several synapomorphies, notably the spurred lateral sepals, a linear and clawed lip, a large, membranous central rostellum lobe covering the anther on top and sides, and the cartilaginous rostellum lobes suggest that the genus is monophyletic (LINDER 1986; LINDER & KURZWEIL 1994).

The genus *Disperis* comprises 74 species distributed in sub-Saharan Africa, Madagascar and adjacent Indian Ocean islands. A single variable and widespread species occurs in tropical Asia (Fig. 2). Centres of diversity are the humid African tropics, the Cape Floristic Region, and Madagascar. Tropical African representatives

account for some 44% of the species, the Madagascan species for \pm 30%, and the southern African species for an additional 35%. At the species level these three centres are very distinct, with some overlap between the southern and the tropical African centres, very little between the African and Madagascan centres, and none between Asia and Africa plus Madagascar.

In contrast to the other species of tribe Diseae which prefer rather open habitats, *Disperis* species are mostly found in wooded situations, except for the southern African representatives which are often found in grassland or sclerophyllous scrub (fynbos). *Disperis* is an essentially terrestrial genus, but several tropical species may grow as low-level epiphytes and a few are frequently or predominantly epiphytic up to several meters above the ground (for example *D. kilimanjarica*). Many southern African species are pollinated by oil-collecting bees in the genus *Rediviva* (Mellitidae), which collect oil secreted by the lip appendages (STEINER 1989). A notable exception is the South African *D. capensis*, which is pollinated by deceit (JOHNSON 1994) and appears to have secondarily lost the facility to secrete oil. Pollination is largely unknown in the tropical African *Disperis* species but it has been suggested that among these species the structure of the lip appendage may not be adequate for oil secretion (STEINER 1989).

On morphological, anatomical and ultrastructural evidence, *Disperis* is usually placed in subtribe Coryciinae of tribe Diseae within the orchid subfamily Orchidoideae (DRESSLER 1981, 1993; LINDER 1986; LINDER & KURZWEIL 1994; PRIDGEON *et al.* 2001). The genus is apparently rather isolated within the subtribe and shares few characters with the remaining genera, namely the adnation of the petals to the median sepal to form a hood, the appendiculate lip that is normally basally fused with the gynostemium and the median-carpel-stigma (KURZWEIL *et al.* 1991). Preliminary molecular work, based on the examination of two species, retrieves *Disperis* as sister to Orchideae + Diseae, suggesting that the genus may be misplaced within the Coryciinae (DOUZERY *et al.* 1999).

A morphological phylogenetic analysis of the southern African species of *Disperis* (MANNING &

LINDER 1992) retrieved two main clades within the genus, identified as the “tropical” and “southern African” clades, respectively. These two groups are well defined on morphological grounds and are recognised here as subgenera. The aim of the present paper is to provide a complete enumeration of the species currently recognised, together with a formal classification into two subgenera, *Dryorkis* and *Disperis*. Within these subgenera several obvious groups of morphologically similar and probably phylogenetically closely related species exist and may be appropriately recognised as sections, but the existence of several morphologically unusual taxa of uncertain affinities makes the formal recognition of sections inadvisable. Additional data sets, including anatomical, ultrastructural and molecular ones are needed to formulate robust phylogenetic hypotheses. Consequently, we establish 10 groups of morphologically similar species but do not formally propose them (Table 1). The information included in this paper is derived largely from KURZWEIL & LINDER (1991) and MANNING & LINDER (1992), with additional data from other authors referred to under the individual species as well as the *World Checklist of Monocots* (GOVAERTS 2004).

CHARACTERS OF TAXONOMIC VALUE

VEGETATIVE FEATURES

Plants are mostly glabrous but a few groups of species have papillose, glandular or hairy stems. Stem pubescence may not always imply a close relationship between the groups concerned but is a useful means of characterising them. The analysis of MANNING & LINDER (1992) suggests that pubescent stems have evolved independently at least four times in the genus. Glandular or hairy stems are found in two species of the “Pusilla group” (*D. pusilla* and *D. raiilabris*); hairy stems characterise all species of the “Bolusiana group” (*D. bodkinii*, *D. bolusiana*, *D. cucullata*, *D. decipiens*, *D. macowanii*, *D. purpurata* and *D. villosa*); and a hirsute stem occurs in *D. capensis* (“Capensis group”). In addition, the stems of *D. cooperi* (“Wealei group”) are weakly hairy.

TABLE 1. — The taxonomic concept of the present study, and the distribution of some characters of particular importance. Groups are the informal groupings recognised in this paper. Abbreviations: **Distr**, main distribution; **tr Afr**, tropical Africa; **SA**, southern Africa; **Mad**, Madagascar and Indian Ocean islands of the Comores, La Réunion, Mauritius, Seychelles, Rodrigues; **Leaf arrang.**, leaf arrangement; **alt**, alternate; **opp**, opposite or subopposite; **Hood**, median sepal/petal hood; **horiz**, horizontal; **refl**, reflexed; **asc**, ascending; **Fusion to gyn**, fusion to gynostemium; **Rost arms**, rostellum arms.

Species	Distr	Stem hairy or papillate	Leaf arrang	Hood	Lateral sepal fusion	Lip Fusion to gyn	Lip Blade stalked	Rost arms
SUBGENUS <i>DRYORKIS</i> (THOUARS) KURZWEIL & MANNING								
1. "Johnstonii group"								
1. <i>johnstonii</i> Rchb.f. ex Rolfe	tr Afr	–	alt	shallow	up to 1/3	+	+	simple
2. <i>reichenbachiana</i> Welw. ex Rchb.f.	tr Afr	–	alt	shallow	free to 1/4	+	+	simple
3. <i>neilgherrensis</i> Wight	Asia	–	alt	shallow	basal to 1/3	+	+	simple
4. <i>togoensis</i> Schltr.	tr Afr	–	alt	shallow	1/4 to 1/2	+	+	simple
5. <i>mozambicensis</i> Schltr.	tr Afr	–	alt	shallow	1/4	?	+	slightly twisted
6. <i>katangensis</i> Summerh.	tr Afr	–	alt	deep	1/4 to 1/3	+	+	simple
7. <i>tripetaloides</i> (Thouars) Lindl.	Mad	–	alt	shallow	almost free	+	+	simple
8. <i>lanceolata</i> Bosser & la Croix	Mad	–	alt	shallow	almost free	+	+	?
9. <i>cordata</i> Sw.	Mad	–	alt	shallow?	up to 1/2	+	+	simple
10. <i>saxicola</i> Schltr.	Mad	–	alt	shallow?	free	+	+	?
11. <i>perrieri</i> Schltr.	Mad	–	alt	shallow	almost free	+	+	?
12. <i>falcatipetala</i> P.J.Cribb & la Croix	Mad	–	alt	deep	1/2	?	+	simple
13. <i>humblotii</i> Rchb.f.	Mad	–	alt	shallow?	1/4 to 1/2	+	+	simple
14. <i>lanceana</i> H.Perrier	Mad	–?	alt	deep	almost entirely	?	+	simple
15. <i>bathiei</i> Bosser & la Croix	Mad	–	alt	shallow	free	+	shortly	simple
16. <i>ankarensis</i> H.Perrier	Mad	–	alt	deep	basal	+	shortly	simple
17. <i>hildebrandtii</i> Rchb.f.	Mad	–	alt	shallow?	up to 1/2	+	shortly	simple
?18. <i>discifera</i> H.Perrier	Mad	–	alt	shallow	basal	+	–	simple
?19. <i>erucifera</i> H.Perrier	Mad	–	alt	shallow	± free	+	?	simple
?20. <i>leuconeura</i> Schltr.	tr Afr	–	opp	shallow	apparently free	?	–	simple
?21. <i>majungensis</i> Schltr.	Mad	–	alt	shallow	± free	+	–	simple
?22. <i>masoalensis</i> P.J.Cribb & la Croix	Mad	–	alt	shallow	c. 1/2	?	?	simple
2. "Oppositifolia group"								
23. <i>ciliata</i> Bosser	Mad	–	opp	deep	c. 1/3	+	–	simple
24. <i>latigaleata</i> H.Perrier	Mad	–	opp	deep	free or basal	+	–	simple
25. <i>oppositifolia</i> Sm.	Mad	–	opp	deep	1/3 to 1/2	+	–	simple
26. <i>similis</i> Schltr.	Mad	–	opp	shallow	± free	+	–	?
?27. <i>trilineata</i> Schltr.	Mad	–	opp	shallow	almost free	+	–	?
3. "Anthoceros group"								
28. <i>aphylla</i> Kraenzl. ex De Wild. & T.Durand	tr Afr	–	opp or absent	spur 3-4 mm, refl	basal	+	–	simple
29. <i>kerstenii</i> Rchb.f.	tr Afr	–	opp	spur 8-12 mm, asc	free	+	–	simple
30. <i>thomensis</i> Summerh.	tr Afr	–	opp	deep	free	+	–	simple
31. <i>nitida</i> Summerh.	tr Afr	–	opp	deep	± free	+	–	?
32. <i>dicerochila</i> Summerh.	tr Afr	–	opp	deep	± free	+	–	simple
33. <i>virginalis</i> Schltr.	tr Afr	–	opp	deep	up to 1/3	+	–	simple
34. <i>elaphoceras</i> Verdc.	tr Afr	–	opp	deep	basal	+ or ± free	–	simple
35. <i>anthoceros</i> Rchb.f.	tr Afr	–	opp	spur 7-30 mm, erect	1/3 to 1/2	weak	–	simple

Species	Distr	Stem hairy or papillate	Leaf arrang	Hood	Lateral sepal fusion	Lip Fusion to gyn	Blade stalked	Root arms
36. <i>bifida</i> P.J.Cribb	tr Afr	-	opp	spur 14-17 mm, erect	1/3	+	-	simple
37. <i>nemorosa</i> Rendle	tr Afr	-	opp	spur 9-15 mm, refl	± free	shortly	-	somewhat twisted
?38. <i>egregia</i> Summerh.	tr Afr	-	alt or opp	spur 12 mm	2/3 or 3/4	+	-	simple
?39. <i>kamerunensis</i> Schltr.	tr Afr	-	opp	spur 10 mm	free?	+	- ?	simple?
?40. <i>mildbraedii</i> Schltr. ex Summerh.	tr Afr	-	opp	spur 16 mm	free?	+	?	simple
?41. <i>uzungwae</i> Verdc.	tr Afr	-	alt	spur 5 mm	1/4 to 1/3	?	-	± twisted
4. "Pusilla group"								
42. <i>pusilla</i> Verdc.	tr Afr	+	solitary	shallow	free	+	-	simple
43. <i>raillabris</i> Summerh.	tr Afr	+	solitary	shallow	free	+	-	twisted?
44. <i>crassicaulis</i> Rchb.f.	tr Afr	-	solitary	deep	free	+	-	simple
SUBGENUS DISPERIS								
5. "Micrantha group"								
45. <i>woodii</i> Bolus	sA	-	opp	spur 8-11 mm, erect	free	±	-	slightly twisted
46. <i>disaeformis</i> Schltr.	sA	-	alt	deep sac, refl	free	+	-	slightly twisted
47. <i>micrantha</i> Lindl.	sA	-	alt	suberect hood	free	weak to +	-	slightly twisted
?48. <i>breviloba</i> Verdc.	tr Afr	mostly glabrous	absent	spur 7 mm, erect	free	± free	-	twisted
?49. <i>kilimanjarica</i> Rendle	tr Afr	-	alt	spur 8-16 mm, refl	free	basal	-	twisted
?50. <i>galerita</i> Rchb.f.	tr Afr	-	alt	spur 3-4 mm, refl	basal?	basal	-	twisted
?51. <i>parvifolia</i> Schltr.	tr Afr	- ?	alt	spur 6-6.5 mm, erect	free	?	-	?
?52. <i>meirax</i> Rchb.f.	tr Afr	-	alt	asc hood	free?	+	-	?
6. "Cardiophora group"								
53. <i>cardiophora</i> Harv.	sA	-	solitary	deep	free	+	-	twisted
54. <i>renibractea</i> Schltr.	sA	-	solitary	deep	free	+	-	twisted
55. <i>lindleyana</i> Rchb.f.	sA	-	solitary	deep	free	+	-	twisted
7. "Thorncroftii group"								
56. <i>thorncroftii</i> Schltr.	sA	-	alt	deep	free	+	-	twisted
8. "Capensis group"								
57. <i>capensis</i> (L.f.) Sw.	sA	+	alt	deep	free	+	-	twisted and curled

Species	Distr	Stem hairy or papillate	Leaf arrang	Hood	Lateral sepal fusion	Lip Fusion to gyn	Blade stalked	Rost arms
9. "Bolusiana group"								
58. <i>boldkinii</i> Bolus	sA	+	alt	hood 2-3 mm, erect	free	-	-	twisted
59. <i>macowanii</i> Bolus	tr Afr, sA	+	alt	hood 2-3 mm, erect	free	-	-	twisted
60. <i>decipiens</i> Verdc.	tr Afr	+	alt	deep	free	hardly	-	twisted
61. <i>cucullata</i> Sw.	sA	+	alt	hood erect	free	-	-	twisted
62. <i>bolusiana</i> Schltr. ex Bolus	sA	+	alt	hood 3-13 mm, asc	free	-	-	twisted
63. <i>purpurata</i> Rchb.f.	sA	+	alt	deep	free	-	-	twisted
64. <i>villosa</i> (L.f.) Sw.	sA	+	alt	hood 5-7 mm, horiz	free	-	-	twisted
10. "Wealei group"								
65. <i>circumflexa</i> (L.) T.Durand & Schinz	sA	-	alt	deep	free	+	-	twisted
66. <i>concinna</i> Schltr.	sA	-	alt	hood 3-4 mm	free	+	-	slightly twisted
67. <i>cooperi</i> Harv.	sA	weakly hairy	alt	hood 6 mm, asc	free	+	-	twisted
68. <i>stenoplectron</i> Rchb.f.	sA	-	alt	hood 9 mm, asc	free	+	-	twisted
69. <i>wealei</i> Rchb.f.	sA	-	alt	hood 4-5 mm	free	+	-	twisted
70. <i>fanniniae</i> Harv.	sA	-	alt	hood 10-16 mm	free	+	-	twisted
71. <i>tysonii</i> Bolus	sA	-	alt	hood 4-7 mm, asc	free	+	-	twisted
72. <i>oxyglossa</i> Bolus	sA	-	alt	shallow	free	+	-	twisted
73. <i>paludosa</i> Harv. ex Lindl.	sA	-	alt	shallow	free	+	-	twisted
74. <i>bosseri</i> la Croix & P.J.Cribb	Mad	-	alt	shallow	free	+	-	simple?

Two types of foliage occur in the genus. All species typically have either two to five leaves that are alternately arranged, or only two which are subopposite or opposite (Fig. 1A, B). Intermediate forms are rare, but a few species may occasionally have subopposite and somewhat spaced leaves, and *D. egregia* has either alternate or opposite leaves. Occasionally, depauperate specimens of various species may have a single leaf (this is found particularly in *D. aphylla*,

D. hildebrandtii, *D. neilgherrensis*, *D. parvifolia* and *D. togoensis*). The leaf arrangement quoted in the descriptions generally refers to flowering specimens. Vegetative plants of normally alternate-leaved species often have subopposite foliage leaves. The arrangement of the foliage leaves is largely consistent within the groups that are recognised here and can be used to characterise them. The leaves are alternate in more than 70% of *Disperis* species. This is the basic condition in



FIG. 1. — Plants, inflorescences and flowers of *Disperis* species: **A**, *D. dicerochila* Summerh.; **B**, *D. anthoceros* Rchb.f.; **C**, *D. cardiophora* Harv.; **D**, *D. capensis* (L.f.) Sw.; **E**, *D. villosa* (L.f.) Sw.; **F**, *D. circumflexa* (L.) T.Durand & Schinz subsp. *circumflexa*; **G**, *D. stenoplectron* Rchb.f.; **H**, *D. paludosa* Harv. ex Lindl. Photos: A, C, H, Kurzweil; B, D-G, J.C. Manning; H, H. Boernitz.

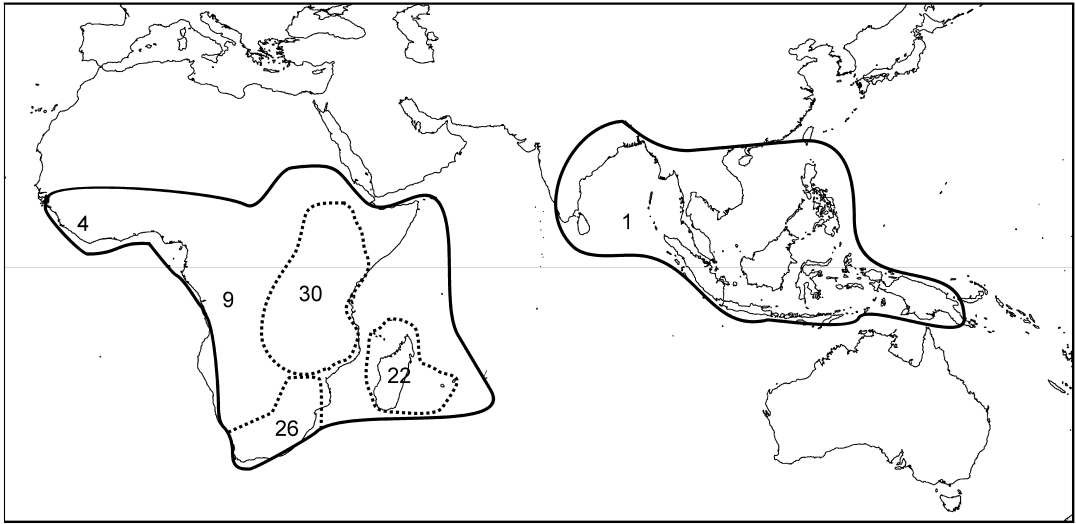


FIG. 2. — Approximate distribution of the genus *Disperis*. Figures represent approximate species numbers. Areas of high diversity are demarcated by dotted lines.

other genera of Deseae and Orchideae and is presumably the ancestral condition in the genus *Disperis*. Opposite leaves are apomorphic and appear to have evolved more than once. Opposite leaves are almost consistently found in both the “Anthoceros group” and the “Oppositifolia group”, and also characterise two aberrant and possibly phylogenetically isolated species, *D. leuconeura* and *D. woodii*. With the exception of *D. woodii*, opposite or subopposite leaves are confined to subgenus *Dryorkis*.

Consistently solitary leaves are found in the “Pusilla group” and the “Cardiophora group” and this is clearly a derived state (Fig. 1C). The leaf is inserted mid-way up the stem in *Disperis raiilabris* and *D. lindleyana* but is basal in *D. crassicaulis*, *D. cardiophora*, *D. pusilla* and *D. renibractea*. Rarely, leaves are absent altogether (*D. breviloba*, some specimens of *D. aphylla*).

PERIANTH

As in the other Coryciinae, the median sepal and the two petals are marginally adnate to each other to form a distinct hood (VOGEL 1959; KURZWEIL & LINDER 1991). The variation in the shape of the hood is extensive in *Disperis*, ranging from shallowly or deeply galeate (majority of

species; Fig. 1A, C-H) to spur-like (scattered in occurrence; Fig. 1B). Different types of hood spurs can be distinguished, depending on the degree of participation of the petals (VOGEL 1959), and the spur can be erect, ascending or reflexed. In *D. johnstonii* and several related species the hood is very shallow (nearly flat) and curved, with the marginal parts of the petals recurved. The shape of the hood, and the length and width of the spur varies somewhat within species and is apparently largely determined by pollinators. Various shallowly and deeply galeate hoods are found in nearly 80% of species and are probably the basic condition. Definite spurs are probably derived and have apparently evolved independently in several groups. Most of the species with markedly spurred hoods are from tropical Africa.

In many species of *Disperis* subgen. *Dryorkis* the lateral sepals are fused basally for up to half their length. This degree of fusion of the lateral sepals occurs in some specimens of *D. anthoceros*, *D. cordata*, *D. hildebrandtii*, *D. humblotii*, *D. oppositifolia* and *D. togoensis*, and apparently consistently in *D. falcatipetala* and *D. masoalensis*. Fusion of the lateral sepals for most of their length occurs in *D. egyptia* and *D. lanceana*. In

contrast, apparently all species of *D.* subgen. *Disperis* have free lateral sepals, with the possible exception of *D. kilimanjarica*, and the poorly known *D. galerita* and *D. meirax*, in which the available literature is not clear as to whether the lateral sepals are completely free or basally weakly fused. Outgroup comparison with the other Orchidoideae suggests that free lateral sepals are the basic condition. Within subgenus *Dryorkis* extensively fused lateral sepals are found in three out of the four informal groups, suggesting that the condition may have evolved more than once: fused lateral sepals occur sporadically in the “Johnstonii group”, the “Anthoceros group” and the “Oppositifolia group”, and only the three species of the “Pusilla group” have consistently free lateral sepals.

Each lateral sepal almost always bears a cylindrical or conical spur 1–3 mm long (Fig. 1E, F, H), into which the rostellum arms protrude before anthesis. These spurs have no role after anthesis and their development is associated with the elongation of the rostellum arms. The very elongate spurs \pm 6 mm long in *D. purpurata* subsp. *pallascens* and the obsolete spurs found in several Madagascan taxa are clearly derived conditions.

The petals may be symmetrical to variously asymmetrical in *Disperis* but this character was not explored in detail in the present study. A discussion of the petals in *Disperis* is provided by KURZWEIL & LINDER (1991). Strongly asymmetrical petals are mostly found in subgenus *Dryorkis*, and the symmetrical petals of some species of subgenus *Disperis* are probably a secondary simplification (KURZWEIL & LINDER 1991: 458). Petals are somewhat fused with the gynostemium in three species from the Western Cape of South Africa (*D. villosa* and, to a lesser degree, in *D. bolusiana* and *D. cucullata*), supporting a close relationship of these species. Fusion between petals and gynostemium has also evolved in *Brachycorythis*, *Neobolusia* and the Disinae.

The front margins of the petals are often undulate and may be more or less enlarged basally to form a lobe, ranging in development from pronounced auricles to massive rounded or triangular lobes that result in deeply bilobed petals. The development of a marked basal anterior petal

lobe appears to be a synapomorphy of the “Anthoceros group”. These lobes are very prominent in *Disperis bifida*, *D. dicerochila*, *D. kerstenii*, *D. mildbraedii*, *D. nemorosa*, *D. nitida*, *D. thomensis* and *D. virginalis* but are reduced or secondarily lost in *D. anthoceros* and *D. aphylla*. Small basal auricles on the petals have evolved in a number of unrelated species. The basal anterior lobes are reminiscent of similar structures in Disinae where they have also been shown to be taxonomically significant (LINDER 1981a–f).

The lip of the genus *Disperis* is extraordinarily complicated in its structure. As in other Coryciinae it is normally fused with the gynostemium at the base and bears an appendage that is often larger than the blade itself (DRESSLER 1981, 1993). The blade may be simple or ornamented with a callus.

The structure of the lip is still not entirely clear despite preliminary studies (VOGEL 1959; KURZWEIL & LINDER 1991). It is also not known whether the lip appendages are homologous in the different groups of the genus: the difficulty in obtaining young stages for ontogenetic investigations has hampered the resolution of the homologies. So far the lip ontogeny of a single species, *Disperis lindleyana*, has been superficially examined (KURZWEIL & LINDER 1991). While inadequate for the interpretation of the lip structure in a large and diverse genus like *Disperis*, the results show that the lip appendage is of late ontogenetic origin and suggest that it is basically bilobed, even in this species which has an entire lip appendage in the mature flower.

Because the homologies of the different lip parts are unclear, past terminology that was used to describe them has been somewhat confused. Different authors have interpreted the structures in different ways, greatly complicating the comparison of species descriptions. Others are entirely inaccurate and difficult to comprehend. Consequently, the usefulness of previous descriptions is limited. In the absence of a comparative morphogenetic survey we are hesitant to present a clear explanation of the lip structure in *Disperis*. We have therefore adopted a simplistic approach, assuming that the lip structure is fundamentally the same in all subgroups of the genus. Our interpretation is based on extensive morphological

investigations supplemented by the fragmentary ontogenetic observations made in one species.

1) The basal claw is the least controversial part of the lip. It is slender and often gradually or abruptly widened in its upper part, and its orientation varies from erect to reflexed. In most species it is basally fused with the gynostemium. This fusion is absent or very weak in a few species, which may be a secondary condition. Some species have very elongate claws which are generally associated with the occurrence of a long median sepal spur, such as *Disperis anthoceros* and *D. bifida*.

The species *Disperis bodkinii*, *D. cucullata* and *D. macowanii* have a cruciform lip claw (MANNING & LINDER 1992). In *D. decipiens*, which appears to be related to these species, the entire, inappendiculate lip is cruciform, which may imply that the “lip” of this species is actually mainly the claw.

2) The structure on top of the claw is superficially two- or three-lobed, comprising the lip blade and its appendage according to our interpretation. We interpret the part that is inserted on top of the claw in a *posterior* position as the lip appendage, which is either entire or two-lobed and frequently papillose. This is the interpretation that has been adopted in some recent flora treatments (e.g., LA CROIX & CRIBB 1995).

However, it has been argued that the two-lobed structure of *Disperis johnstonii*, *D. togoensis* and possibly also *D. katangensis* may have evolved through splitting and apical widening of the claw (SUMMERHAYES 1935b). A number of other species share this type of “lip appendage” and if Summerhayes’s interpretation is vindicated, it would suggest that the “lip appendage” of such species is not strictly homologous with the appendage in *D. lindleyana* and other species of subgenus *Disperis*.

3) We interpret the part of the lip that is inserted on top of the claw in the *anterior* position as the blade. This blade is very diverse in shape but is generally unlobed. The blade may be ligulate, lorate or triangular (e.g., *Disperis anthoceros*, *D. capensis*, *D. cardiophora*, *D. lindleyana*, *D. thomensis*), and is sometimes hidden by the lobes of the lip appendage that hang over it (e.g., *D. anthoceros*). In some species of the

“*Anthoceros* group” it is surrounded by obvious, trichome-like excrescences. Several species have blades that are marginally fused with the lip appendage, resulting in a boat-shaped or cup-shaped blade-appendage-complex (termed pseudopeltate by VOGEL 1959) (e.g., *D. bolusiana*, *D. oxyglossa*, *D. paludosa*, *D. stenoplectron*, *D. villosa*).

In a number of species the lip blade is narrowed for some of its length into a stalk before expanding into a more or less rotund apical portion (e.g., *D. johnstonii*, *D. katangensis*, *D. neilgherrensis*). This narrow stalk is reminiscent of the “upper claw” in many *Corycium* species (KURZWEIL *et al.* 1991). The stalked lip blade often bears a papillose callus, which has been interpreted as homologous with the lip “tuberculum” found in *Ceratandra* (VOGEL 1959). This is unlikely in view of the apparent distant relationship between the two genera suggested by DNA sequence data (DOUZERY *et al.* 1999). The structure of the expanded portion of the lip that is borne on the stalk has prompted VERDCOURT (1968) to suggest that the appendage of this group is in a basal position on the lip claw, and is not homologous with the apical lip appendages of the remainder of *Disperis* species.

Whatever the correct interpretation of the lip may be, this organ has long since been identified as one of the taxonomically most valuable features in the genus *Disperis* (LINDLEY 1830-1840; SCHLECHTER 1898; KURZWEIL & LINDER 1991; MANNING & LINDER 1992). As such it has also been heavily used as a diagnostic key character in floristic works. Here we use the structure of the lip to distinguish subgenus *Dryorkis*, primarily with a two-lobed lip appendage (Fig. 3A), from subgenus *Disperis*, defined by the synapomorphy of an entire (though sometimes apically bifid) lip appendage (Fig. 3B). Four species in subgenus *Dryorkis* have the lip appendage only weakly two-lobed or unlobed (*D. discifera*, *D. egregia*, *D. kamerunensis*, *D. uzungwae*) but reveal their affinity to this subgenus by other characters.

GYNOSTEMIUM

The gynostemium of *Disperis* species is a complicated structure that is discussed by VOGEL (1959) and KURZWEIL & LINDER (1991). Illus-

trations are invariably more informative than lengthy descriptions. Details of the gynostemium are unknown to us in several species, particularly those where no modern descriptions are available, which severely limits hypotheses regarding the phylogenetic polarity of characters and their taxonomic value.

The structure of the anther is comparatively simple, as it lacks the separation of the two thecae that is typical of other Coryciinae (VOGEL 1959; KURZWEIL *et al.* 1991). In this respect the genus is probably unspecialised, but the thecae remain widely open after the removal of the pollinia which is unusual in subfamily Orchidoideae. This character state is apparently another synapomorphy for *Disperis*. The lateral appendages that are present on the sides of the gynostemium next to the anther are bipartite, suggesting a derivation from both auricles and basal bulges (KURZWEIL & LINDER 1991).

In contrast to the anther, the structure of the rostellum is highly derived. A flat central lobe covers the top and sides of the anther. Projecting from it are two cartilaginous lateral lobes, the rostellum arms (VOGEL 1959; KURZWEIL & LINDER 1991) (Fig. 1H). Both have been used as synapomorphies of the genus (LINDER 1986; LINDER & KURZWEIL 1994). The structure of the lateral arms is frequently commented on in the literature, including the older descriptions, and is taxonomically informative. In most species of subgenus *Dryorkis* the rostellum arms are relatively simple in structure, being straight and often linear or spatulate with widened tips. In contrast, strongly twisted rostellum arms have evolved in most groups of subgenus *Disperis*. This latter form of rostellum arm is clearly the derived condition. Within subgenus *Disperis* comparatively simple rostellum arms are found only in *D. disaeformis*, *D. micrantha* and *D. woodii*, all in the "Micrantha group", which is basal in the subgenus (MANNING & LINDER 1992). Apparently simple rostellum arms are also found in *D. bosseri* in the "Wealei group" (which otherwise has rather complicated rostellum arms), where it is either a secondary condition or may indicate that this species is incorrectly placed.

As in other Coryciinae, the stigma is derived exclusively from the median carpel, which is very

unusual in orchids (KURZWEIL 1991). The lateral carpel apices, which usually in the orchids develop into the receptive stigma, are rudimentary in *Disperis*, and are apparent as small teeth near the base of the rostellum (KURZWEIL & LINDER 1991). The genus shows extensive diversity in the shape and position of the stigma. Many species of subgenus *Dryorkis* have two narrowly lanceolate stigmas at or near the point of insertion of the rostellum arms, and in many species of subgenus *Disperis* the stigma consists of two separate or partly united pads on the upper surface of the rostellum. In those species of subgenus *Disperis* where the lip base is not fused with the gynostemium, the stigma is located on the front of the gynostemium and is entire or apically emarginate. An unusual condition is found in *D. capensis*, where the two separate stigmas are located on the rostellum in front of the point of the lip insertion. Outgroup comparison with *Huttonaea* (KURZWEIL 1989) suggests that a single stigmatic area on the median carpel is the basic condition.

POLLEN

Pollen data are mainly available for the South African species of subgenus *Disperis* (LINDER 1986; CHESSELET 1989; MANNING & LINDER 1992; CHESSELET & LINDER 1993; LINDER & KURZWEIL 1994). Only few observations on pollen surface ornamentation of species of subgenus *Dryorkis* are available (*D. anthoceros*, *D. johnstonii*, *D. virginalis*: MANNING & LINDER 1992; *D. dicerochila*, *D. neilgherrensis*, *D. reichenbachiana*: KURZWEIL unpubl. data). The "tropical group" of MANNING & LINDER (1992) (equivalent with subgenus *Dryorkis*) was defined by the baculate pollen and this character is used here as a possible synapomorphy to define subgenus *Dryorkis*.

CLASSIFICATION AND PHYLOGENY

Despite the great morphological diversity in the genus *Disperis*, two distinct clades were distinguished in the cladistic analysis of MANNING & LINDER (1992), based primarily on characters of the lip and appendage, and on pollen sculpturing.

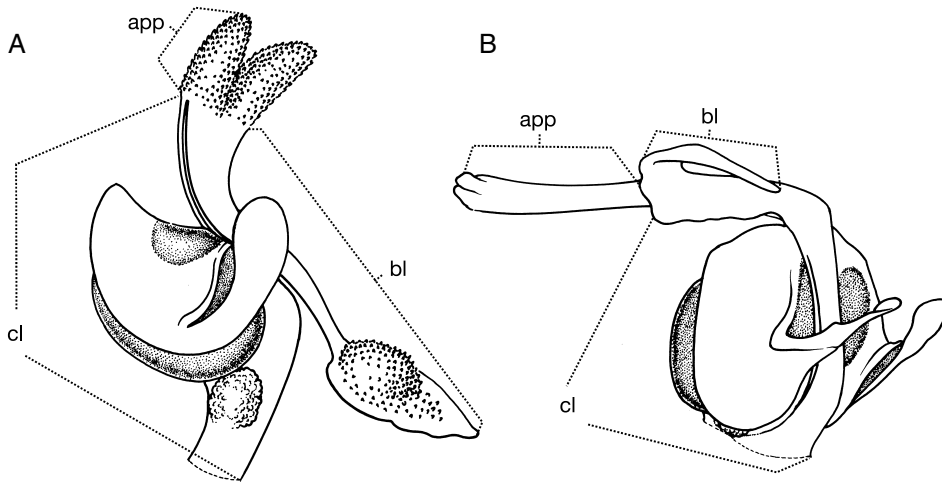


FIG. 3. — Gynostemium-lip complexes of two *Disperis* species, illustrating the lip interpretation followed here: **A**, *D.* subgen. *Dryorkis* (*D. johnstonii* Rchb.f. ex Rolfe, modified after Cribb & la Croix 1995); **B**, *D.* subgen. *Disperis* (*D. kilimanjarica* Rendle, modified after Kurzweil & Linder 1991). Diagrammatic. Abbreviations: **app**, lip appendage; **bl**, lip blade; **cl**, lip claw.

These are formally recognised here as the subgenera *Dryorkis* and *Disperis*. This classification differs sharply from the sectional classification of SCHLECHTER (1898) who recognised two groups based on the arrangement of the foliage leaves. This classification was obviously artificial, even to SCHLECHTER himself (SCHLECHTER 1898: 913).

Within the two subgenera recognised here, several groups of similar and apparently closely related species can be identified. The groups that we recognise within subgenus *Dryorkis* are based on inferred morphological synapomorphies, while those within subgenus *Disperis* are derived largely from the clades retrieved by the morphological analysis of MANNING & LINDER (1992). In addition, there are also several morphologically aberrant species that do not fit into any of these groups. We therefore find that it is not feasible to recognise formal sections but rather use informal groups to indicate similarity and possible relatedness. Although unsatisfactory in a taxonomic sense, this appears to us to be the best solution based on the present state of knowledge. At the end of three of the groups we have placed those species which we think possibly also belong to them (marked by ?).

Disperis subgen. *Dryorkis* occurs in the tropics and subtropics of Africa, Madagascar and the

Indian Ocean islands, and also ranges into Asia. The three species found in the northern parts of southern Africa (*D. anthoceros*, *D. johnstonii* and *D. virginialis*) were used as the outgroup in a cladistic study of the southern African taxa (MANNING & LINDER 1992). The subgenus is mostly characterised by a two-lobed lip appendage (Fig. 3A), although it is not clear at this stage whether it is homologous in different subgroups (see comments in SUMMERHAYES 1935b; VERDCOURT 1968 and KURZWEIL & LINDER 1991). In *D. discifera*, *D. egregia*, *D. kamerunensis* and *D. uzungwae* as well as some specimens of *D. tripetaloides* and *D. katangensis* the lip appendage differs in being only weakly two-lobed or unlobed. Simple, untwisted rostellum arms also characterise this subgenus but both the two-lobed nature of the lip appendage and the simple rostellum arms are plesiomorphic and cannot be regarded as synapomorphies for the clade. MANNING & LINDER (1992) regarded baculate pollen as a synapomorphy for the “tropical clade” and although based on limited sampling it appears to be a true synapomorphy for the subgenus. All species of subgenus *Dryorkis* for which adequate information is available have a gynostemium with two lanceolate stigmas at or near the base of the rostellum arms. Lanceolate

stigmas in a lateral position are apparently derived but this character is not known in about 52% of the species. Within the subgenus there is also a tendency towards the fusion of the lateral sepals, which is interpreted as derived since flowers with two free lateral sepals are almost certainly plesiomorphic. Preliminary ITS sequence data suggest that the subgenus is a well supported clade sister to subgenus *Disperis* (STEINER pers. comm.), but since only five out of 44 species in the subgenus ($\approx 11\%$) have been examined so far the results are obviously very limited. Apart from the possible significance of baculate pollen, no synapomorphy for subgenus *Dryorkis* is known at present, and it cannot be determined whether the subgenus is monophyletic.

In contrast, *Disperis* subgen. *Disperis* appears to be truly monophyletic, defined by the synapomorphy of an entire but sometimes apically bifid lip appendage (Fig. 3B) that has probably evolved through fusion of the lobes of a two-lobed lip appendage. This clade, though not formally treated, was recognised by MANNING & LINDER (1992) as the "southern African clade". Almost all species of this subgenus are characterised by alternate leaves, presumably a plesiomorphic condition. Many species of subgenus *Disperis* have also retained some apparently plesiomorphic features of the flower, including symmetrical petals, free lateral sepals, and entire or only partly separated stigmas but some of these may also be secondary developments. The pollen tectum is perforate, resulting in a rugulose to reticulate ornamentation, which is the basic condition in Daseae (MANNING & LINDER 1992). Subgenus *Disperis* exhibits a high degree of specialisation in the structure of the lip appendage and the rostellum arms. The subgenus is largely confined to southern and south-central Africa, with a few extensions into eastern Africa (*D. breviloba*, *D. decipiens*, *D. galerita*, *D. kilimanjarica*, *D. macowanii*, *D. meirax*, *D. parvifolia*) and Madagascar (*D. bosseri*).

Speciation patterns within subgenus *Disperis* were analysed by MANNING & LINDER (1992), who concluded that the subgenus originated in southern Africa, with one major and one minor radiation in summer-rainfall eastern South Africa, and a third major radiation in winter-

rainfall Western Cape. The two major radiations under different climatic regimes were interpreted as following an increase in oil secretion resulting from the evolution of a concave lip and epithelial elaiophores. It was suggested that these developments fostered the competitive success of these species in attracting the specialised oil-collecting bees in the genus *Rediviva* (Hymenoptera, Mellittidae) that act as the sole pollinators of these species.

Speciation patterns in subgenus *Dryorkis* have not been analysed and little is known about their pollination biology. In many cases the species may be deceitful mimics of species of *Impatiens* (Balsaminaceae).

SYSTEMATICS

DISPERIS SW.

Kongl. Vetensk. Acad. Nya Handl. 21: 218 (1800); Rolfe, Fl. Trop. Afr. 7: 288 (1898); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 911 (1898); Rolfe, Fl. Cap. 5, 3: 291 (1913); Summerhayes, Fl. W. Trop. Afr., ed. 2: 203 (1968); Verdcourt, Fl. Trop. East Afr.: 216 (1968); Geerinck, Fl. Afr. Centr.: 229 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 228 (1995); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 247 (1997); Szlachetko & Olszewski, Fl. Camer. 34: 34 (1998); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 299 (1999); la Croix *et al.*, Adansonia 24: 56 (2002). — Type species: *Disperis secunda* (Thunb.) Sw. [*nom. illeg.*] = *D. circumflexa* (L.) T. Durand & Schinz, lectotype designated by Phillips, Gen. S. African Fl. Pl., ed. 2: 237 (1951).

Dipera Spreng., Syst. Veg. 3: 696 (1826), *nom. illeg.*
Dipera Wight, Icon. Plant. Ind. Orient. 5. t. 1719 (1851), *orth. var.*

Dryopeia Thouars, Hist. Orchid.: t. 1-3 (1822) [*Dryopria* and *Dryopaëia*, *sphalm.*]. — Type species: *Dryopeia oppositifolia* Thouars, lectotype, here designated.

Terrestrial herbs with root tubers; mostly slender and up to 650 mm tall. **Leaves** 1 to 5, rarely reduced, cauline or basal, opposite or alternate, ovate to lanceolate, obtuse, acute or acuminate, glabrous or pubescent, sometimes purple underneath. **Inflorescence** 1-several-flowered, racemose, occasionally secund; bracts similar to upper leaves or markedly smaller. **Flowers** medium-sized or small, resupinate, mostly white,

yellow, pink or red; pedicel and ovary mostly cylindrical; median sepal mostly galeate or produced into spur, adnate to petals to form hood; lateral sepals spreading, each with saccate spur mostly 1-3 mm long near middle or towards tip; petals lanceolate or falcate, sometimes clawed or basally auriculate; lip claw linear or oblong, almost always basally fused to gynostemium, blade varying from lanceolate and ligulate to ovate, smooth, warty or pubescent, sometimes stalked, appendage simple or 2-lobed, often papillose, pubescent or tomentose. **Gynostemium** subsessile or sessile; anther with adjacent and parallel thecae, mostly horizontally

reflexed, with 2 sectile pollinia; rostellum 3-lobed, central lobe flat and membranous, covering anther, lateral lobes developed as cartilaginous arms projecting forwards or upwards and bearing viscidia, stigma bilobed, situated on central rostellum lobe, either on front side of gynostemium or on portion above anther, often at base of rostellum arms.

DISTRIBUTION. — Seventy-four terrestrial or rarely epiphytic species, in forest, scrub or grassland in sub-Saharan Africa, Madagascar and islands of the western Indian Ocean; one species widespread in tropical Asia.

Key to subgenera, informal groups and species of *Disperis*

Note: the position of the poorly known *D. mozambicensis*, *D. mildbraedii* and *D. kamerunensis* in the key is unsatisfactory as their characters are only incompletely known to us.

1. Lip appendage ± deeply 2-lobed from the base or immediately above it (= from the insertion on the claw); rostellum arms normally simple; stigmas mostly lanceolate at or near rostellum base (subgen. *Dryorkis* p.p.) 2
- 1'. Lip appendage entire for most of its length, apically either also entire, weakly emarginate, deeply bifid or with 2-4 teeth; rarely consisting of few to many lobes on top of a very long claw that are hanging over the minute blade (in one species and one variety lip appendage absent); rostellum arms various 40
2. Lip blade stalked and callose; leaves alternate ("*Johnstonii* group" p.p.) 3
- 2'. Lip blade not or only indistinctly stalked 19
3. African or Asian plants 4
- 3'. Plants from Madagascar and the Indian Ocean islands 9
4. Hood about as deep as wide; lip appendage reniform or shallowly 2-lobed; central and eastern Africa 6. *D. katangensis*
- 4'. Hood shallow, much wider than deep; widespread 5
5. Plants from Asia 3. *D. neilgherrensis*
- 5'. Plants from Africa 6
6. Lip blade fleshy, oblong-cuneate 2. *D. reichenbachiana*
- 6'. Lip blade flat, with a median callus 7
7. Hood cordate at base 4. *D. togoensis*
- 7'. Hood narrowed or rounded at base 8
8. Petals 12-14 mm long; flowers pink or mauve; Mozambique 5. *D. mozambicensis*
- 8'. Petals 8-11 mm long; flowers white with yellow or pink markings; widespread 1. *D. johnstonii*
9. Hood distinctly broader than tall 10
- 9'. Hood longer than broad or orbicular 13
10. Lateral sepals fused for nearly half their length or more 11
- 10'. Lateral sepals free or only fused at their base 12
11. All three sepals 8-10 mm long; lip blade with prominent vesicular hairs, lip very shortly and indistinctly stalked 17. *D. hildebrandtii*
- 11'. Median sepal 12-13 mm long, laterals 8-9 mm long; lip blade with c. 1.5 mm long stalk, without vesicular hairs 14. *D. lanceana*
12. Hood 12-15 × 16-20 mm, only 2 mm wide at base 11. *D. perrieri*
- 12'. Hood 8 × 15 mm, not tapering at base 16. *D. ankarensis*
13. Lowermost leaf with a sheathing petiole 14
- 13'. All leaves sessile 16

14. Lateral sepals fused for at least one quarter 13. *D. humblotii*
 14'. Lateral sepals free 15
 15. Lateral sepals 8-11 mm; lip blade reniform, papillose 10. *D. saxicola*
 15'. Lateral sepals 13-14 mm long; lip blade tongue-shaped, glabrous 15. *D. bathiei*
 16. Leaf base distinctly cordate 17
 16'. Leaf base more or less rounded 18
 17. Lateral sepals nearly free 7. *D. tripetaloides*
 17'. Lateral sepals extensively fused (up to half) 9. *D. cordata*
 18. Lateral sepals nearly free 8. *D. lanceolata*
 18'. Lateral sepals fused extensively in basal half 12. *D. falcatispetala*
 19. Leaves two, opposite or subopposite 20
 19'. Leaves alternate, solitary or rarely absent 33
 20. Hood shallow; lip appendage inserted at the junction of the claw with the gynostemium and consisting of two upwards and inwards curved horns; sepals 4-6 mm long; central and eastern Africa .. 20. *D. leuconeuria*
 20'. Not the above combination of characters 21
 21. Hood shallow or deep, very rarely spurred; Madagascar and Indian Ocean islands 22
 21'. Hood deep or extended into a prominent spur 3-12 mm long; Africa ("Anthoceros group" p.p.) 27
 22. Hood developed as an erect spur 7-9 mm long 35. *D. anthoceros* var. *humbertii*
 22'. Hood shallow or deep but never spur-like ("Oppositifolia group") 23
 23. Lateral sepals fused for one third or half 24
 23'. Lateral sepals free or nearly free 25
 24. Petals apically long ciliate 23. *D. ciliata*
 24'. Petals glabrous 25. *D. oppositifolia*
 25. Lateral sepals 6-10 mm, unspurred 24. *D. latigaleata*
 25'. Lateral sepals 3-6 mm, with sac-like spurs 26
 26. Lip appendage arms bifurcate; lateral sepals 3-4 mm 27. *D. trilineata*
 26'. Lip appendage arms entire; lateral sepals 4-6 mm 26. *D. similis*
 27. Hood developed as a distinct reflexed or ascending spur 28
 27'. Hood deeply concave but not with a slender spur 29
 28. Spur reflexed, 3-4 mm long 28. *D. aphylla*
 28'. Spur ascending, 8-12 mm long; Tanzania 29. *D. kerstenii*
 29. Petal front margin rounded and entire; Tanzania 34. *D. elaphoceras*
 29'. Petals more or less two-lobed at their front margin 30
 30. Flowers small; lateral sepals 5-6 mm, white 30. *D. thomensis*
 30'. Flowers larger; lateral sepals 7-11 mm, white or pink 31
 31. Lateral sepals fused up to one third; South Africa and Zimbabwe 33. *D. virginalis*
 31'. Lateral sepals free or fused at their very base only 32
 32. Lip appendage lobes deeply bifurcate into two horns or teeth; flowers white or pink; widespread
 32. *D. dicerochila*
 32'. Lip appendage lobes apically Y-shaped with short lobes; flowers white; Cameroon 31. *D. nitida*
 33. Small plants with solitary leaf and free lateral sepals; hood shallow or deep but not spurred
 ("Pusilla group") 34
 33'. Not the above combination of characters (leaves mostly two or more, rarely one or absent; lateral sepals often basally fused; hood sometimes spurred) 36
 34. Plants glabrous, hood deeply concave; Ethiopia 44. *D. crassicaulis*
 34'. Plants hairy or glandular; hood very shallow with the petal front margins reflexed 35
 35. Plants 25-40 mm tall; petals 8 mm long; eastern Africa, Zambia and Zaire/DRC 42. *D. pusilla*
 35'. Plants to 150 mm tall; petals about 10 mm long; Central African Republic 43. *D. railabris*
 36. Leaf solitary or absent; hood with reflexed spur 3-4 mm long; widespread in continental Africa
 28. *D. aphylla*
 36'. Leaves 1-4; hood various; Madagascar and Comores 37
 37. Hood broader than tall; lateral sepals extensively fused 38
 37'. Hood longer than broad or orbicular; lateral sepals \pm free 39
 38. Median sepal much shorter than laterals; lip blade without vesicular hairs 22. *D. masoalensis*
 38'. All three sepals equally long; lip blade with conspicuous vesicular hairs 17. *D. hildebrandtii*
 39. Lateral sepals about 5 mm long; lip blade narrowly triangular 21. *D. majungensis*
 39'. Lateral sepals longer than 7 mm; lip a densely white-tomentose subrhombic lobe that is deeply notched
 19. *D. erucifera*

40. Lip with elongate claw which is basally sometimes fused to the gynostemium and generally extends far beyond the latter; appendage of two 2-forked lobes, the 2 forks of each either entire, laciniate or fimbriate; lip blade minute and lorate; hood with prominent spur 7-30 mm long 41
- 40'. Not this combination of characters (either lip claw shorter; lip appendage apically entire, weakly lobed or bifid; or hood not spurred) 44
41. Petals with 4 mm long aristate tips that project forwards; Cameroon and Bioko Island .. 40. *D. mildbraedii*
- 41'. Petals apically acute or obtuse; widespread 42
42. Median sepal/petal spur reflexed and 9-15 mm long; lateral sepals nearly free; south-central and eastern Africa 37. *D. nemorosa*
- 42'. Median sepal/petal spur erect or ascending, 12-30 mm long; lateral sepals basally fused 43
43. Flowers pink; spur apically bifid; Zambia and Rwanda 36. *D. bifida*
- 43'. Flowers white; spur apically not bifid; widespread in eastern, western and central Africa, reaching South Africa 35. *D. anthoceros*
44. Lateral sepals fused for two thirds or three quarters; lip appendage/blade complex a pendent carrot-shaped structure; Kenya and Tanzania 38. *D. egregia*
- 44'. Lateral sepals free or fused up to one third; lip not like this 45
45. Leaves opposite 46
- 45'. Leaves alternate, very rarely solitary or absent 47
46. Lateral sepals 8 mm long; Cameroon 39. *D. kamerunensis*
- 46'. Lateral sepals 5 mm long; South Africa 45. *D. woodii*
47. Lip appendage/blade complex on top of the claw an ovate, largely papillose structure; Madagascar and La Réunion 18. *D. discifera*
- 47'. Lip clearly differentiated into claw, appendage and blade 48
48. Lateral sepals fused for one quarter to one third 49
- 48'. Lateral sepals free or only basally fused 50
49. Hood with a prominent erect spur 5 mm long; lip claw 3-4 times longer than the gynostemium, appendage lorate and apically denticulate; Tanzania 41. *D. uzungwae*
- 49'. Hood deeply concave but not spurred; lip claw not much longer than the gynostemium, appendage reniform or apically emarginate; widespread in south-central and eastern Africa 6. *D. katangensis*
50. Hood very shallow with the petals reflexed; lip appendage reniform and apically more or less emarginate, blade indistinctly stalked, callose; Madagascar and islands of the western Indian Ocean .. 7. *D. tripetaloides*
- 50'. Hood either deeply concave or hooded; if rarely shallow then petals not reflexed; lip appendage entire; continental and particularly southern Africa, one species in Madagascar (subgen. *Disperis* p.p.) 51
51. Lip blade small in relation to the appendage, triangular or ligulate, flat or convex; rostellum arms short, twisted; plants glabrous, mostly with 2 or 3 leaves; widespread in southern and tropical Africa ("Micrantha group" p.p.) 52
- 51'. Not this combination of characters; mainly South Africa, a few species in tropical Africa and one in Madagascar 58
52. Leaves absent, reduced to minute scale leaves; hood erect and spur-like, 7 mm long; Zambia and Malawi 48. *D. breviloba*
- 52'. Foliage leaves present 53
53. Lip appendage inflexed and densely long-papillate at the apex, resembling a brush or mop 54
- 53'. Lip appendage not like this although often hairy or papillose 55
54. Median sepal with a blunt, suberect saccate spur 1 mm long 47. *D. micrantha*
- 54'. Median sepal with a deflexed conical spur 2-5 mm long 46. *D. disaeformis*
55. Median sepal with an erect or ascending spur or sac 56
- 55'. Median sepal spur reflexed 57
56. Leaves 4 mm long; flowers green and purple or yellowish; Malawi, Tanzania and Cameroon 51. *D. parvifolia*
- 56'. Leaves 10-22 mm long; flowers pink; Ethiopia 52. *D. meirax*
57. Mostly epiphytic; flowers solitary, white with a green or mauve tinge; widespread in south-central and eastern Africa 49. *D. kilimanjarica*
- 57'. Terrestrial in montane grassland or scrubland; flowers 1-3, pink to purple; Ethiopia 50. *D. galerita*
58. Leaves solitary; lip blade triangular or lorate and slightly convex; South Africa and Zimbabwe ("Cardiophora group") 59
- 58'. Leaves 2-5 61
59. Leaf half-way up the stem, spreading; bracts spreading, ovate, acute; flowers 1-4, not secund 55. *D. lindleyana*
- 59'. Leaf basal, suberect; bracts conduplicate, reniform; flowers (2-) 6-20, secund 60

60. Petals oblong, hooded with the inner surface concealed; median sepal 3-4 mm long; lateral sepals 4-5 mm long; petals *c.* 4 mm long 53. *D. cardiophora*
- 60'. Petals triangular, flaring at the apex to expose the purple markings within; median sepal 4-5 mm long; lateral sepals 6.5-8 mm long; petals *c.* 7 mm long 54. *D. renibractea*
61. Rostellum arms long, exerted from the hood, basally porrect and then sharply inflexed at the tip, *c.* 5 mm long; lip blade ovate-acute and convex; South Africa and Zimbabwe ("Thorncroftii group") only 56. *D. thorncroftii*
- 61'. Rostellum arms not like this (shorter or with a different structure) 62
62. Stems hirsute; flowers almost always solitary; the three sepal apices with caudae 6-20 mm long; Western and Eastern Cape of South Africa ("Capensis group") only 57. *D. capensis*
- 62'. Stems glabrous, papillose or pubescent; flowers 1-several; sepals without caudae; widespread 63
63. Stems papillose or pubescent; lip claw not fused to the gynostemium; stigma frontal; mainly Western Cape of South Africa, two species ranging into tropical Africa ("Bolusiana group") 64
- 63'. Stems almost always glabrous; lip claw mostly extensively fused to the gynostemium, blade elongate, shallowly or deeply boat-shaped; stigma mostly dorsal on the rostellum; mainly South Africa and Zimbabwe, one species in Madagascar ("Wealei group") 70
64. Lip without an appendage; Tanzania 60. *D. decipiens*
- 64'. Lip appendiculate; mostly South Africa 65
65. Lip blade with the apex upcurved and only slightly concave; median sepal 2-6 mm long; lip appendage narrowly oblong, 2-4 lobed at the apex 66
- 65'. Lip blade cup- or goblet-shaped, distinctly concave; median sepal always more than 4 mm long; appendage tapering with the apex entire 67
66. Lateral sepals 4-6 mm long; sepals and petals concolourous, white to lilac; lip appendage pubescent over the entire upper surface and shortly 3-4 lobed at the apex; South Africa to Tanzania 59. *D. macowanii*
- 66'. Lateral sepals 2-3 mm long; sepals green and petals white; lip appendage glabrous except at the apex which is usually sharply inflexed and bifid; Western Cape of South Africa 58. *D. bodkinii*
67. Petal base extensively fused to the gynostemium; lip blade slipper-shaped; rostellum arms kinked in the middle 64. *D. villosa*
- 67'. Petals free or almost free from the gynostemium; lip blade cup-shaped; rostellum arms not kinked in the middle although the tip may be deflexed 68
68. Rostellum arms incurled through 360°, the viscidia directed downwards; lip claw cruciform .. 61. *D. cucullata*
- 68'. Rostellum arms not incurled; lip claw oblanceolate 69
69. Flowers purple or rarely white; lateral sepals 8-15 mm long; rostellum arms exerted, *c.* 2.5-5 mm long 63. *D. purpurata*
- 69'. Flowers yellow; lateral sepals 6-10 mm long; rostellum arms included, scarcely 1 mm long .. 62. *D. bolusiana*
70. Lip appendage horizontal or ascending 71
- 70'. Lip appendage with apex deflexed and descending 77
71. Madagascar; flowers pale pink 74. *D. bosseri*
- 71'. South Africa and Zimbabwe; flowers yellow, white, pink or red, often with greenish tinge 72
72. Flowers greenish-yellow or whitish-yellow, in second inflorescences; leaves linear-lanceolate; rostellum arms curled outwards through 360° 65. *D. circumflexa*
- 72'. Flowers white, pink or magenta; leaves ± lanceolate to ovate; rostellum arms straight or incurled 73
73. Hood shallow, open boat-shaped; sepals attenuate; lip blade with the tip porrect and free from the petals .. 74
- 73'. Hood deep, median sepal helmet-shaped or saccate, deeper than wide; sepals acuminate; lip blade with the tip inflexed and adhering to the tips of the petals and median sepal 75
74. Lateral sepals when seen from the front spreading horizontally at first, then sharply deflexed; lip claw glandular-pubescent, blade narrowly triangular and conduplicate 73. *D. paludosa*
- 74'. Lateral sepals only slightly bent, spreading; lip claw glabrous, blade at first conduplicate, then flaring and shallowly funnel-shaped 72. *D. oxyglossa*
75. Rostellum arms porrect; lip blade at first horizontal then sharply flexed upwards 68. *D. stenoplectron*
- 75'. Rostellum arms bent or curved; lip blade ascending from the base 76
76. Rostellum arms deflexed then geniculate, much widened at the base; lateral sepals 10-11 mm long 67. *D. cooperi*
- 76'. Rostellum arms tightly incurled; lateral sepals 6-8 mm long 71. *D. tysonii*
77. Hood 10-16 mm deep; rostellum arms included in the hood; lip appendage sigmoid and tapering, 5-6 mm long 70. *D. fanninia*
- 77'. Hood 3-5 mm deep; rostellum arms exerted from the hood; lip appendage shortly digitate, 1-2 mm long .. 78
78. Rostellum arms porrect; flowers 1-3 66. *D. concinna*
- 78'. Rostellum arms deflexed and geniculate; flowers 1-6 69. *D. wealei*

Disperis Sw. subgen. **Dryorkis** (Thouars)
Kurzweil & Manning, stat. nov.

Dryorkis Thouars, Nouv. Bull. Sci. Soc. Philom. Paris 1: 316 (1809) [*Dryorchis, sphalm.*]. — Type species: *Dryorkis tripetaloides* Thouars, lectotype, here designated.

Mostly glabrous herbs. Leaves alternate or opposite. Median sepal mostly linear or narrowly lanceolate, lateral sepals often fused at their base; petals mostly asymmetrical; lip appendage almost always bilobed, mostly hairy or papillate, blade frequently stalked. Rostellum arms usually straight, erect or slightly twisted. Pollen baculate.

DISTRIBUTION. — Forty-four species, mainly in the African, Madagascan and Asian tropics and extending into the northern parts of southern Africa.

GROUP 1: “JOHNSTONII GROUP” (SPECIES 1-22);
FIGURE 4

Glabrous herbs. Leaves normally alternate. Tepal hood shallow or deep, lateral sepals frequently joined at base or more extensively; lip appendage mostly with erect, ascending or horizontally reflexed processes, usually pubescent throughout, blade normally with callus, with pronounced and elongate stalk, rarely stalk short and insignificant. Rostellum arms straight, linear-spathulate, erect or slightly twisted outwards.

DIAGNOSIS AND RELATIONSHIPS. — This group basically comprises the species with the “*Katangensis* type” lip of KURZWEIL & LINDER (1991), and is defined by the callose and stalked lip blade. A close relationship between the continental African species *Disperis johnstonii*, *D. mozambicensis*, *D. reichenbachiana* and *D. togensis* was suggested by SUMMERHAYES (1931, 1933, 1935a) and VERDCOURT (1968). In addition, *D. katangensis* from mainland Africa, and *D. tripetaloides* from Madagascar and adjacent islands have a similar lip but differ from the group in their shallowly bilobed lip appendage, and the former species also by its deep hood. VERDCOURT (1968: 93) included *D. leuconoura*

in this group despite its simple lip blade, which was interpreted as a reduction from the more complex ancestral state. The species is also vegetatively different in its opposite or subopposite leaves, however we provisionally retain it here. SUMMERHAYES (1931) suggested that *D. katangensis* and its nearest African relative *D. mozambicensis* are the western-most members of a group of species centred in the Indo-Malayan region (all Asian species are here considered synonymous with *D. neilgherrensis*). Although no reasons were advanced, this was presumably done on the basis of the similarity in lip structure. With the reduction of the Asian species to a single taxon it is more probable that it represents an easterly invasion from an African source.

A number of species from Madagascar and adjacent Indian Ocean islands appear to be related to the mainly continental African species of the “Johnstonii Group”. Madagascan species of the genus *Disperis* are generally not well known and some are still known from the type collection alone. Although the species have recently been revised (LA CROIX *et al.* 2002), their relationships are still poorly understood. *Disperis cordata*, *D. falcatispetala*, *D. humblotii*, *D. lanceana*, *D. lanceolata*, *D. perrieri* and *D. saxicola* all share a prominently stalked, callose lip with the African species mentioned above. Five morphologically aberrant and probably phylogenetically isolated species have provisionally been placed at the end of the “Johnstonii group”. *Disperis discifera* from Madagascar and La Réunion has an ovate and unlobed lip appendage which is very unlike that of any other *Disperis* species. The lip appendage in *D. erucifera* is also unusual, consisting of a deeply bifid, subrhombic lobe. In both species the alternate leaves, simple rostellum arms, extensively hairy lip appendage and strongly asymmetrical petals suggest their inclusion in this group. *D. leuconoura* is anomalous in this group on account of its foliage. Available illustrations of the lip of this species suggest that the lip blade is apically slightly callose, and on account of this feature we have provisionally placed it here. Finally, the two Madagascan species *D. majungensis*, with a short triangular lip blade and an apically deeply bifid lip appendage, and *D. masoalensis*, with a fleshy lorate lip blade and two strongly forwards-

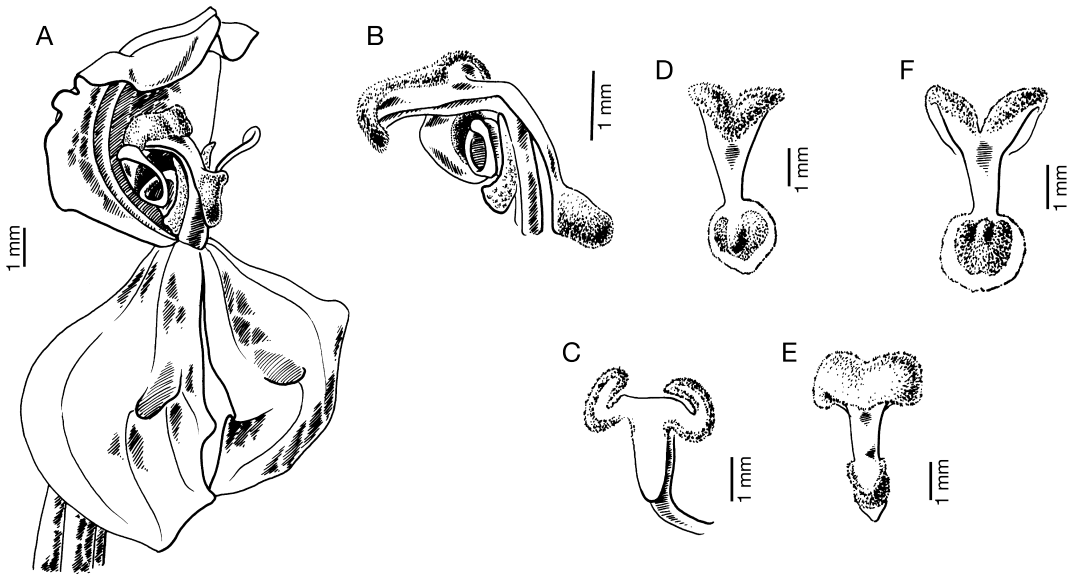


FIG. 4. — Flowers and floral details in the “Johnstonii group”: **A, E**, *Disperis tripetaloides* (Thouars) Lindl.: **A**, flower; **E**, lip; **B**, *D. reichenbachiana* Welw. ex Rchb.f., lip and gynostemium; **C**, *D. leuconeura* Schltr., lip; **D, D. johnstonii** Rchb.f. ex Rolfe, lip; **F**, *D. togoensis* Schltr., lip. Drawn from alcohol material: **A, E**, Jeffrey 407; **B**, Polhill & Paulo 1467; **C**, McLoughlin 106; **D**, Cole s.n.; **F**, Scholes 20.

curved lip appendage processes, are provisionally placed here on account of their alternate leaves, extensively hairy and apically deeply bifid or bilobed lip appendage, and apparently simple rostellum arms.

DISTRIBUTION. — Subtropical and tropical Africa but ranging into Madagascar, the Indian Ocean islands and south-east Asia.

1. *Disperis johnstonii* Rchb.f. ex Rolfe

Fl. Trop. Afr. 7: 291 (1898), as *johnstonii*; Summerhayes, Fl. W. Trop. Afr., ed. 2: 203 (1968); Verdcourt, Fl. Trop. East Afr.: 219 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 231 (1995); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 248 (1997); Szlachetko & Olszewski, Fl. Camer. 34: 40 (1998); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 302 (1999). — Type: Tanzania, Kilimanjaro, *Johnston s.n.* (holo-, K). *Disperis stolzii* Schltr., Bot. Jahrb. Syst. 53: 548 (1915). — Type: Tanzania, Rungwe Distr., *Stolz* 672 (holo-, B \ddot{u} ; iso-, K).

Disperis johnstonii Rchb.f. in Oliv., Trans. Linn. Soc. London, Bot. 2: 349 (1887), *nom. nud.*

Plants to 150 mm. Leaves 2(-3), alternate, ovate to lanceolate, 12-30 \times 4-22 mm. Flowers (1-)2 to 5, white with yellow or pink petals; median sepal 8-11 \times 1 mm, hood flat and incurved, lateral sepals semi-orbicular, 8-14 \times 4.5-7 mm, fused in basal third; petals elliptic, 9-10 \times 2-3 mm; lip blade stalked, ovate with a papillate crest; appendage of two papillate lobes (Fig. 4D).

DISTRIBUTION AND PHENOLOGY. — Widespread in tropical Africa, ranging south to the KwaZulu-Natal coast of South Africa; in rich humus or sandy soil in grassy places under trees or among grass in *Brachystegia* and *Uapaca* woodland, often associated with rocks, also in marshy places, from 500 to 2000 m. Flowering from February to September.

2. *Disperis reichenbachiana* Welw. ex Rchb.f.

Flora 48: 180 (1865); Rolfe, Fl. Trop. Afr. 7: 290 (1898); Verdcourt, Fl. Trop. East Afr.: 221 (1968);

Geerinck, Fl. Afr. Centr.: 236 (1984); P.J. Cribb & Fay, Kew Bull. 42: 719 (1987); la Croix & P.J. Cribb, Fl. Zambes.: 231 (1995). — Type: Angola, *Welwitsch 694* (holo-, W; iso-, BM, K, LISU).

Plants 70–250 mm. Leaves 2–4, alternate, ovate. Flowers 1–4, pink; median sepal 7–8 × 1–2 mm, hood shallow, 6–8.5 mm wide, lateral sepals elliptic, 9–10.5 × 3.5–5.5 mm, basally fused; petals 6–10 × 2–3.5 mm; lip 6.5–8 mm long, blade oblong with fleshy papillose callus, stalked, appendage of two diverging papillose lobes (Fig. 4B).

DISTRIBUTION AND PHENOLOGY. — Widespread in tropical Africa, from Zimbabwe and Angola to Uganda and Kenya in the east, Zaire/DRC and São Thomé in the west and the Central African Republic in the north; in leaf litter in deep shade on the floor of riverine and submontane forest and occasionally in mossy rock cracks in grassland and bush, at 800–2330 m. Flowering from December to March in south-central Africa, and December to July in eastern Africa.

3. *Disperis neilgherrensis* Wight

Icon. Plant. Ind. Orient. 5: t. 1719 (1851); Hooker, Fl. Brit. India 6: 169 (1894); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 931 (1898); Kraenzlin, Orch. Gen. Sp.: 838 (1900); Kurzweil, Blumea 50: 145 (2005). — *D. zeylanica* var. *nilgirensis* (Wight) Pradhan, Ind. Orch. 1: 42 (1976). — Type: India, Coimbatore, *Wight 3018* (lecto-, K, designated by Kurzweil 2005; isolecto-, AMES, C, S, W).

Disperis walkerae Rchb.f., Linnaea 41: 101 (1877). — Type: *Walker s.n.* (unknown).

Disperis zeylanica Trimen, J. Bot. 23: 245 (1885); Hooker, Fl. Brit. India 6: 169 (1894); Jayaweera, Handb. Fl. Ceyl. 2: 381 (1981). — Syntypes: Sri Lanka, near Rambodde, *Walker 16* (K, icono.); Sri Lanka, *Walker 180* (K).

?*Disperis papuana* Michol. & Kraenzl. in Kraenzlin, Orch. Gen. Sp.: 844 (1900). — Type: Moluccas, “Timorlaut- oder Tenimber-Insel”, *Micholitz s.n.* (unknown).

Disperis rhodoneura Schltr. in Schumann & Lauterbach, Fl. Schutzgeb. Südsee, Nachtr.: 81 (1905). — Type: Papua New Guinea, Torricelli Range, *Schlechter 14332* (holo-, B†).

Disperis philippinensis Schltr., Repert. Spec. Nov. Regni Veg. 9: 436 (1911). — Type: Philippines, Luzon, *Merrill 4215* (iso-, AMES).

Disperis javanica J.J.Sm., Bull. Jard. Bot. Buitenzorg, ser. 2, 14: 19 (1914). — Type: Java, Lawoe, *Backer 6765* (BO).

Disperis siamensis Rolfe ex Downie, Bull. Misc. Inform. Kew 1925: 422 (1925); Seidenfaden, Dansk Bot. Ark. 31: 139 (1977). — Type: Thailand, Doi Suthep, *Kerr 1987* (holo-, K; iso-, C).

Disperis orientalis Fukuy., Bot. Mag. (Tokyo) 50: 17 (1936). — Type: Taiwan, Kôto-syo, *Fukuyama 4839* (Herb. Orch. Fuk.).

Disperis palawensis (Tuyama) Tuyama, Bot. Mag. (Tokyo) 54: 267 (1940). — ?*Stigmatodactylus palawensis* Tuyama, Bot. Mag. (Tokyo) 53: 57 (1939). — *Pantlingia palawensis* (Tuyama) Rauschert, Feddes Repert. 94: 434 (1983). — Type: Caroline Islands, Pulau, *Tuyama s.n.* (unknown).

Disperis lantauensis S.Y.Hu, Chung Chi J. 11: 17 (1972). — Type: Hong Kong, Lantau Island, *Hu 10812* (holo-, ?AA).

Disperis tripetaloides (Thouars) Lindl., Gen. Sp. Orchid. Pl.: 371 (1839), p.p., as *tripetaloides*.

Plants 40–380 mm. Leaves 1–3, alternate, narrowly ovate, 3–43 × 3–31 mm. Flowers 1–5(–10), white or pink; median sepal lanceolate, 5–14 × 0.7–2.2 mm, hood shallow, lateral sepals ovate-lanceolate, 5–15 × 1.5–8 mm, joined in basal quarter or half; petals ovate-lanceolate, 5.5–14 × 2–5 mm; lip blade rotund, stalked, with hairy crest, appendage of two papillose spreading or ascending processes.

DISTRIBUTION AND PHENOLOGY. — Widespread but localised in Asia, recorded in India, Sri Lanka, Thailand, Indonesia, Hong Kong, Taiwan, southern Japan, the Caroline Island Pulau, the Philippines and Papua New Guinea; growing in forest as well as in grassy places, at altitudes of up to 1600 m; the flowering time is rather diverse depending on the climate of the region. The 10 originally described Asian *Disperis* species were recently shown to be conspecific (KURZWEIL 2005).

4. *Disperis togoensis* Schltr.

Bot. Jahrb. Syst. 38: 2 (1905); Verdcourt, Fl. Trop. East Afr.: 221 (1968); Summerhayes, Fl. W. Trop. Afr., ed. 2: 203 (1968); Geerinck, Fl. Afr. Centr.: 237 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 246 (1995); Szlachetko & Olszewski, Fl. Camer. 34: 38 (1998). — Types: Togo, *Schlechter 12990* (holo-, B†); Cameroon, Bamenda Distr., *Maitland 1519* (neo-, K, designated by Geerinck 1984).

Disperis cardiopetala Summerh., Hooker's Icon. Pl. 33: t. 3270 (1935), *nom. nov. pro D. cordata* Summerh., Bull. Misc. Inform. Kew 1933: 252 (1933), *nom. illegit., non D. cordata* Sw. (1800). — Type: Cameroon, Bamenda Distr., *Maitland 1519* (holo-, K).

Disperis atacorensis A.Chev., Explor. Bot. Afrique Occ. Franç. I: 622 (1920), *nom. nud.*

Plants 50–150 mm. Leaves 1–3, alternate, ovate, 6–35 × 5–20 mm. Flowers 3–10, pink; median sepal 7–8.5 × 0.5–1 mm, hood shallow, lateral sepals semi-ovate, 8–11 × 4–5 mm, joined for quarter to half; petals ovate, 7–10 × 2–3.5 mm; lip 4.5–5 mm long, blade rotund, with papillate knob in centre, stalked, appendage of two papillate diverging lobes (Fig. 4F).

DISTRIBUTION AND PHENOLOGY. — South-central, eastern and western Africa (Malawi, Mozambique, Zaire/DRC, Uganda, Tanzania, Congo, Cameroon, Nigeria, Ghana, Togo, Benin); in savanna, among rocks or at forest margins at 140–1500 m. Flowering from February to August.

5. *Disperis mozambicensis* Schltr.

Bot. Jahrb. Syst. 24: 428 (1897); Rolfe, Fl. Trop. Afr. 7: 575 (1898); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 946 (1898); la Croix & P.J. Cribb, Fl. Zambes.: 243 (1995). — Type: Mozambique, Beira, *Schlechter s.n.* (holo-, B†; drawing, K).

Plants 70–130 mm. Leaves 3, alternate, lanceolate, 10–20 × 7–10 mm. Flowers few, pink or mauve; median sepal linear, hood shallow, 12–14 × 10 mm, lateral sepals 10 × 6 mm, subfalcate, joined basally up to quarter; petals lanceolate, 13 × 5 mm; lip blade suborbicular, stalked, with papillose crest, appendage bifurcate.

DISTRIBUTION AND PHENOLOGY. — Mozambique; among bushes on river banks. Flowering in April.

6. *Disperis katangensis* Summerh.

Bull. Misc. Inform. Kew 1931: 384 (1931); Verdcourt, Fl. Trop. East Afr.: 219 (1968); Geerinck,

Fl. Afr. Centr.: 234 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 239 (1995). — Type: Zaire/DRC, Kisanga, *von Hirschberg 168* (holo-, K).

Plants 50–200 mm. Leaves 2, alternate, ovate, 5–30 × 5–20 mm. Flowers 1–5, mauve with yellow and purple marks; median sepal linear, 7–17 mm long, laterals elliptic, 9–15 × 6–11 mm, basally joined (up to third); lip 7.5–10 mm long, blade circular or elliptic with papillate crest, stalked, appendage reniform and emarginate or deeply bilobed, papillose.

var. *katangensis*

Verdcourt, Fl. Trop. East Afr.: 219 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 242 (1995).

DISTRIBUTION AND PHENOLOGY. — Zambia, Zaire/DRC, Angola and Tanzania; in *Brachystegia* woodland from about 1500 to 2000 m. Flowering mainly from December to February, also in May.

var. *minor* Verdc.

Kew Bull. 22: 93 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 242 (1995). — Type: Zambia, Mwinilunga Distr., *Milne-Redhead 3540* (holo-, K; iso-, BR, SRGH).

Differs from the typical variety in having smaller flowers and a deeply bilobed lip appendage.

DISTRIBUTION. — Known only from *Cryptosepalum* woodland in northern Zambia at about 1400 m.

7. *Disperis tripetaloides* (Thouars) Lindl.

Gen. Sp. Orch. Pl. 371 (1839), as *tripetaloides*; Schlechter, Bull. Herb. Boissier, ser. 1, 6: 932 (1898), as *tripetaloides*; H. Perrier in Humbert, Fl. Madag. (Engl. revis.), Orch.: 117 (1981), as *tripetaloides*; Du Puy *et al.*, Orch. Madag.: 136 (1999); la Croix *et al.*, Adansonia 24: 76 (2002). — *Dryopeia tripetaloides* Thouars, Hist. Orchid.: t. 3 (1822). — Type: La Réunion, *Thouars s.n.* (holo-, P). *Dryorkis tridris* Thouars, Hist. Orchid.: t. 3 (1822), *nom. superfl. pro Dryopeia tripetaloides* Thouars (1822).

Plants to 220 mm. Leaves 2–3, alternate, ovate, 15–50 × 8–25 mm. Flowers 1–5, white or rose-coloured; median sepal linear, 8–9 mm, hood

shallow, 6.5-8.5 × 3-5 mm, lateral sepals elliptic, 7-10 × 5 mm, nearly free; petals semi-circular, 6-8 mm long; lip blade oblong with fleshy and papillose structure at tip, appendage papillose, more or less bilobed (Fig. 4A, E).

DISTRIBUTION AND PHENOLOGY. — Madagascar, Seychelles, Comores, Mauritius, La Réunion and Rodrigues; singly or in small colonies in rich soil in the understorey of semi-dry (rarely humid) forest, from sea level to about 700 m. Flowering mostly from November to June. In his description Lindley (1839) erroneously cited a specimen from Sri Lanka under this species, which was later referred to *D. zeylanica* (= *D. neilgherrensis*).

8. *Disperis lanceolata* Bosser & la Croix

Adansonia 24: 81 (2002). — Type: Madagascar, distr. of Ankazobe, *Bosser 7951* (holo-, P).

Plants to 270 mm. Leaves 2-3, alternate, lanceolate to ovate, 18-36 × 7-15 mm. Flowers 2-5, rose-pink; median sepal 7.5 × 1 mm, hood 5.5-7.5 × 2.5-3 mm, lateral sepals oblanceolate, 6-9 mm long, free; petals oblong, 7.5 × 2 mm; lip blade suborbicular or elliptic with fleshy callus, appendage of two diverging, papillose lobes.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in humus in moist forests, also on forest margins, from 1200 to 2000 m. Flowering from March to May.

9. *Disperis cordata* Sw.

Kongl. Vetensk. Acad. Nya Handl. 21: 220 (1800); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 955 (1898); la Croix *et al.*, *Adansonia* 24: 78 (2002). — Type: Mauritius.

Disperis discolor (Thouars) Frapp. ex Cordem., Cat. Orch. Réunion: 10 (1880). — *Dryopeia discolor* Thouars, Hist. Orchid.: t. 2 (1822). — Type: *Thouars*, Hist. Orchid.: t. 2 (1822) (lecto-, unknown).

Dryorkis erythrodris Thouars, Hist. Orchid.: t. 2 (1822), *nom. superfl. pro Dryopeia discolor* Thouars (1822).

Plants to 200 mm. Leaves 2, alternate, ovate or narrowly-ovate, 10-37 × 7-14 mm. Flowers 1-3, white or rose-coloured with purple markings; median sepal linear, 7-8 mm long, hood 8 × 6-6.5 mm, lateral sepals ovate, 7-10 × 4-4.5 mm, united in lower half; petals ovate; lip blade consisting of hairy ovate hump on flat narrowly triangular stalk, appendage of two diverging and papillose horns.

DISTRIBUTION AND PHENOLOGY. — La Réunion and Mauritius; under trees in semi-dry forest, from 400 to 1500 m. Flowering mainly from December to March.

10. *Disperis saxicola* Schltr.

Repert. Spec. Nov. Regni Veg. Beih. 33: 110 (1925); H. Perrier *in* Humbert, Fl. Madag. (Engl. revis.), Orch.: 114 (1981); Du Puy *et al.*, Orch. Madag.: 136 (1999); la Croix *et al.*, *Adansonia* 24: 72 (2002). — Type: Madagascar, Itomampy, *Perrier de la Bâthie 12650* (iso-, P).

Plants to 250 mm. Leaves 3, alternate, ovate, 24-60 × 10-28 mm. Flowers 2-5, purplish to pink; median sepal linear, 8 mm long, hood oblong, 6-8 × 4.5 mm, lateral sepals elliptic, 8-11 × 5 mm, free; petals lanceolate, 5-8 × 2-3.2 mm; lip blade a kidney-shaped structure on a long linear stalk, appendage of two pubescent lobes.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in dense forest, also in shade among rocks from 400 to 1000 m. Flowering mainly from June to September.

11. *Disperis perrieri* Schltr.

Ann. Inst. Bot.-Géol. Colon. Marseille, ser. 3, 1: 160 (1913); H. Perrier *in* Humbert, Fl. Madag. (Engl. revis.), Orch.: 114 (1981); Du Puy *et al.*, Orch. Madag.: 136 (1999); la Croix *et al.*, *Adansonia* 24: 71 (2002). — Type: Madagascar, Manongarivo Massif, *Perrier de la Bâthie 1924* (holo-, P).

Plants to 300 mm. Leaves 2-4, alternate, lanceolate, 28-50 × 9-12 mm. Flowers 1-2, mauve and

rose-coloured, hood green; median sepal linear, 10 × 1 mm, hood shallowly obovate, 12-15 × 16-20 mm, lateral sepals semi-ovate, 8.5-10 × 3.5-4 mm, free; petals 12 × 6 mm; lip blade a fleshy terminal body, stalked, appendage of two diverging papillose branches.

DISTRIBUTION AND PHENOLOGY. — North-western Madagascar; in damp woodland and humid evergreen forest from 1000 to 2250 m. Flowering in March and May.

12. *Disperis falcatipetala* P.J.Cribb & la Croix

Adansonia 24: 85 (2002). — Type: Madagascar, Antsiranana, Malcomber, Hutcheon, Razafimanantsoa & Zjbra 1413 (holo-, MO).

Plants to 135 mm. Leaves 3, alternate, ovate, to 18 × 8 mm. Flowers 3, white with purple dots; median sepal linear-oblong, 4 × 1 mm, laterals spatulate, 9.5-10 × 3.5 mm, united in basal half; petals oblong, 5 × 1 mm; lip 3.5 mm long, blade spatulate, appendage of two fleshy villose lobes.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in montane forest from 1700 to 1730 m. Flowering in April.

13. *Disperis humblotii* Rchb.f.

Flora 68: 377 (1885); H. Perrier *in* Humbert, *Fl. Madag.* (Engl. revis.), *Orch.*: 116 (1981); Du Puy *et al.*, *Orch. Madag.*: 135 (1999); la Croix *et al.*, *Adansonia* 24: 75 (2002). — Type: Comores, *Humblot s.n.* (holo-, W).
Disperis comorensis Schltr., *Bot. Jahrb. Syst.* 24: 429 (1897), *Bull. Herb. Boissier*, ser. 1, 6: 946 (1898); Du Puy *et al.*, *Orch. Madag.*: 134 (1999). — Type: Comores, *Bang s.n.* (holo-, B†).

Plants to 220 mm. Leaves 2-3, alternate, ovate, 20-40 × 10-20 mm, lower leaf long petiolate. Flowers 2-10, rose-coloured or white; median sepal lanceolate, 6-7 mm long, hood oblong, lateral sepals narrowly ovate, 9-10 × 2.5-3 mm, basally united for up to half their length; petals linear-ligulate, 6-7 mm long; lip blade fleshy, saddle-shaped, papillose, stalked, appendage of two diverging oblong lobes, papillose.

DISTRIBUTION AND PHENOLOGY. — Madagascar and Comores (Anjouan, Grande Comore); in humid evergreen forest from 700 to 1400 m. Flowering from July to October.

14. *Disperis lanceana* H.Perrier

Notul. Syst. (Paris) 5: 223 (1936), *in* Humbert, *Fl. Madag.* (Engl. revis.), *Orch.*: 114 (1981); Du Puy *et al.*, *Orch. Madag.*: 135 (1999); la Croix *et al.*, *Adansonia* 24: 72 (2002). — Type: Madagascar, *Lance s.n.* (holo-, P).

Plants to 150 mm. Leaves 2-3, alternate, lanceolate to ovate, 30-35 × 12-13 mm. Flowers 2-3, pink, relatively large; median sepal linear, 12-13 × 0.8 mm, hood deep, 10-12 × 14-15 mm, lateral sepals almost completely united to form synsepalum 8-9 × 10-12 mm; petals ovate, 10-13 × 5 mm; lip blade fleshy, tongue-shaped, papillose, stalked, appendage of two curved horns.

DISTRIBUTION. — Madagascar.

15. *Disperis bathiei* Bosser & la Croix

Adansonia 24: 79 (2002). — Type: Madagascar, massif of Manongarivo, *Perrier de la Bathie 1924bis* (holo-, P).

Plants ± 170 mm. Leaves 3, alternate, ovate, lowest petiolate, to 33 × 18 mm. Flowers to 5, colour unknown; median sepal linear, 10 × 1 mm, hood 6 mm wide, lateral sepals apparently free, elliptic, 13-14 × 4.5-5.6 mm; petals oblong, 10 × 2.5 mm; lip blade linguiform, stalked, appendage of two pubescent prongs with thickened apices.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in humid forest between 1000 and 2000 m. Flowering in May.

16. *Disperis ankarensis* H.Perrier

Notul. Syst. (Paris) 8: 129 (1939), *in* Humbert, *Fl. Madag.* (Engl. revis.), *Orch.*: 113 (1981); Du Puy *et al.*, *Orch. Madag.*: 133 (1999); la Croix *et al.*,

Adansonia 24: 67 (2002). — Type: Madagascar, Antsiranana, *Humbert 18825* (holo-, P).

Plants to 180 mm. Leaves 2, alternate, lanceolate, 35-50 × 5-10 mm. Flowers 1-3, green and pink; median sepal linear, 8 mm long, hood 15 mm wide, lateral sepals falcate, 7 × 3 mm; petals falcate; lip blade fleshy and tongue-shaped, with long hairs, appendage of two linear-oblong horns.

DISTRIBUTION AND PHENOLOGY. — Western Madagascar; on rocks in semi-dry forest, in humus on limestone at about 300 m. Flowering in January.

17. *Disperis hildebrandtii* Rchb.f.

Otia Bot. Hamb.: 73 (1878); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 929 (1898); H. Perrier in *Humbert, Fl. Madag.* (Engl. revis.), Orch.: 113 (1981); Du Puy *et al.*, Orch. Madag.: 134 (1999); la Croix *et al.*, *Adansonia* 24: 67 (2002). — Type: Madagascar, Nosy-Bé, *Hildebrandt 3158* (holo-, W; iso-, BM, K, P, WU).

Plants to 250 mm. Leaves 1-3, alternate, lanceolate, 15-70 × 5-20 mm. Flowers 1-6, rose-coloured; median sepal linear, 8-10 × 1 mm, hood 10 × 12 mm, lateral sepals semi-ovate, 8-10 × 3-6 mm, united in basal half; petals 8-10 × 3-6 mm; lip blade tongue-shaped, hairy, appendage of two erect and curved papillose processes.

DISTRIBUTION AND PHENOLOGY. — Central, north-eastern and northern Madagascar, Comores (Mayotte); in the understorey of humid to semi-dry woodland and forest from 90 to 2400 m. Flowering from September to February.

?18. *Disperis discifera* H.Perrier

Notul. Syst. (Paris) 5: 222 (1936), in *Humbert, Fl. Madag.* (Engl. revis.), Orch.: 111 (1981); Du Puy *et al.*, Orch. Madag.: 134 (1999); la Croix *et al.*, *Adansonia* 24: 65 (2002). — Type: Madagascar, Mt Tsaratanana, *Perrier de la Bâthie 16081* (lecto-, P).

Plants to 300 mm. Leaves 2-4, alternate, ovate or lanceolate, 16-60 × 6-20 mm. Flowers 1-3, pink with darker markings; median sepal linear, 8-12 × 1-2 mm, hood shallow, lateral sepals ob-ovate, 6.5-13 × 4.5-7 mm, basally united; petals oblong, 8-12 × 4-6 mm; lip blade minute, triangular, tip glabrous, ?appendage ovate, papillose.

DISTRIBUTION AND PHENOLOGY. — Madagascar and La Réunion; in moist forest and ericaceous shrub, also in pine plantations, at 800-2350 m. Flowering from February to August.

var. *discifera*

DISTRIBUTION. — Madagascar.

var. *borbonica* (H.Perrier) Bosser

Adansonia 24: 65 (2002). — *D. borbonica* H.Perrier, Notul. Syst. (Paris) 5: 228 (1936). — Type: La Réunion, *Delteil s.n.* (holo-, P).

DISTRIBUTION. — Madagascar and La Réunion. Differs from the typical variety in its smaller flowers. In Madagascar sometimes sympatric with the typical variety.

?19. *Disperis erucifera* H.Perrier

Notul. Syst. (Paris) 5: 226 (1936), in *Humbert, Fl. Madag.* (Engl. revis.), Orch.: 116 (1981); Du Puy *et al.*, Orch. Madag.: 134 (1999); la Croix *et al.*, *Adansonia* 24: 73 (2002). — Type: Madagascar, Antsiranana, *Perrier de la Bâthie 17509* (holo-, P).

Plants to 280 mm. Leaves 2-4, alternate, lanceolate or ovate, 58-62 × 18-36 mm. Flowers 1-6, violet or pink; median sepal linear, 11 × 1-1.5 mm, laterals semi-circular, 7-10 × 3-4 mm, free; petals semi-ovate, 11-12 mm; lip blade thick-fleshy, with recurved apex, hairy, appendage bifurcate, hairy.

DISTRIBUTION AND PHENOLOGY. — Northern and north-eastern Madagascar; common in leaf debris and humus in crevices in shaded limestone rocks, from 30 to 350 m. Flowering from January to March.

?20. *Disperis leuconeura* Schltr.

Bot. Jahrb. Syst. 53: 549 (1915); Verdcourt, Fl. Trop. East Afr.: 222 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 242 (1995). — Type: Tanzania, Rungwe Distr., *Stolz 1902* (holo-, B†; iso-, K).

Plants 40-160 mm. Leaves 2, opposite, ovate, 20-35 × 14-18 mm. Flowers 1-3, pink; median sepal linear-lanceolate, ± 6 mm long, hood shallow, 5 × 6 mm, lateral sepals ovate, 4-5 × 2-4 mm, free; petals 5.5 mm long; lip 4 mm long, blade narrowly triangular, glabrous, appendage of two curved papillose lobes (Fig. 4C).

DISTRIBUTION AND PHENOLOGY. — Zambia, Zimbabwe, Malawi and Tanzania; in leaf litter in evergreen and riverine forests and mixed woodland, at 450-900 m. Flowering from December to March.

?21. *Disperis majungensis* Schltr.

Repert. Spec. Nov. Regni Veg. Beih. 33: 108 (1925); H. Perrier *in* Humbert, Fl. Madag. (Engl. revis.), Orch.: 115 (1981); Du Puy *et al.*, Orch. Madag.: 135 (1999); la Croix *et al.*, Adansonia 24: 73 (2002). — Type: Madagascar, Majunga, *Perrier de la Bâthie 13038* (holo-, P).

Plants to 130 mm. Leaves 2, alternate, ovate, 20-43 × 12-20 mm. Flowers 1-3, violet; median sepal linear, 6 × 0.8 mm, hood shallow, 5-6 × 4.5 mm, lateral sepals 5 mm long, free; petals semi-circular, 5.5-6 × 2-3 mm; lip 4.5 mm long, blade triangular, pubescent, appendage of two erect and pubescent lobes.

DISTRIBUTION AND PHENOLOGY. — Western Madagascar; among rocks in forest, in limestone-derived soils or humus from sea level to 100 m. Flowering in January and February.

?22. *Disperis masoalensis* P.J.Cribb & la Croix

Adansonia 24: 82 (2002). — Type: Madagascar, Toamasina, *Schatz, Van der Werff, Gray & Razafimandimbison 3380* (holo-, K; iso-, MO, P).

Plants to 120 mm. Leaves 2, alternate, ovate, 25-32 × 11-12 mm. Flowers 1-2, pinkish white;

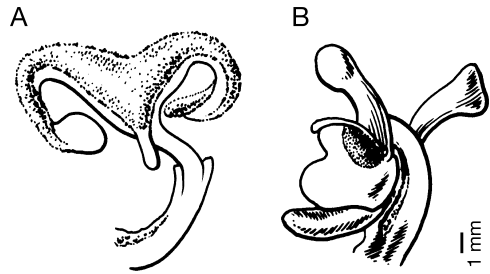


FIG. 5. — *Disperis oppositifolia* Sm. ("Oppositifolia group"): **A**, lip; **B**, gynostemium. Drawn from alcohol material: *Barclay 375*.

median sepal lanceolate, 10 × 1-1.5 mm, hood shallow, lateral sepals ovate, 18 mm long, united for about half; petals ovate, 10 × 6 mm; lip blade linguiform, papillose, basally slightly narrowed and forming indistinct stalk, appendage of two incurved papillose processes.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in moss on boulders in river beds from sea level to 25 m. Flowering in October.

GROUP 2: "OPPOSITIFOLIA GROUP"
(SPECIES 23-27); FIGURE 5

Glabrous herbs with opposite leaves. Hood shallow or deep, lateral sepals free or joined in their lower part; lip appendage of two forward-curved, reflexed or decurved narrow processes, usually pubescent throughout, blade narrowly triangular or lorate, unstalked and without an apical callus. Rostellum arms simple where known.

DIAGNOSIS AND RELATIONSHIPS. — The narrowly triangular or lorate lip blade, which is unstalked and lacks a callus, is the main character of the group. *Disperis similis* with its reflexed and decurved lip appendage processes is distinct in the "Oppositifolia group", in which the processes are typically forward-curved. An unusual member of this group is *D. trilineata*, which has bifurcate lip appendage processes, and on account of this feature we provisionally place this species at the end.

DISTRIBUTION. — Madagascar, Mascarenes and Comores.

23. *Disperis ciliata* Bosser

Adansonia 24: 64 (2002). — Type: Madagascar, Mangindrano, *Humbert & Capuron 25002* (holo-, P; iso-, K, MO, P).

Plants to 200 mm. Leaves 2, opposite, lanceolate, 20–45 × 8–20 mm. Flowers 2–5, rose-coloured; median sepal linear-lanceolate, 7 × 1.5 mm, hood 6 × 6 mm, lateral sepals ovate, basally united, 7.5 × 5.5 mm, without spurs; petals ovate, 6–6.5 × 4.5 mm; lip blade triangular, papillose, appendage of two spreading, curved and papillose horns.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in humid montane forest between 1700 and 1900 m. Flowering in January and February.

24. *Disperis latigaleata* H. Perrier

Notul. Syst. (Paris) 8: 36 (1939), in *Humbert, Fl. Madag.* (Engl. revis.), *Orch.*: 111 (1981); *Du Puy et al.*, *Orch. Madag.*: 135 (1999); *la Croix et al.*, *Adansonia* 24: 62 (2002). — Type: Madagascar, Ankazondrano, *Humbert 13440* (lecto-, P).

Plants to 210 mm. Leaves 2, opposite, ovate or lanceolate, 16–60 × 10–20 mm. Flowers 1–4, pink or violet; median sepal linear, 6–8 × 1 mm, hood broad, lateral sepals semi-orbicular, almost free, apparently unspurred; petals ovate, 5–7 × 4.5–5 mm; lip blade triangular, pubescent with glabrous tip, appendage of two linear lobes, pubescent, slightly thickened at tips.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in dry deciduous forest or woodland and in moss on boulders from 600 to 2000 m, sometimes epiphytic. Flowering from September to December.

25. *Disperis oppositifolia* Sm.

In Rees, Cycl. 11: 6 (1809); *Schlechter, Bull. Herb. Boissier, ser. 1, 6: 954* (1898); *H. Perrier in Humbert,*

Fl. Madag. (Engl. revis.), *Orch.*: 110 (1981); *Du Puy et al.*, *Orch. Madag.*: 135 (1999); *la Croix et al.*, *Adansonia* 24: 60 (2002). — *Dryopeia oppositifolia* (Sm.) Thouars, *Hist. Orchid.*: t. 1 (1822). — *Dryorkis antididris* Thouars, *Hist. Orchid.*: t. 1 (1822), *nom. superfl.* — Type: La Réunion, *Smith s.n.* (holo-, LINN).

Plants to 250 mm. Leaves 2, opposite, ovate, 15–55 × 8–20 mm. Flowers 1–3 (to 12 in var. *mascarenensis*), white, pink or lilac with darker markings; median sepal linear, 4.5–7 × 0.5 mm, hood shallow, lateral sepals 5–10 × 3–4 mm, united up to half; petals falcate, 4.5–7 × 3–3.5 mm; lip blade triangular, appendage of two linear, curved pubescent lobes, often widened at tips (Fig. 5).

DISTRIBUTION AND PHENOLOGY. — Madagascar, Comores and Mascarenes; in humid, riparian forest, on rocks by streams and sometimes in pine plantations from sea level to 1200 m; often locally common. Flowering from July to February.

var. *oppositifolia*

Lip blade largely pubescent; flowers 1–3.

DISTRIBUTION. — Madagascar, Comores and Mascarenes.

var. *mascarenensis* Bosser

Adansonia 24: 62 (2002). — Type: La Réunion, Mt St Denis, *Bosser 21622* (holo-, P).

Lip blade glabrous on the upper surface; flowers up to 12.

DISTRIBUTION. — La Réunion, and possibly also Mauritius; at about 500 m.

26. *Disperis similis* Schltr.

Repert. Spec. Nov. Regni Veg. Beih. 33: 111 (1925); *H. Perrier in Humbert, Fl. Madag.* (Engl. revis.), *Orch.*: 110 (1981); *Du Puy et al.*, *Orch. Madag.*: 136 (1999); *la Croix et al.*, *Adansonia* 24: 59 (2002). — Type: Madagascar, massif of Andringitra, *Perrier de la Bâthie 14345* (lecto-, P).

Plants to 270 mm. Leaves 2, subopposite or opposite, ovate or lanceolate, 15–45 × 7–22 mm.

Flowers 1-4, pink; median sepal linear, 4-5 × 0.8 mm, lateral sepals oblong-lanceolate, 4-6 × 3 mm, more or less free; lip blade triangular, glabrous, appendage of two diverging pubescent lobes.

DISTRIBUTION AND PHENOLOGY. — Madagascar; in moss forest from 1500 to 2000 m. Flowering mostly in January and February.

?27. *Disperis trilineata* Schltr.

Repert. Spec. Nov. Regni Veg. Beih. 33: 112 (1925); H. Perrier in Humbert, Fl. Madag. (Engl. revis.), Orch.: 110 (1981); Du Puy *et al.*, Orch. Madag.: 136 (1999); la Croix *et al.*, Adansonia 24: 58 (2002). — Type: Madagascar, Sambirano Valley, Perrier de la Bâthie 15705 (holo-, P).

Plants to 150 mm. Leaves 2, opposite or nearly so, ovate, 15-40 × 8-18 mm. Flowers 1-3, pink or violet; median sepal linear, 3-4 mm long, hood shallow, lateral sepals elliptic, 3-4 mm long, free; petals elliptic, 3-4 mm long; lip 4 mm long; blade narrowly lanceolate, glabrous, appendage of two tomentose and 2-forked finger-like processes.

DISTRIBUTION AND PHENOLOGY. — Madagascar and Comores; in moist forests at about 400 m altitude. Flowering from January to March.

GROUP 3: "ANTHOCEROS GROUP"
(SPECIES 28-41); FIGURE 6

Glabrous herbs. Leaves normally opposite or subopposite. Hood deep or with pronounced spur, petals frequently with large basal anterior lobe and therefore appearing bilobed, lateral sepals free or extensively fused; lip claw mostly very long and slender, blade simple and ecallose, often surrounded by hairs, appendage mostly as two pendent or forward-curved and deeply bifurcate lobes, rarely of many pendent lobes or entire and apically dentate. Rostellum arms linear-spathulate, erect or suberect, usually elongate and only rarely short (*D. nemorosa*); stigma

lateral, mostly narrowly lanceolate at base of rostellum arms.

DIAGNOSIS AND RELATIONSHIPS. — This group comprises species with two opposite or subopposite leaves, usually bilobed petals, a deep or spurred hood and the "Virginalis type" lip of KURZWEIL & LINDER (1991). SUMMERHAYES (1937, 1956) proposed that *Disperis dicerochila*, *D. kerstenii*, *D. nitida*, *D. thomensis* and *D. virginalis* were closely related on account of their lip structure, and we also include *D. anthoceros*, *D. aphylla*, *D. bifida*, *D. elaphoceras* and *D. nemorosa* as part of this group. Preliminary molecular work shows that *D. dicerochila* and *D. nemorosa* form a well supported clade (STEINER pers. comm.), supporting this treatment. Within the group, the relative length and orientation of the lip appendage as well as other floral features are used to distinguish the species. At an earlier stage, SUMMERHAYES (1935c) had suggested that *D. leuconeura* and *D. oppositifolia* have close affinities to these species but their different lip structure indicates otherwise. *Disperis elaphoceras* shares the opposite leaves, two 2-pronged lip appendage processes and simple lip blade but differs in having a rather short basal lip claw. A possible relationship between *D. elaphoceras* and *D. dicerochila* was pointed out by VERDCOURT (1986).

Four species, *Disperis egregia*, *D. kamerunensis*, *D. mildbraedii* and *D. uzungwae*, are morphologically aberrant but appear to be related to this group and have therefore provisionally been added at its end. The lip appendage of *D. egregia* is very much unlike that of any other *Disperis* species, and SUMMERHAYES (1952) was unable to relate the species to any others in the genus. Another remarkable feature of *D. egregia* is the gynostemium with its erect anther. The extensive fusion of the lateral sepals is similar to what is found in some other species of subgenus *Dryorkis*, and an inclusion in this subgenus is also suggested by the apparently simple rostellum arms (illustration in STEWART 1996). *D. kamerunensis* and *D. mildbraedii* are poorly known. In both species we were not able to trace any illustrations, and the available and rather old descriptions of floral and particularly lip details are

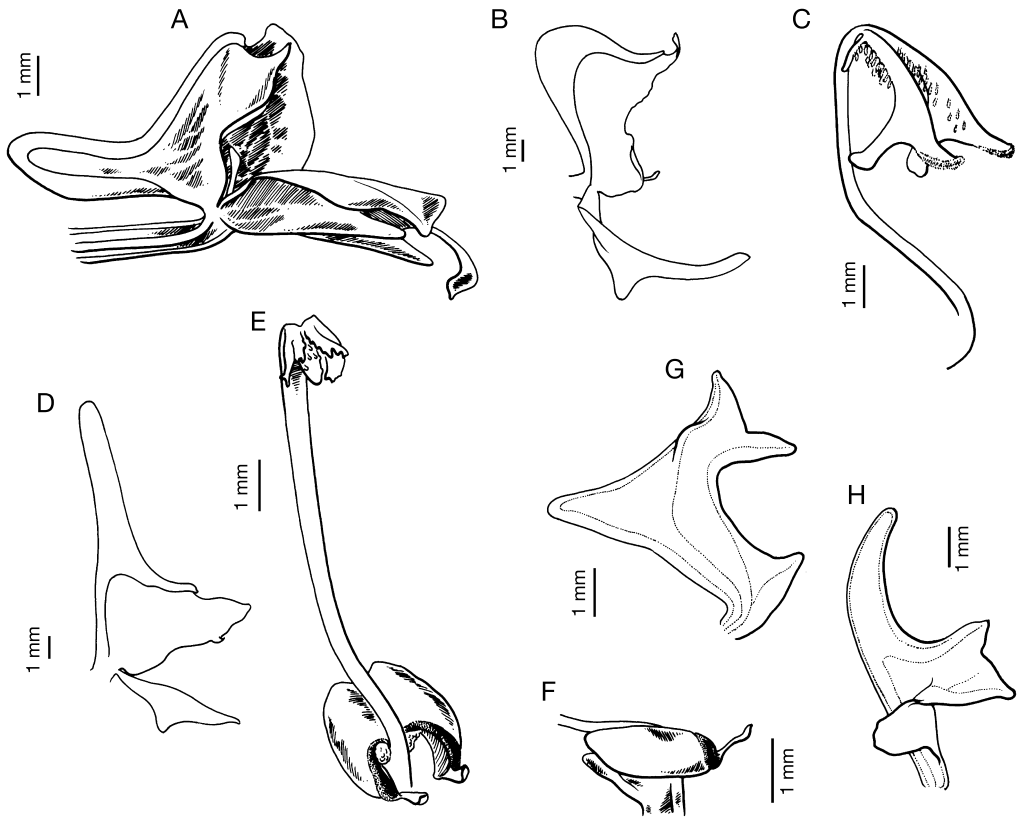


FIG. 6. — Flowers and floral details in the “Anthoceros group”: **A**, *Disperis aphylla* Kraenzl. ex De Wild. & T.Durand, flower; **B**, **C**, **D**, *Disperis virginialis* Schltr.: **B**, flower in side view; **C**, lip; **D**–**F**, *D. anthoceros* Rchb.f.: **D**, flower in side view; **E**, lip and gynostemium; **F**, gynostemium; **G**, *D. thomensis* Summerh., petal; **H**, *D. kerstenii* Rchb.f., petal. Drawn from alcohol material: **A**, Schajes 2839A; **B**, **C**, Eyles 4477; **D**–**F**, Manning s.n.; **G**, Jaeger 1289; **H**, Eggeling 6634.

therefore difficult to interpret. Because of its opposite leaves, bilobed petals (SCHLECHTER 1898: 949) and spurred hood we have provisionally placed *D. kamerunensis* in the “Anthoceros group”. The allusion to a relationship with *D. nemorosa* and *D. kerstenii* by SCHLECHTER (1898: 949) also points to its inclusion in this group. However, ROLFE’s (1898: 292) reference to a “tooth-like” lip appendage may suggest an affinity of this species with *Disperis* subgen. *Disperis*. *Disperis mildbraedii* is placed here entirely based on SUMMERHAYES’s (1933) description and his assertion that it is allied to *D. nemorosa*, *D. anthoceros* and *D. kamerunensis*. The affinities of *D. uzungwae* are even less clear at the moment. Probably because of the general

lip shape with its entire appendage, VERDCOURT (1986) pointed out a possible distant relationship with *D. bodkinii*, *D. meirax*, *D. parvifolia* and *D. woodii*, although it differs from these in the much longer lip claw (all four species are here included in subgenus *Disperis*). On the basis of the elongate median sepal spur, the extensively fused lateral sepals, the long lip claw, the simple lip blade surrounded by hairs and the gynostemium structure, we feel that the species is better placed in the “Anthoceros group”. However, the alternate leaves of the species are most unusual in this group.

DISTRIBUTION. — Subtropical and tropical Africa; one species ranging into Madagascar.

28. *Disperis aphylla* Kraenzl. ex De Wild. & T. Durand

Bull. Soc. Roy. Bot. Belgique 38: 71 (1900); Verdcourt, Fl. Trop. East Afr.: 226 (1968); Geerinck, Fl. Afr. Centr.: 233 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 234 (1995); Szlachetko & Olszewski, Fl. Camer. 34: 42 (1998). — Type: Zaire/DRC, Matende-Makanga, *Dewèvre 1065* (holo-, BR; iso-, K).

Plants 60-160 mm. Leaf 1 or absent (2 leaves in subsp. *bifolia*), opposite, ovate, 20-30 × 15-25 mm. Flowers 1-5, white or pink; median sepal linear, forming reflexed spur 3-4 mm long together with petals, lateral sepals ovate, 7-9 × 2-3 mm, free; petals triangular, 7 × 3 mm; lip blade minute, deflexed, appendage of two linear, papillose lobes (Fig. 6A).

DISTRIBUTION AND PHENOLOGY. — From Angola and Zambia northwards to East Africa and West Africa as far as Cameroon; in leaf litter in montane evergreen forests at 2000-2150 m. Flowering from February to July.

subsp. *aphylla*

Verdcourt, Fl. Trop. East Afr.: 227 (1968). — *D. aphylla* var. *aphylla* Szlachetko & Olszewski, Fl. Camer. 34: 42 (1998).

Stem leafless or with 1 leaf.

DISTRIBUTION. — Angola, Zaire/DRC to Cameroon and East Africa.

subsp. *bifolia* Verdc.

Kew Bull. 22: 96 (1968), Fl. Trop. East Afr.: 227 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 236 (1995). — *D. aphylla* var. *bifolia* (Verdc.) Szlach. & Olszewski, Fl. Camer. 34: 42 (1998). — Type: Tanzania, Lushoto Distr., *Verdcourt 213* (holo-, EA; iso-, K, MO, PRE).

Stem with two opposite leaves.

DISTRIBUTION. — Zambia, Malawi and Tanzania.

29. *Disperis kerstenii* Rchb.f.

Otia Bot. Hamburg, 2: 102 (1881); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 948 (1898); Rolfe, Fl.

Trop. Afr. 7: 291 (1898); Verdcourt, Fl. Trop. East Afr.: 226 (1968). — Type: Tanzania, Kilimanjaro, *Kersten s.n.* (holo-, B†; fragment, W).

Plants 150-300 mm. Leaves 2, opposite, ovate, 32-39 × 20-24 mm. Flowers 2-4, pink; median sepal linear, forming curved ascending spur 8-12 mm long together with petals, lateral sepals obovate, 9 × 5-7.5 mm, free; petals with long posterior lobe, and apical and basal anterior lobes, shortly clawed; lip about 9-13 mm long, blade descending, oblong, appendage of two narrow bifurcate lobes (Fig. 6H).

DISTRIBUTION AND PHENOLOGY. — Tanzania; in humus or moss on rocks on the floor of evergreen forests from 1350 to 2250 m. Flowering from April to August.

30. *Disperis thomensis* Summerh.

Bull. Misc. Inform. Kew 1937: 458 (1937), Fl. W. Trop. Afr., ed. 2: 203 (1968); Verdcourt, Kew Bull. 30: 606 (1975); Geerinck, Fl. Afr. Centr.: 233 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 246 (1995); Szlachetko & Olszewski, Fl. Camer. 34: 44 (1998). — Type: São Thomé, *Exell 136* (holo-, BM).

Plants 90-150 mm. Leaves 2, opposite, ovate, 20-50 × 13-35 mm. Flowers 1-4, white; median sepal lanceolate, hood 5 mm long, lateral sepals obovate, 5-6 × 2.5-3 mm, free; petals oblong, 5.3-6.5 mm long, with basal and apical anterior lobes; lip 4.5-7 mm long, blade linear, papillose, appendage of two bifurcate processes, papillose (Fig. 6G).

DISTRIBUTION AND PHENOLOGY. — Wide-spread in tropical Africa from Zambia and Angola northwards to Kenya in the east and Guinea in the west, also known from islands off the West African coast such as São Thomé and Bioko; in leaf litter in evergreen and riverine forests from 1300 to 2150 m, sometimes also as a low-level epiphyte. Flowering mainly between January and April in south-central and eastern Africa, and from August to November in West Africa.

31. *Disperis nitida* Summerh.

Kew Bull. 11: 222 (1956); Summerhayes, Fl. W. Trop. Afr., ed. 2: 205 (1968); Szlachetko & Olszewski, Fl. Camer. 34: 44 (1998). — Type: Cameroon, Bamenda, *Savory UCI 451* (holo-, K).

Plants 120-500 mm. Leaves 2, opposite, ovate, 15-70 × 12-60 mm. Flowers 1-5, white; median sepal narrowly lanceolate, to 12.5 mm long, hood narrow, lateral sepals semi-ovate, free, ± 11 × 3.7-6 mm; petals C-shaped with large anterior lobes; lip blade linear, pendent, hirsute, appendage as two, bilobed lobes, papillose.

DISTRIBUTION AND PHENOLOGY. — Cameroon; in deep shade in montane forests at 1800-2200 m, sometimes also as a low-level epiphyte. Flowering in September.

32. *Disperis dicerochila* Summerh.

Hooker's Icon. Pl. 33: t. 3272 (1935); Verdcourt, Fl. Trop. East Afr.: 223 (1968); Geerinck, Fl. Afr. Centr.: 232 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 239 (1995); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 248 (1997). — Type: Uganda, Ruwenzori, *Eggeling 1382* (holo-, K).

Plants 60-260 mm. Leaves 2, opposite, ovate, 15-55 × 10-40 mm. Flowers 1-3, white and pink; median sepal linear-lanceolate, 7-11 mm long, hood boat-shaped, lateral sepals ovate-lanceolate, 7-10 × 4-8 mm, free; petals elliptic, 7-10 × 3.5-4 mm; lip 7-9 mm long, blade lorate and pointing forwards, appendage of two forked lobes (Fig. 1A).

DISTRIBUTION AND PHENOLOGY. — South-central and eastern Africa as far as Ethiopia; in leaf-litter and on mossy branches in montane forest. Flowering from December to October.

33. *Disperis virginalis* Schltr.

Bot. Jahrb. Syst. 24: 431 (1897), Bull. Herb. Boissier, ser. 1, 6: 953 (1898); Rolfe, Fl. Cap. 5, 3: 311 (1913); la Croix & P.J. Cribb, Fl. Zambes.: 247 (1995); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 302 (1999). — Type: South Africa,

Limpopo, Houtboschberg, *Schlechter 4453* (holo-, B†; iso-, WU).

Disperis nelsonii Rolfe, Fl. Cap. 5, 3: 311 (1913). — Type: South Africa, Limpopo, *Nelson 493* (lecto-, K, designated by Linder & Kurzweil 1999).

Disperis kerstenii sensu Schltr., Bot. Jahrb. Syst. 20, Beibl. 50: 43 (1895).

Plants to 250 mm. Leaves 2, opposite, ovate, to 75 × 45 mm. Flowers 1-3, pale mauve; median sepal hooded, ± 10-13 mm long, lateral sepals oblanceolate, 8-10 × 4-8 mm, basally fused; petals oblong, 11-14 × 3-4 mm; lip ascending, ± 8 mm long, blade ligulate, appendage of two 2-forked lobes hanging over blade (Fig. 6B, C).

DISTRIBUTION AND PHENOLOGY. — South Africa (Limpopo) and Zimbabwe; in leaf litter in gallery forest and in wattle and pine plantations, also reported on moss-covered rocks under *Podocarpus* at ± 1500-2500 m. Flowering in February and March.

34. *Disperis elaphoceras* Verdc.

Kew Bull. 41: 54 (1986). — Type: Tanzania, Uzungwa Mts, *Thomas 3682A* (holo-, K; iso-, MO).

Plants 70-170 mm. Leaves 2, opposite, ovate, 13-30 × 7-16 mm. Flowers 1-2, pink; median sepal narrowly elliptic, 6 × 1.9 mm, hood deep, lateral sepals elliptic, 6.1 × 3.3 mm; petals rhomboid, 6.9 × 4.8 mm; lip almost free from gynostemium, blade lorate, glabrous, appendage of two bilobed lobes, papillose.

DISTRIBUTION AND PHENOLOGY. — Very local in Tanzania; on damp mossy rocks, at 1300-1700 m; flowering in September.

35. *Disperis anthoceros* Rchb.f.

Otia Bot. Hamburg. 2: 103 (1881); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 951 (1898); Rolfe, Fl. Trop. Afr. 7: 292 (1898), Fl. Cap. 5, 3: 311 (1913); Summerhayes, Fl. W. Trop. Afr., ed. 2: 205 (1968); Verdcourt, Fl. Trop. East Afr.: 229 (1968), Kew Bull. 21: 99 (1968); Geerinck, Fl. Afr. Centr.:

230 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 234 (1995); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 247 (1997); Szlachetko & Olszewski, Fl. Camer. 34: 46 (1998); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 303 (1999); la Croix *et al.*, Adansonia 24: 58 (2002). — Type: Ethiopia, ex Tigre v. Begemder River, *Schimper 1210* (syn-, W) & *1295* (syn-, W; isosyn-, BM, K).

Disperis hamadryas Schltr., Ann. Transvaal Mus. 10: 252 (1924). — Type: South Africa, KwaZulu-Natal, *Wood 841* (lecto-, K, designated by Linder & Kurzweil 1999; isolecto-, NH, SAM).

Plants to 300 mm. Leaves 2, opposite, ovate, to 38 × 40 mm. Flowers to 4 (rarely to 7), white, petals marked with green or partly pale pink; median sepal with slender erect spur 7–30 mm, lateral sepals obovate to semi-orbicular, 5–15 × 3–10 mm, united for about half; petals falcate, 6–7 × 4–5 mm; lip linear, ascending, 8–15 mm long, blade minutely ligulate, appendage irregularly lobed, hanging over blade (Figs 1B; 6D–F).

DISTRIBUTION AND PHENOLOGY. — The most widespread species of the genus, found throughout tropical Africa from Sudan and Ethiopia westwards to Nigeria and southwards to the northern provinces of South Africa, and recently also recorded in Madagascar; in leaf litter on the floor of evergreen forests, also in moss on rocks in deep shade, often along streams, also in bamboo-forests, *Pinus* and *Cupressus* plantations, or wet *Brachystegia* woodland, from 600 to 1800 m in southern Africa and from 1100 to 2700 m in tropical Africa. Flowering mainly in February and March.

var. **anthoceros**

Verdcourt, Fl. Trop. East Afr.: 229 (1968); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 247 (1997).

Median sepal spur 12–16(–20) mm; lateral sepals less than 10 mm.

DISTRIBUTION. — Widespread.

var. **grandiflora** Verdc.

Kew Bull. 22: 99 (1968), Fl. Trop. East Afr.: 230 (1968). — Type: Tanzania, Iringa Distr., *Polhill & Paulo 1640* (holo-, K).

Differs from the typical variety by having larger flowers, possibly polyploid (VERDCOURT 1968).

DISTRIBUTION. — Only known from stream valleys in montane mist forest in south-western Tanzania, at altitudes from 2160 to 2550 m.

var. **humbertii** (H.Perrier) la Croix

Adansonia 24: 58 (2002). — *D. humbertii* H.Perrier, Notul. Syst. (Paris) 8: 35 (1939), as *humbertii*; Du Puy *et al.*, Orch. Madag.: 134 (1999). — Type: Madagascar, Toliara, *Humbert 14212* (holo-, P).

Differs from the typical variety by having smaller flowers.

DISTRIBUTION. — Endemic to southern Madagascar, in a ravine among bamboo.

36. *Disperis bifida* P.J.Cribb

Kew Bull. 40: 403 (1985); la Croix & P.J. Cribb, Fl. Zambes.: 236 (1995). — Type: Zambia, Nyika, *Dowsett-Lemaire 347* (holo-, K).

Plants 150–300 mm. Leaves 2, opposite, ovate, 25–45 × 15–35 mm. Flowers 1–4, pink; median sepal with slender, erect and apically bifid spur 14–17 mm long, lateral sepals semi-orbicular, 10 × 5 mm; petals 8–10 × 5 mm, with basal anterior lobes; lip 11 mm long, blade lorate, minute, appendage of two lacinate lobes.

The species apparently hybridises with *Disperis dicerochila* (LA CROIX 1988; LA CROIX *et al.* 1991; LA CROIX & CRIBB 1995). These hybrids are possibly the same as those that were previously interpreted as hybrids with *D. thomensis* (CRIBB & STEWART 1985).

DISTRIBUTION AND PHENOLOGY. — Known from a small forest patch on the Zambian side of the Nyika National Park, recently also reported in south-western Rwanda; in leaf-litter in evergreen forest at 2180 m. Flowering in February and March.

37. *Disperis nemorosa* Rendle

J. Bot. 33: 297 (1895); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 950 (1898); Rolfe, Fl. Trop. Afr. 7: 292 (1898); Verdcourt, Fl. Trop. East Afr.: 227 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 231 (1995). — Type: Uganda, Ruwenzori, *Scott Elliot 7944* (holo-, K).

Disperis centrocorys Schltr., Bot. Jahrb. Syst. 53: 549 (1915). — Type: Tanzania, Rungwe Mts, *Stolz 1192* (holo-, B†; iso-, K).

Plants 100-300 mm. Leaves 2, opposite, ovate, 25-65 × 20-40 mm. Flowers 1-4, white or pink; median sepal with slender deflexed spur 9-15 mm long, lateral sepals oblong, 6-8 × 4-5 mm, basally fused; petals auriculate; lip blade minute, appendage of two obtuse lobes.

DISTRIBUTION AND PHENOLOGY. — Zambia, Malawi, Uganda, Kenya and Tanzania; in leaf litter in deep shade in evergreen forests and bamboo forests from about 1800 to 2550 m. Flowering mainly from February to April in south-central Africa, and up to September in East Africa.

38. *Disperis egregia* Summerh.

Kew Bull. 6: 464 (1952); Verdcourt, Fl. Trop. East Afr.: 225 (1968). — Type: Tanzania, Usambara Mts, *Moreau 214* (holo-, K).

Plants to 180 mm. Leaves 2, alternate or subopposite, ovate, 20-50 × 15-40 mm. Flowers 3, pink; median sepal forming broad and curved spur 12 mm long together with petals, lateral sepals 8-10 mm long, largely joined to form synsepalum 12.5 mm wide, spurs 5 mm long; petals 11.5 mm long, irregularly 3-lobed with one lobe forming side wall of spur; lip 10.5 mm long, hidden in spur, with fleshy carrot-shaped and apically bifid papillose structure on top.

DISTRIBUTION AND PHENOLOGY. — Very localised in Tanzania and Kenya; in moss on rocks in forest from 900 to 1050 m. Flowering in May and June.

39. *Disperis kamerunensis* Schltr.

Bot. Jahrb. Syst. 24: 431 (1897); Rolfe, Fl. Trop. Afr. 7: 575 (1898); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 948 (1898); Summerhayes, Fl. W. Trop. Afr., ed. 2: 205 (1968); Szlachetko & Olszewski, Fl. Camer. 34: 46 (1998). — *D. preussii* Rolfe, Fl. Trop. Afr. 7: 291 (1898). — Type: Cameroon, *Preuss 609* (B†).

Plants 100-350 mm. Leaves 2, opposite, ovate, to 50 × 40 mm. Flowers 2-4, ?white; median sepal with oblong spur 10 mm long, laterals ovate, 8 × 5 mm; petals oblong, auriculate; lip appendage tooth-like.

DISTRIBUTION AND PHENOLOGY. — Cameroon; in montane and submontane forest at 1100-1800 m.

40. *Disperis mildbraedii* Schltr. ex Summerh.

Bull. Misc. Inform. Kew 1933: 253 (1933), Fl. W. Trop. Afr., ed. 2: 205 (1968); Szlachetko & Olszewski, Fl. Camer. 34: 45 (1998). — Type: Bioko Island (Fernando Po), *Mildbraed 6312* (holo-, B†; drawing of holo-, K).

Disperis mildbraedii Schltr., Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped. 2: 180 (1922), *nom. nud.*

Plants ± 250 mm. Leaves 2, opposite, ovate, 25-57 × 20-37 mm. Flowers 1-3, white or pink; median sepal linear, 12 × 1 mm, hood deep, lateral sepals obovate, 11-12 × 5.5 mm; petals with aristate tips 4 mm long; lip claw linear, blade a small papillose knob, appendage apically sharply incurved, bilobed.

DISTRIBUTION AND PHENOLOGY. — Cameroon and Bioko Island; in submontane forests at about 1100-1400 m. Flowering in August.

41. *Disperis uzungwae* Verdc.

Kew Bull. 41: 56 (1986). — Type: Tanzania, Uzungwa Mts, *Lovett 270* (holo-, K).

Plants 100-150 mm. Leaves 2, alternate, elliptic-ovate, 25-45 × 14-30 mm. Flowers several, white; median sepal with curved spur 5 mm long,

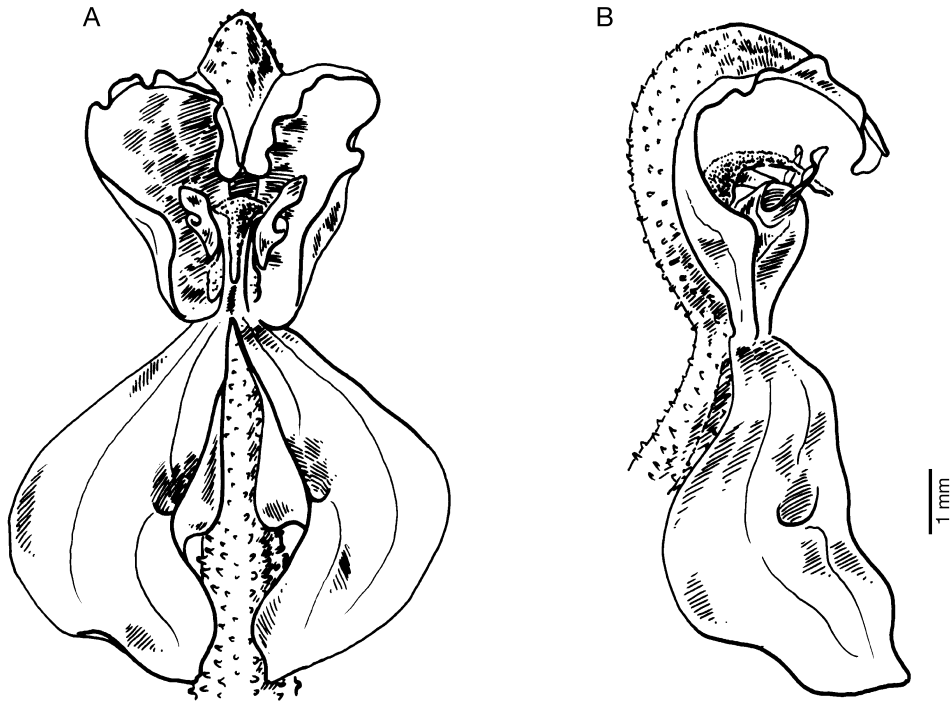


FIG. 7. — *Disperis pusilla* Verdc. ("Pusilla group"), flower: **A**, front view; **B**, side view. Drawn from alcohol material: Richards 17074.

lateral sepals basally united, elliptic, 3.5-4 × 2-2.5 mm; petals oblong, ± 3.3 × 1.7 mm; lip hidden in spur, blade lorate, ciliate, appendage linear-oblong, apically erose or bifid.

DISTRIBUTION AND PHENOLOGY. — Local in Tanzania; the type material was collected in a forest clearing on the site of an old fireplace at 750 m in April.

**GROUP 4: "PUSILLA GROUP" (SPECIES 42-44);
FIGURE 7**

Small, mostly hairy or glandular plants. Leaf solitary. Median sepal linear or narrow, hood shallow or deep, lateral sepals free; lip with two-lobed appendage made up of triangular and deflexed lobes.

DIAGNOSIS AND RELATIONSHIPS. — This small group of three species is readily distinguished by their small stature, the frequently glandular or

hairy stems and the solitary basal leaf. A close relationship between *Disperis pusilla* and *D. raiilabris* was suggested by VERDCOURT (1968), based on their remarkably similar lips. The two species are also nearly identical in the shape of their shallow hood with its reflexed sides and the forward-curved tip. *Disperis crassicaulis* is similar to these two species in vegetative morphology but differs in having a deep hood and a lip with a glabrous blade. SUMMERHAYES (1939) had pointed out that his newly described *D. raiilabris* belongs to the same group as *D. crassicaulis*, but also suggested a close relationship with *D. johnstonii* and *D. katanensis*. We do not agree with this.

DISTRIBUTION. — Tropical Africa.

42. *Disperis pusilla* Verdc.

Kew Bull. 22: 94 (1968), Fl. Trop. East Afr.: 223 (1968); Geerinck, Fl. Afr. Centr.: 238 (1984); la Croix

& P.J. Cribb, Fl. Zambes.: 244 (1995). — Type: Zambia, Abercorn Distr., *Richards 10373* (holo-, K; iso-, EA).

Plants 25–40 mm. Leaf 1, basal, ovate, 6–8 × 6–10 mm, papillose. Flower solitary, deep yellow; median sepal linear-lanceolate, 8 × 1.8 mm, hood shallow, lateral sepals semi-orbicular, 6 × 3.5 mm, free; petals oblong, 8 × 2.8 mm; lip papillose, triangular, blade awl-shaped, appendage of two deflexed lobes (Fig. 7).

DISTRIBUTION AND PHENOLOGY. — Kenya, Tanzania, Zambia and Zaire/DRC; in grassland, woodland and bog from 1650 to 2400 m. Flowering mainly in November and December but also in May.

43. *Disperis railabris* Summerh.

Bull. Misc. Inform. Kew 1939: 491 (1939); Szlachetko & Olszewski, Fl. Camer. 34: 38 (1998). — Type: Central African Republic, Yalinga, *Le Testu 2804* (holo-, K; iso-, P).

Plants to 150 mm. Leaf 1, ovate, to 12 mm long. Flowers 1–4, yellow; median sepal ligulate, 10 × 2 mm, lateral sepals semi-orbicular, free; petals reflexed, about 10 mm long; lip blade lanceolate, glabrous at tip, appendage of two deflexed lobes, papillose.

The curious epithet derives from the fancied resemblance of the lip to a flat-fish of the genus *Raia* (SUMMERHAYES 1939).

DISTRIBUTION AND PHENOLOGY. — Central African Republic; in moist sandy places in woody savanna. Flowering in May.

44. *Disperis crassicaulis* Rchb.f.

Linnaea 22: 860 (1849); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 927 (1898); Rolfe, Fl. Trop. Afr. 7: 289 (1898); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 248 (1997). — *Pterygodium biflorum* Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 303 (1850). — Type: Ethiopia, *Schimper 570* (holo-, W; iso-, BM, K, P).

Plants 20–50 mm. Leaf 1, prostrate, ovate, 10–18 × 5–12 mm. Flowers 1–2, yellow, hood yellow-

ish to maroon; median sepal linear, 7–8 × 1 mm, hood shallow, lateral sepals ovate, 6–7 × 4 mm; petals obovate, 6 × 4 mm; lip blade oblong, appendage with two reflexed obtuse lobes and median erect process of similar length, all covered in fimbriate hairs.

DISTRIBUTION AND PHENOLOGY. — Ethiopia; montane grassland and *Podocarpus* forest at 2000–2500 m. Flowering from May to August.

Disperis Sw. subgen. *Disperis*, subgen. nov.

Glabrous or hairy herbs. Leaves mostly alternate, very rarely basal, opposite or absent. Median sepal mostly ovate or lanceolate and galeate, lateral sepals almost always free; lip appendage entire but sometimes apically bifid, often hairy or papillate. Rostellum arms mostly twisted. Pollen rugulate.

DISTRIBUTION. — Thirty species, mainly in southern Africa but ranging into the tropics of Africa and Madagascar.

GROUP 5: “MICRANTHA GROUP” (SPECIES 45–52); FIGURE 8

Almost always glabrous herbs. Leaves two, mostly alternate, rarely opposite or absent. Hood deep or spurred, lateral sepals free or fused at very base; lip claw weakly or extensively fused with gynostemium, blade flexed forward, flap-shaped or triangular, flat or convex, small in relation to appendage. Rostellum arms short and twisted outwards.

DIAGNOSIS AND RELATIONSHIPS. — This group is characterised by a small, convex lip blade corresponding to the “*Cardiophora* type” of KURZWEIL & LINDER (1991), and by their short, twisted rostellum arms. The southern African species included here were retrieved as several clades in the cladistic study of MANNING & LINDER (1992). Within the group, *Disperis micrantha* and *D. disaeformis* were regarded as sister species, defined by the peculiar, reflexed and apically strongly papillate lip appendage.

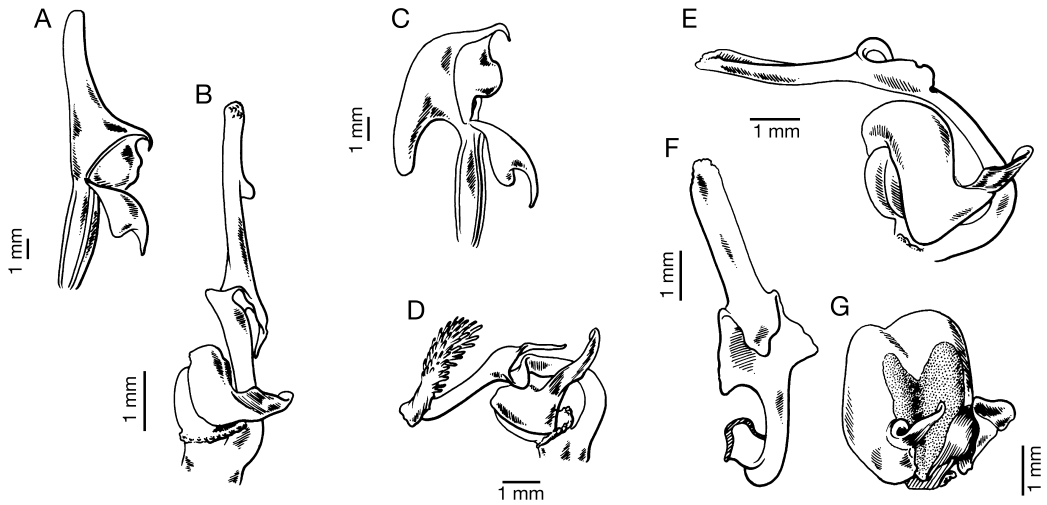


FIG. 8. — Flowers and floral details in the “Micrantha group”: **A, B**, *Disperis woodii* Bolus: **A**, flower; **B**, lip and gynostemium; **C, D**, *D. disaeformis* Schltr.: **C**, flower; **D**, lip and gynostemium; **E-G**, *D. kilimanjarica* Rendle: **E**, lip and gynostemium; **F**, lip; **G**, gynostemium. Drawn from alcohol material: A, B, *Batten s.n.*; C, D, source unknown; E, F, *Mabberley & McCan 13*; G, *Dowsett-Lemaire 352*.

Five tropical African species, *Disperis breviloba*, *D. galerita*, *D. kilimanjarica*, *D. meirax* and *D. parvifolia* have a remarkably similar lip structure and are probably closely related. A possible relationship between *D. breviloba* and *D. parvifolia* was suggested by VERDCOURT (1977) and the similarity of the lip of *D. galerita* with that of *D. kilimanjarica* was noted by CRIBB & THOMAS (1997). The poorly known *D. meirax* was also associated with *D. galerita* (SCHLECHTER 1898).

DISTRIBUTION. — Southern and tropical Africa.

45. *Disperis woodii* Bolus

J. Linn. Soc., Bot. 22: 78 (1885); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 950 (1898); Rolfe, Fl. Cap. 5, 3: 312 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 303 (1999). — Type: South Africa, KwaZulu-Natal, *Sanderson 1010* (syn-, SAM); South Africa, KwaZulu-Natal, *Wood 127* (syn-, BOL; isosyn-, K, SAM).

Disperis stenoglossa Schltr., Bot. Jahrb. Syst. 20, Beibl. 50: 19 (1895), Bull. Herb. Boissier, ser. 1, 6: 936 (1898); Rolfe, Fl. Cap. 5, 3: 312 (1913). — Type:

South Africa, KwaZulu-Natal, *Schlechter 3001* (holo-, B†).

Disperis mkenii Harv., Thes. Cap. 2: 47 (1863), *nom. nud.*

Plants to 150 mm. Leaves 2, subbasal, subopposite, ovate, 10–25 × 6–15 mm. Flowers 1(–2), white, often tinged with pink; median sepal ovate, with erect spur 8–11 mm long, lateral sepals elliptic, 5 × 2 mm; petals falcate, rotund, 4.5 × 3 mm; lip blade deflexed, triangular, appendage erect, oblong, apically bifid (Fig. 8A, B).

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape and KwaZulu-Natal); on grassy slopes, sometimes in marshy situations up to 1800 m. Flowering mainly from May to August.

46. *Disperis disaeformis* Schltr.

Verh. Bot. Vereins Prov. Brandenburg 35: 47 (1893), Bull. Herb. Boissier, ser. 1, 6: 935 (1898); Rolfe, Fl. Cap. 5, 3: 308 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 304 (1999). — Type: South Africa, near Riversdale, *Schlechter 2143* (holo-, B†).

Plants to 150 mm. Leaves 2, alternate, ovate, 10-26 × 4-16 mm. Flowers 1-4(-7), whitish, often tinged pink; median sepal obovate, 5 × 3 mm, with deflexed sac 2-5 mm long, lateral sepals ovate, 5 × 2 mm; petals ovate, 3.5 × 2.5 mm; lip blade triangular, appendage oblong, apical part recurved, with long papillae (Fig. 8C, D).

DISTRIBUTION AND PHENOLOGY. — South Africa (Western and Eastern Cape, KwaZulu-Natal, a single collection from Limpopo); in grassland, scrub and forest patches in relatively dry areas and in *Acacia* scrub from 350 to 1000 m. Flowering mainly from July to October.

47. *Disperis micrantha* Lindl.

Gen. Sp. Orch. Pl.: 370 (1839); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 934 (1898); Rolfe, Fl. Cap. 5, 3: 308 (1913); la Croix & P.J. Cribb, Fl. Zambes.: 243 (1995); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 304 (1999). — Type: South Africa, Cap Bonae Spei, *Mund s.n.* (holo-, K).

Plants 60-180 mm. Leaves 2, alternate, ovate, 25-55 × 14-36 mm. Flowers 3-7, white or lilac; median sepal obovate, 4 × 3 mm, with erect sac 1 mm long, lateral sepals ovate, 3 × 1.5 mm; petals clawed, ovate, auriculate, 2.5 × 2 mm; lip blade triangular, appendage oblong, ascending, with long papillae.

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal, Mpumalanga, Gauteng, Limpopo), Swaziland and Zimbabwe; on forest floors, in riverine forests, often amongst rocks, at 550-1350 m. Flowering from February to April.

?48. *Disperis breviloba* Verdc.

Kew Bull. 32: 9 (1977); la Croix & P.J. Cribb, Fl. Zambes.: 236 (1995). — Type: Zambia, Kundalila Falls, *Williamson & Gassner 2344* (holo-, K). *Disperis parvifolia* sensu G. Williamson, Orch. S.-Centr. Afr.: 101 (1977).

Plants 80-160 mm. Leafless apart from basal scale leaves. Flowers 1-3, green-brown and pink;

median sepal with conical spur 7 mm long, lateral sepals oblong, 3.5-4 × 1.5-2.2 mm, without spurs; petals oblong, 3-3.5 × 1.5-2 mm; lip blade lorate, appendage linear, apically bifid.

DISTRIBUTION AND PHENOLOGY. — Zambia and Malawi; in *Brachystegia* woodland, dambo and montane grassland, at 1200-2340 m. Flowering from December to February.

?49. *Disperis kilimanjarica* Rendle

J. Linn. Soc., Bot. 30: 400 (1895); Rolfe, Fl. Trop. Afr. 7: 290 (1898); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 937 (1898); Verdcourt, Fl. Trop. East Afr.: 225 (1968); Geerinck, Fl. Afr. Centr.: 237 (1984); la Croix & P.J. Cribb, Fl. Zambes.: 229 (1995). — Type: Tanzania, Kilimanjaro, *Taylor s.n.* (holo-, BM).

Plants 50-120 mm. Leaves 2, alternate, ovate-cordate, 15-35 × 12 mm. Flower 1, white tinged with green; median sepal 8-16 mm long, forming blunt reflexed spur with petals, lateral sepals ovate, 7-12 × 3-5 mm; petals oblong, 8 × 4 mm; lip 6 mm long, recurved into spur, blade triangular, appendage oblong, 3 mm long, tip papillose (Fig. 8E-G).

Disperis kilimanjarica is said to reproduce vegetatively by stolons (ROLFE 1898).

DISTRIBUTION AND PHENOLOGY. — South-central and eastern Africa; in montane forest, mostly epiphytic up to 6 m above the ground, on moss- and liverwort-covered branches, occasionally in leaf litter on the forest floor, at 1750-3000 m. Flowering from February to June (to October in East Africa).

?50. *Disperis galerita* Rchb.f.

Oria Bot. Hamburg. 2: 103 (1881); Rolfe, Fl. Trop. Afr. 7: 289 (1898); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 943 (1898); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 248 (1997). — Type: Ethiopia, Semien, *Schimper 631* (holo-, W; iso-, BM, K, P).

Plants 100-300 mm. Leaves 2-3, alternate, ovate, 15-35 × 10-20 mm. Flowers 1-3, pink to purple; median sepal galeate, hood 7-10 mm tall, with short reflexed spur 3-4 mm long, lateral

sepals ovate, 7-10 × 4-5 mm; petals oblong, 7-8 × 2-3.5 mm; lip 8-10 mm long, appendage linear, reflexed towards tip of spur.

DISTRIBUTION AND PHENOLOGY. — Southern and western Ethiopia; in grassland mixed with bushes of *Erica arborea* and *Hypericum* at about 2000-3800 m. Flowering in July and August.

?51. *Disperis parvifolia* Schltr.

Bot. Jahrb. Syst. 53: 547 (1915); Verdcourt, Fl. Trop. East Afr.: 226 (1968); Summerhayes, Fl. W. Trop. Afr., ed. 2: 203 (1968); la Croix & P.J. Cribb, Fl. Zambes.: 244 (1995); Szlachetko & Olszewski, Fl. Camer. 34: 41 (1998). — Type: Tanzania, Rungwe Distr., *Stolz 1125* (holo-, B†; ?iso-, K).

Plants 40-110 mm. Leaves 1-2, alternate, ± 4 × 4 mm. Flower solitary, green and purple or yellowish; median sepal forming erect conical spur 6-6.5 mm long, lateral sepals elliptic, 2.5-4.5 × 2 mm; petals oblong, 3.5-4 × 2 mm; lip 4-4.5 mm long, blade linear, deflexed, appendage linear, erect, hairy.

DISTRIBUTION AND PHENOLOGY. — Malawi, Tanzania and Cameroon; in submontane grassland from 1500 to 1675 m. Flowering in January and February.

?52. *Disperis meirax* Rchb.f.

Otia Bot. Hamburg. 2: 103 (1881); Rolfe, Fl. Trop. Afr. 7: 290 (1898); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 944 (1898); P.J. Cribb & Thomas, Fl. Ethiop. Eritr. 6: 248 (1997). — Type: Ethiopia, *Schimper 632* (holo-, W; iso-, K, P).

Plants 80-110 mm. Leaves 2, alternate, ovate, 10-22 × 5-9 mm. Flowers 1-2, pink; median sepal galeate, hood conical, 7 × 3 mm, lateral sepals obovate, 2.6 × 2 mm, apparently basally united, not spurred but concave; petals ovate, 5 × 1 mm; lip 5 mm long, blade ligulate, appendage oblong, apically deeply bifid.

The available descriptions of this poorly known species are hard to interpret with regard to the lip shape, and also a rough pencil sketch on a

herbarium sheet in W (no. 47187) is not sufficiently clear.

A good line drawing of the lip was recently published (SEBSEBE *et al.* 2004: 154) but contradicts the available descriptions of this organ. We suspect that two figures on the respective plate were actually erroneously swapped around, and think that figure L (labelled as *Disperis meirax*) shows the lip of *D. johnstonii* while that of *D. meirax* is shown in figure K (labelled as *D. johnstonii*). This would conform roughly with the above-mentioned figure in W.

DISTRIBUTION AND PHENOLOGY. — North-western Ethiopia; in afro-alpine grassland and *Erica arborea* forest on steep slopes from 3500 to 3800 m. Flowering in August and September.

GROUP 6: "CARDIOPHORA GROUP" (SPECIES 53-55); FIGURE 9

Glabrous herbs. Leaf one, either basal or half-way up stem. Median sepal ovate or lanceolate, hooded, laterals free; lip claw slightly recurved, blade triangular or lorate, slightly convex, appendage oblong or triangular.

DIAGNOSIS AND RELATIONSHIPS. — Distinguished by the solitary leaf and lip of the "*Cardiophora* type" (KURZWEIL & LINDER 1991), this group is supported by preliminary molecular data (STEINER pers. comm.). Within the group, *Disperis cardiophora* and *D. renibractea* are allied by their basal, clasping leaf and reniform floral bracts with pellucid margins (MANNING & LINDER 1992).

DISTRIBUTION. — South Africa and Zimbabwe.

53. *Disperis cardiophora* Harv.

Thes. Cap. 2: 4 (1863); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 926 (1898); Rolfe, Fl. Cap. 5, 3: 303 (1913); J.C. Manning *in* H.P. Linder & Kurzweil, Orch. S. Afr.: 307 (1999). — Type: South Africa, KwaZulu-Natal, *Sanderson 488* (holo-, TCD; iso-, BOL, K, SAM).

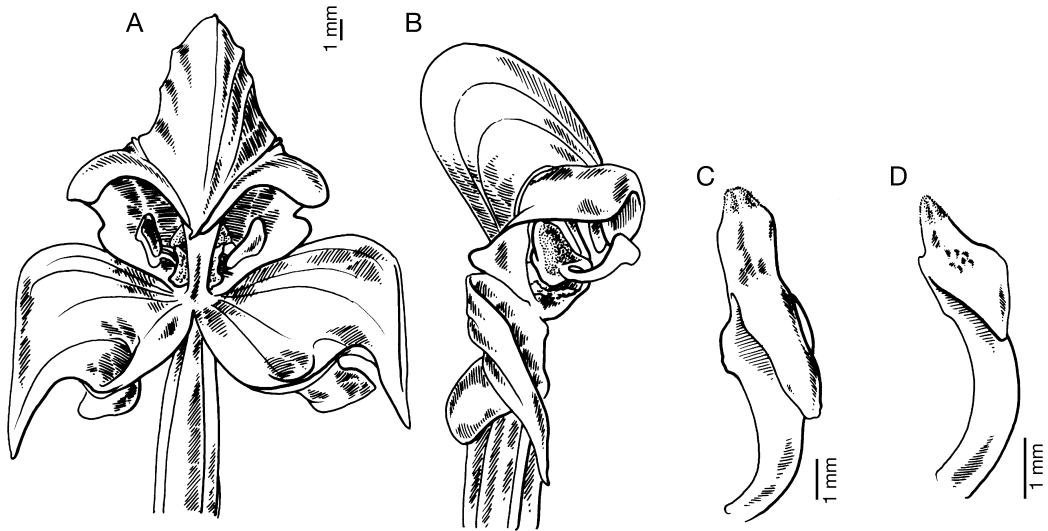


FIG. 9. — Flowers and floral details in the “Cardiophora group”: **A-C**, *Disperis lindleyana* Rchb.f.: **A**, **B**, flower; **C**, lip; **D**, *D. cardiophora* Harv., lip. Drawn from alcohol material: A-C, Hall 902; D, source unknown.

Plants to 260 mm. Leaf 1, basal, subrotund, 10-17 × 8-19 mm. Flowers mostly 6-20 in second raceme, greenish-white to pink; median sepal saccate, 3-4 × 3-4 mm, laterals ovate, 4-5 × 2.5-3 mm; petals oblong, 4 × 2-3 mm; lip blade triangular, 1.7 mm long, appendage triangular, pubescent (Figs 1C; 9D).

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal and Mpumalanga); in montane or subalpine grassland, in seepage areas and near water courses at 500-2500 m. Flowering mainly from December to February.

54. *Disperis renibractea* Schltr.

Ann. Transvaal Mus. 10: 252 (1924); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 308 (1999). — Type: South Africa, Mpumalanga, *Kaessner s.n.* (holo-, B†).

Plants to 280 mm. Leaf 1, basal, ovate, 19-40 × 14-26 mm. Flowers 4-13, in secund racemes, cream and maroon or brown; median sepal ovate, 4-5 × 3-4 mm, hooded, lateral sepals ovate, 6.5-8 × 3.5-4 mm; petals oblong, clawed,

7 × 3.5 mm; lip blade ovate, appendage triangular, with pubescent apex.

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal and Mpumalanga); in montane or subalpine grassland from 1300 to 2800 m. Flowering mainly from December to February.

55. *Disperis lindleyana* Rchb.f.

Flora 48: 181 (1865); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 928 (1898); Rolfe, Fl. Cap. 5, 3: 309 (1913); la Croix & P.J. Cribb, Fl. Zambes.: 242 (1995); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 305 (1999). — Type: South Africa, *Krebs s.n.* (holo-, W).

Plants to 300 mm. Leaf 1, half way up stem, ovate, about 20-55 × 13-40 mm. Flowers 1-4, white; median sepal hooded, lanceolate, 9 × 5 mm, laterals ovate, 10-12 × 4-7 mm; petals clawed, oblong, 6-7 × 3-4 mm; lip blade oblong, appendage oblong, ascending, apically pubescent (Fig. 9A-C).

The species spreads vegetatively and may form dense colonies.

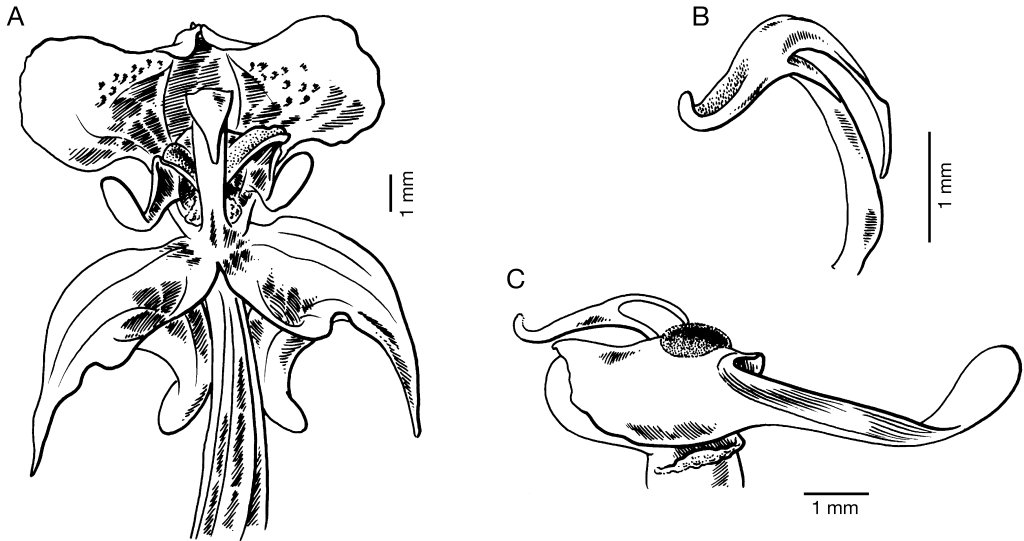


FIG. 10. — Flower and floral details in *Disperis thorncroftii* Schltr. ("Thorncroftii group"): **A**, flower; **B**, lip; **C**, gynostemium. Drawn from alcohol material: Schnell 22861.

DISTRIBUTION AND PHENOLOGY. — South Africa (Western and Eastern Cape, KwaZulu-Natal, Mpumalanga, Limpopo), Swaziland and Zimbabwe; on the floor of evergreen forests, often in rocky places, sometimes epilithic, also in pine and wattle plantations, from 750 to 2000 m. Flowering mainly in December and January.

GROUP 7: "THORNCROFTII GROUP" (SPECIES 56); FIGURE 10

Glabrous herb. Leaves two, alternate. Median sepal lanceolate and deeply hooded, laterals free; lip claw erect and fused with gynostemium, blade oblong with tapering tip, slightly convex, appendage oblong, reflexed.

DIAGNOSIS AND RELATIONSHIPS. — This is a distinctive species with two leaves, a lip of the "*Cardiophora* type" (KURZWEIL & LINDER 1991) and long, projecting rostellum arms bent upwards at the tips.

DISTRIBUTION. — South Africa and Zimbabwe.

56. *Disperis thorncroftii* Schltr.

Bot. Jahrb. Syst. 20, Beibl. 50: 19 (1895), Bull. Herb. Boissier, ser. 1, 6: 933 (1898); Rolfe, Fl. Cap. 5, 3: 309 (1913); la Croix & P.J. Cribb, Fl. Zambes.: 246 (1995); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 305 (1999). — Type: South Africa, Eastern Cape, *Galpin 1688b* (syn-, B†); South Africa, "Transvaal", *Thorncroft 505* (syn-, NH).

Plants to 260 mm. Leaves 2, alternate, ovate, 15–45 × 6–33 mm. Flowers 1–3, white or lilac; median sepal lanceolate, hooded, 7–9 × 3 mm, lateral sepals ovate, 6–8 × 3–4.5 mm; petals rotund, clawed, 6–7 × 4–5 mm, pubescent; lip blade ovate, appendage oblong, reflexed (Fig. 10).

DISTRIBUTION AND PHENOLOGY. — South Africa (Western and Eastern Cape, KwaZulu-Natal, Mpumalanga) and Zimbabwe; on forest floor at 900–3050 m. Flowering in November and December.

GROUP 8: "CAPENSIS GROUP" (SPECIES 57); FIGURE 11

Hirsute herb. Leaves two, alternate. Median sepal ovate and deeply galeate, laterals free, all

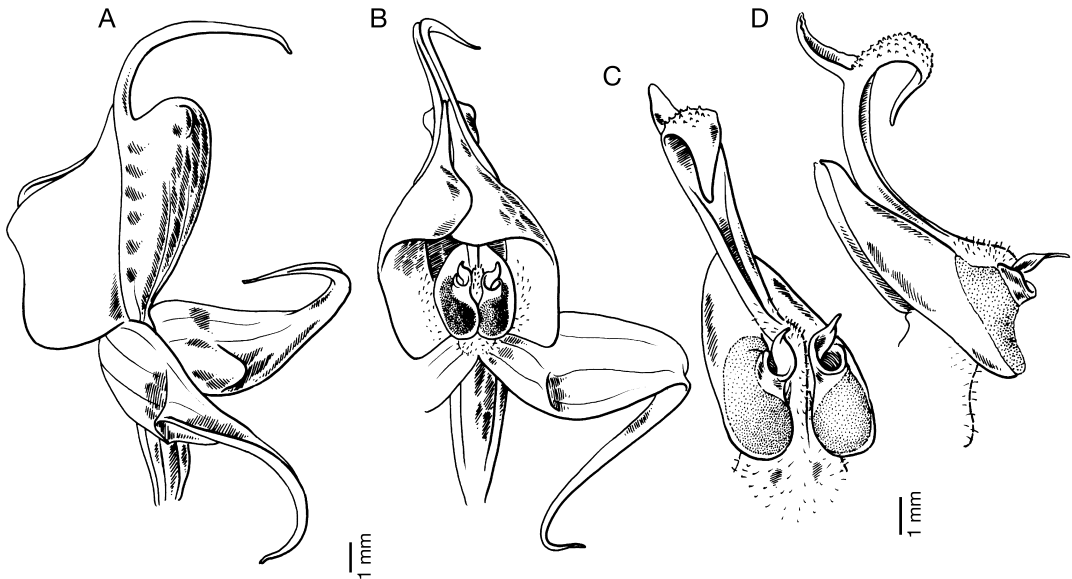


FIG. 11. — Flower and floral details in *Disperis capensis* (L.f.) Sw. ("Capensis group"): A, B, flower; C, D, lip and gynostemium. Drawn from alcohol material (source unknown).

three with long caudae; lip claw reflexed but soon curved forwards, terminating in a tapering lorate blade, appendage lorate.

DIAGNOSIS AND RELATIONSHIPS. — In its flower morphology this species is unlike any other species in the genus. Preliminary molecular data suggest that the species forms a clade together with *Disperis paludosa* (STEINER pers. comm.).

DISTRIBUTION. — South-western South Africa.

57. *Disperis capensis* (L.f.) Sw.

Kongl. Vetensk. Acad. Nya Handl. 21: 220 (1800); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 915 (1898); Rolfe, Fl. Cap. 5, 3: 302 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 313 (1999). — *Arethusa capensis* L.f., Suppl. Pl.: 405 (1781). — *Dipera capensis* (L.f.) Spreng., Syst. Veg. 3: 696 (1826), *nom. illegit.* — Type: South Africa, Cape of Good Hope, herb. *Burman s.n.* (lecto-, BM). *Dipera tenera* Spreng., Syst. Veg. 3: 696 (1826), *nom. superfl.* — *Disperis capensis* (L.f.) Sw. var. *tenera* (Spreng.) Sond., Linnaea 19: 112 (1847), *nom. illegit.* — *Disperis tenera* (Spreng.) Bolus, J. Linn. Soc.,

Bot. 19: 346 (1882), *nom. illegit.* — Type: South Africa, *Berger s.n.* (loc. incert.). *Disperis graminifolia* Banks ex Steud., Nomencl. Bot., ed. 2, 1: 520 (1840). — Type unknown.

Plants 70–650 mm, hirsute. Leaves 2, alternate, lanceolate, 10–90 × 2.5–11 mm. Flowers solitary (rarely 2), with brownish green sepals and magenta (rarely cream) petals, sepals with caudae 9–20 mm long; median sepal ovate, hooded, 9–11 × 3–5 mm, lateral sepals lanceolate, spreading near base and recurved above, 13–45 × 3–4 mm; petals oblong, 8–15 × 4–10 mm; lip blade triangular; appendage triangular (absent in var. *brevicaudata*) (Figs 1D; 11).

DISTRIBUTION AND PHENOLOGY. — South Africa (Western and Eastern Cape); in damp sandy soils in fynbos and *Restio*-veld, often in seepages from 10 to 1100 m. Flowering mainly from July to September.

var. *capensis*

J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 313 (1999).

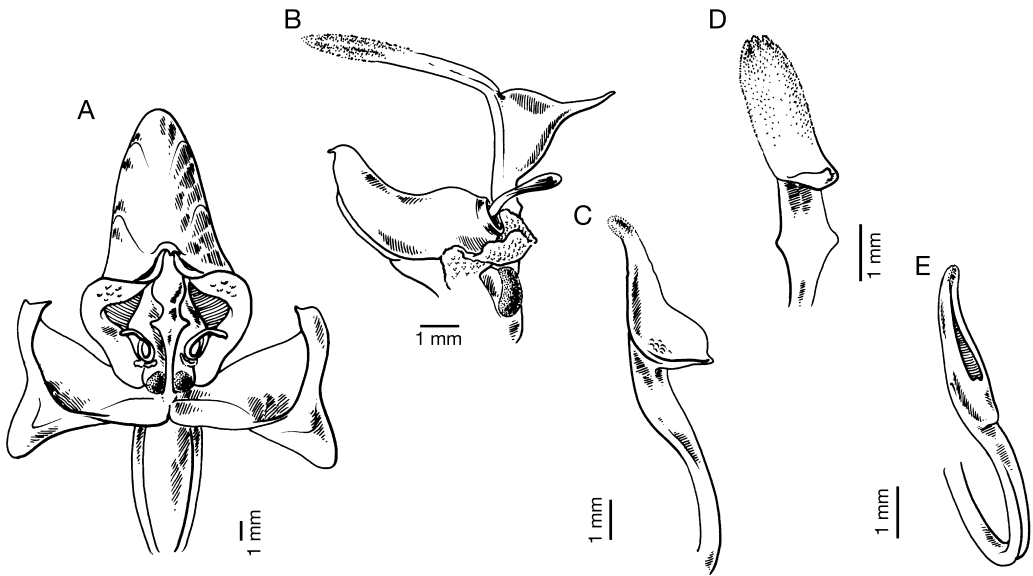


FIG. 12. — Flower and floral details in the “Bolusiana group”: **A, B, *Disperis cucullata*** Sw.: **A**, flower; **B**, lip and gynostemium; **C, *D. bolusiana*** Schltr. ex Bolus, lip; **D, *D. macowanii*** Bolus, lip; **E, *D. villosa*** (L.f.) Sw., lip. Drawn from alcohol material (sources unknown).

var. *brevicaudata* Rolfe

Fl. Cap. 5, 3: 303 (1913); J.C. Manning in H.P. Linder & Kurzweil, *Orch. S. Afr.*: 313 (1999). — Type: South Africa, Table Mountain, *Wolley Dod 3074* (holo-, BOL). *Dipera tenera* Spreng., *Syst. Veg.*: 696 (1826), p.p.

Differs from the typical variety in the smaller habit, the boat-shaped median sepal and the absence of the lip appendage. The sepal caudae are only 2.5–3 mm long. Found in the same area as the typical variety and often together with it. The reduction of floral structures may indicate a step in its evolution to autogamy.

GROUP 9: “BOLUSIANA GROUP” (SPECIES 58–64);
FIGURE 12

Small hairy plants. Leaves two (rarely three), alternate. Median sepal ovate, forming a sac or hood, lateral sepals free; lip claw weakly or not at all fused with gynostemium, blade triangular, lorate and slightly concave or forming a cup together with base of appendage, appendage lorate, rarely absent (*Disperis decipiens*).

DIAGNOSIS AND RELATIONSHIPS. — A well defined group distinguished by the hairy stems, lip that is not fused to the gynostemium, concave lip blade and frontal stigma. The lip is of the “*Wealei* type” (KURZWEIL & LINDER 1991). Within the group, *Disperis bolusiana* and *D. purpurata* are apparently sister species, defined by apically deflexed lateral rostellum arms, and *D. bodkinii*, *D. cucullata*, *D. decipiens* and *D. macowanii* share a somewhat cruciform lip claw. In this subgroup, *D. bodkinii* and *D. macowanii* are linked by the irregularly toothed lip appendage and the peculiar awl-shaped auricles (MANNING & LINDER 1992).

DISTRIBUTION. — Mainly south-western parts of South Africa but ranging into tropical Africa.

58. *Disperis bodkinii* Bolus

Icon. *Orchid. Austro-Afric.* 1: t. 96 (1896); Schlechter, *Bull. Herb. Boissier*, ser. 1, 6: 937 (1898); Rolfe, *Fl. Cap.* 5, 3: 307 (1913), as *bodkini*; J.C. Manning in H.P. Linder & Kurzweil, *Orch. S. Afr.*: 312 (1999). — Type: South Africa, Claremont Flats,

Bodkin 7970 (lecto-, NH, designated by Linder & Kurzweil 1999; isolecto-, BOL, GRA, K).

Plants pubescent, to 150 mm. Leaves 2, alternate, ovate to suborbicular, usually 8-25 × 5-17 mm. Flowers 1-2(-3), small, green and white, sometimes with pinkish or brownish tinge; median sepal 2-3 × 1.7 mm, with erect hood 2-3 mm long, lateral sepals ovate, 2-3 × 1.5 mm; petals obovate, with basal auricle, 2.5 × 1.5 mm; lip free from gynostemium, claw linear, blade triangular, appendage entire, curved, apically bifid, glabrous except at apex.

DISTRIBUTION AND PHENOLOGY. — South Africa (Western Cape); in fynbos, also in pine plantations, from 25 to 760 m. Flowering from (June) July to October, often after fire. Plants of this species are tiny and therefore frequently overlooked, thus creating the impression that they are exceedingly rare.

59. *Disperis macowanii* Bolus

J. Linn. Soc., Bot. 22: 77 (1885); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 938 (1898); Rolfe, Fl. Cap. 5, 3: 307 (1913), as *macowanii*; Verdcourt, Kew Bull. 30: 603 (1975); la Croix & P.J. Cribb, Fl. Zambes.: 243 (1995); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 311 (1999). — Type: South Africa, Somerset East, *MacOwan* 2626 (lecto-, SAM, designated by Linder & Kurzweil 1999; isolecto-, K).

Plants pubescent, to 120 mm. Leaves 2, alternate, ovate, 9-20 × 5-16 mm. Flower 1, white, often with mauve tinge; median sepal ovate, 4-6 × 2 mm, hood 2-3 mm long, erect, lateral sepals ovate, 4-5 mm long; petals oblong, 4 × 1.5 mm; lip free from gynostemium, blade triangular, appendage oblong, pubescent, apex 3-4 lobed (Fig. 12D).

DISTRIBUTION AND PHENOLOGY. — South Africa (Cape Floristic Region, KwaZulu-Natal, a single record from Limpopo), Malawi and Tanzania; in rich organic matter on rocky slopes like stream banks and on cliffs, in shaded and damp places, frequently associated with moss or lichens, amongst shrubs, also in montane grassland from 1500 to 2500 m. *Disperis macowanii* is one of the few species in the genus that are known

from both tropical and South Africa, where it occurs in both the winter- and summer-rainfall regions. The species flowers from December to April in the South African summer-rainfall region and in tropical Africa, and from July to August in the South African winter-rainfall region.

60. *Disperis decipiens* Verdc.

Kew Bull. 30: 605 (1976). — Tanzania, Mbeya Distr., *Leedal* H 659/74B (holo-, K).

Plants mostly 120 mm. Leaves 2, alternate, ovate, 5-22 × 3-15 mm. Flower 1, white; median sepal 5 mm long, lateral sepals naviculate, 5-6.5 × 2-3 mm; petals lanceolate, 5-5.5 × 1-1.5 mm; lip only basally fused to gynostemium, lanceolate, 4-5.5 mm long, without appendage.

The absence of the lip appendage in this species is probably due to secondary loss.

DISTRIBUTION AND PHENOLOGY. — Rather localised in Tanzania; in forests and cypress plantations at ± 1700 m. Flowering in April and May.

61. *Disperis cucullata* Sw.

Kongl. Vetensk. Acad. Nya Handl. 21: 220 (1800); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 923 (1898); Rolfe, Fl. Cap. 5, 3: 304 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 311 (1999). — *Dipera cucullata* (Sw.) Spreng., Syst. Veg. 3: 696 (1826), *nom. superfl.* — Type: South Africa, Cape of Good Hope, *Thunberg* s.n. (lecto-, S, designated by Linder & Kurzweil 1999).

Plants puberulous, 60-200 mm. Leaves 2, alternate, elliptic-ovate, 7-25 × 3.5-11 mm. Flower 1, green; median sepal deeply hooded, ovate, 4-9 × 4-8 mm, lateral sepals ovate, 8-17 × 4-6 mm; petals falcate, oblong, 4-8 × 1-1.5 mm; lip free from gynostemium, blade forming cup together with base of appendage, verrucose on inside, appendage oblong, pubescent apically (Fig. 12A, B).

Disperis cucullata is known to hybridise with *D. villosa*, resulting in the hybrid *D. × duckittiae* (STEWART *et al.* 1982: 210).

DISTRIBUTION AND PHENOLOGY. — South Africa (Western Cape); in damp, sandy places in

fynbos from 30 to 350 m. Flowering mainly in August and September.

62. *Disperis bolusiana* Schltr. ex Bolus

Icon. Orchid. Austro-Afric. 1: t. 93 (1896); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 940 (1898); Rolfe, Fl. Cap. 5, 3: 305 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 309 (1999). — Type: South Africa, Stellenbosch, *Lloyd ex Sanderson 937* (syn-, K); South Africa, Groene Kloof, *Bolus 4337* (syn-, BOL); South Africa, Hopefield, *Schlechter 5321* (syn-, B†).

Disperis purpurata Rchb.f. var. *parviflora* Bolus, J. Linn. Soc., Bot. 22: 79 (1885), Icon. Orchid. Austro-Afric. 1: t. 93 (1896), as *parvifolia*, as syn. — Type: South Africa, Stellenbosch, *Lloyd ex Sanderson 937* (syn-, K); South Africa, Groene Kloof, *Bolus 4337* (syn-, BOL).

Plants pubescent, to 260 mm. Leaves 2(-3), alternate, ovate, 6-25 × 3-17 mm. Flower solitary, greenish-yellow; median sepal hooded, 4-7 × 3-4 mm, lateral sepals lanceolate, 6-10 × 2.5-4 mm; petals oblong, 4-6 × 4-5 mm; lip not fused to gynostemium, blade forming cup together with base of appendage, appendage oblong (Fig. 12C).

DISTRIBUTION AND PHENOLOGY. — South Africa (Western Cape); in renosterveld over clay soils from 60 to 1200 m. Mainly flowering from September to October.

subsp. *bolusiana*

J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 310 (1999).

DISTRIBUTION. — Western Cape.

subsp. *macrocorys* (Rolfe) J.C. Manning

S. African J. Bot. 56: 494 (1990); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 310 (1999). — *D. macrocorys* Rolfe in Fl. Cap. 5, 3: 306 (1913). — Type: South Africa, Clanwilliam Distr., *Bolus 9093* (lecto-, PRE; isolecto-, GRA, MO, NBG, NH).

Differs from the typical subspecies in the deeper hood and in the pale yellow flowers.

DISTRIBUTION. — Essentially a montane subspecies, only found at around 900-1000 m in the Western Cape.

63. *Disperis purpurata* Rchb.f.

Linnaea 41: 55 (1877); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 939 (1898); Rolfe, Fl. Cap. 5, 3: 306 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 310 (1999). — Type: South Africa, Hantam Mts, *Meyer s.n.* (holo-, W).

Disperis namaquensis Bolus, J. Linn. Soc., Bot. 20: 486 (1884). — Type: South Africa, Namaqualand, *Morris s.n.* (lecto-, SAM, here designated).

Plants pubescent, to 140 mm. Leaves 2, alternate, ovate, 19-30 × 9-25 mm. Flower 1, pink, magenta or rarely white; median sepal ovate, 6-10 × 5-8 mm, saccate, lateral sepals obovate, 8-15 × 3-5 mm, spurs to 6 mm long; petals clawed, oblong, 4-8 × 4-5 mm; lip free from gynostemium, blade forming cup together with base of appendage, appendage triangular, apex pubescent.

DISTRIBUTION AND PHENOLOGY. — South Africa (Western and Northern Cape, a single record from the Eastern Cape); in fynbos in the dry inland areas, often in shaded spots at the base of shrubs or rocks, frequently in seepage zones from 800 to 1500 m. Flowering mainly from August to October.

subsp. *purpurata*

J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 311 (1999).

DISTRIBUTION. — Western and Northern Cape. Once recorded in Eastern Cape.

subsp. *pallescens* Bruyns

S. African J. Bot. 55: 494 (1989); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 311 (1999). — Type: South Africa, Richtersveld, *Bruyns 3226* (holo-, NBG; iso-, BOL, PRE).

Differs from the typical subspecies by the longer lateral sepal spurs.

DISTRIBUTION. — An endemic subspecies from the arid Richtersveld in the Northern Cape of South Africa.

64. *Disperis villosa* (L.f.) Sw.

Kongl. Vetensk. Acad. Nya Handl. 21: 220 (1800); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 942 (1898);

Rolfe, Fl. Cap. 5, 3: 304 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 308 (1999). — *Arethusa villosa* L.f., Suppl. Pl.: 405 (1781). — *Dipera villosa* (L.f.) Spreng., Syst. Veg. 3: 696 (1826), *nom. superfl.* — Type: South Africa, Cape of Good Hope, *Thunberg s.n.* (holo-, S).

Plants pubescent, to 180 mm. Leaves 2, alternate, subrotund, 6-40 × 3-23 mm. Flowers 1-4, greenish-yellow; median sepal deeply saccate, 5-7 × 3-5 mm, lateral sepals horizontally spreading, oblanceolate, 6-7 × 3-4 mm; petals falcate, clawed, basally fused with gynostemium, 3 × 1.5 mm; lip free from gynostemium, blade minute, appendage naviculate (Figs 1E; 12E).

The species is known to hybridise with *Disperis cucullata* (see under that species).

DISTRIBUTION AND PHENOLOGY. — South Africa (Western Cape, a single record from the Eastern Cape); in sandy or clay soil in low fynbos or *Restio*-veld, also recorded from road verges, from near sea level to 210 m. Flowering mainly in August and September.

GROUP 10: "WEALEI GROUP" (SPECIES 65-74);
FIGURE 13

Glabrous or rarely weakly hairy (*Disperis cooperi*) plants. Leaves 2-5, alternate. Median sepal mostly ovate to lanceolate and hooded, hood shallowly or deeply saccate, lateral sepals free; lip blade elongate and somewhat boat-shaped, at base marginally fused to the entire lip appendage to form a concave structure, rarely (*D. oxyglossa*, *D. tysonii*) fusion absent or weak, blade always with verrucose elaiophores. Rostellum arms usually twisted outwards at tips.

DIAGNOSIS AND RELATIONSHIPS. — Within this group the lip shape has been used to define groups of closely related species (MANNING & LINDER 1992). *Disperis circumflexa*, *D. concinna*, *D. cooperi*, *D. fanniniae*, *D. stenoplectron*, *D. tysonii* and *D. wealei* all have a lip blade with an erect tip that is adherent to the petals and the median sepal. *Disperis concinna*, *D. fanniniae* and *D. wealei* are linked by their deflexed lip appendage, while *D. cooperi* and *D. tysonii*

share a lip that is erect from the base. Preliminary molecular data are not entirely congruent with these hypotheses, and suggest that four species in this group, *D. oxyglossa*, *D. stenoplectron*, *D. tysonii* and *D. wealei* form a well supported clade that excludes *D. circumflexa*, *D. fanniniae* and *D. paludosa* (STEINER pers. comm.).

DISTRIBUTION. — South Africa and Zimbabwe, ranging into Madagascar.

65. *Disperis circumflexa* (L.) T.Durand & Schinz

Consp. Fl. Afric. 5: 118 (1894); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 315 (1999). — *Ophrys circumflexa* L., Pl. Rar. Afr.: 27 (1760). — *Orchis circumflexa* (L.) Bolus, J. Linn. Soc., Bot. 19: 346 (1882), *nom. inval. pro syn.* — Type: South Africa, Cape of Good Hope, herb. *Burman s.n.* (lecto-, BM, designated by Linder & Kurzweil 1999).

Arethusa secunda Thunb., Prod. Fl. Cap. 3 (1794), *nom. illeg.* — *Disperis secunda* (Thunb.) Sw., Kongl. Vetensk. Acad. Nya Handl.: 220 (1800); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 922 (1898); Rolfe, Fl. Cap. 5, 3: 294 (1913). — Type: South Africa, Cape of Good Hope, *Thunberg s.n.* (loc. incert.).

Dipera secunda Spreng., Syst. Veg. 3: 696 (1826), *nom. illegit.*

Plants to 250 mm. Leaves 2, alternate, suberect, linear, 25-130 × 1.5-6 mm. Flowers 2-11, in secund raceme, yellow or white and green; median sepal ovate, hooded, 4-6 × 4-5 mm, lateral sepals ± horizontal, obovate, 7-11 × 2.5-4.5 mm; petals falcate, ovate, basally auriculate, 4-6 × 2-3 mm; lip blade boat-shaped with tubercles within, appendage linear, pointing backwards.

DISTRIBUTION AND PHENOLOGY. — South Africa (Western and Northern Cape); in soils derived from clay, sandstone or granite in low fynbos, *Restio*-veld and renosterveld, at 100-700 (-1000) m. Flowering mainly from August to September.

subsp. ***circumflexa*** (Figs 1F; 13C)

J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 315 (1999). — *D. circumflexa* (L.) T.Durand

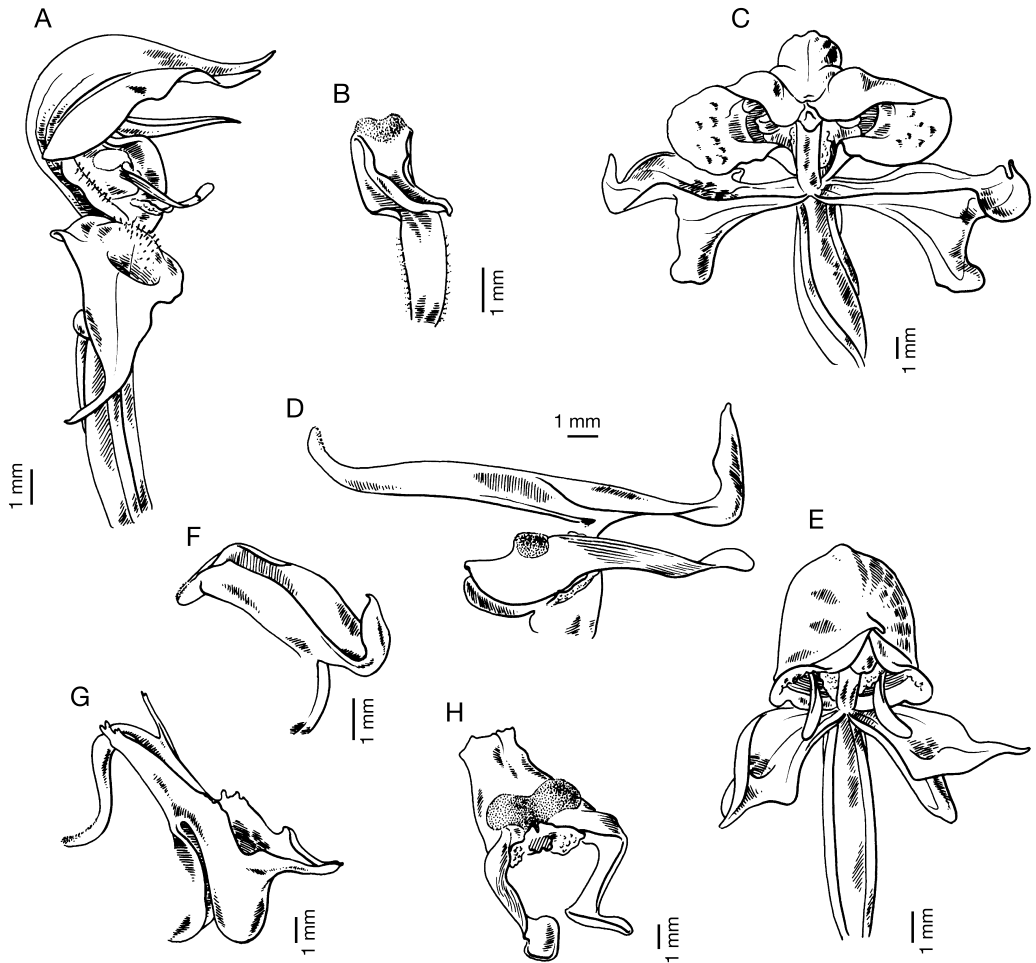


FIG. 13. — Flowers and floral details in the “Wealei group”: **A, B**, *Disperis paludosa* Harv. ex Lindl.: **A**, flower; **B**, lip; **C**, *D. circumflexa* (L.) T.Durand & Schinz subsp. *circumflexa*, flower; **D**, *D. stenoplectron* Rchb.f., lip and gynostemium; **E, F**, *D. concinna* Schltr.: **E**, flower; **F**, lip; **G**, *D. fanniniae* Harv., lip; **H**, *D. wealei* Rchb.f., gynostemium. Drawn from alcohol material (sources unknown).

& Schinz var. *circumflexa*; J.L. Stewart *et al.*, Wild Orch. S. Afr.: 201 (1982).

DISTRIBUTION. — Mainly Western Cape.

subsp. *aemula* (Schltr.) J.C. Manning

S. African J. Bot. 56: 495 (1990); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 316 (1999). — *D. secunda* (Thunb.) Sw. var. *aemula* Schltr., Bull. Herb. Boissier, ser. 1, 6: 923 (1898). — *D. circumflexa* (L.) T.Durand & Schinz var. *aemula* (Schltr.) Kraenzl., Orch. Gen. Sp.: 826 (1900);

J.L. Stewart *et al.*, Wild Orch. S. Afr.: 201 (1982). — Type: South Africa, Cape of Good Hope, *Penther s.n.* (syn-, ?B†); South Africa, *Krook s.n.* (syn-, ?B†); South Africa, Olifantrivierberge, *Schlechter s.n.* (syn-, ?B†).

Differs from the typical subspecies in the more robust habit with frequently broader leaves, the larger green and white flowers and the shape of the hood. This subspecies is mainly found in the Northern Cape of South Africa.

66. *Disperis concinna* Schltr.

Bot. Jahrb. Syst. 20, Beibl. 50: 43 (1895), Bull. Herb. Boissier, ser. 1, 6: 920 (1898); Rolfe, Fl. Cap. 5, 3: 299 (1913); la Croix & P.J. Cribb, Fl. Zambes.: 239 (1995); J.C. Manning *in* H.P. Linder & Kurzweil, Orch. S. Afr.: 318 (1999). — Type: South Africa, Transvaal, *Schlechter s.n.* (holo-, B†).

Plants to 350 mm. Leaves 3, alternate, ovate, 10–32 × 4–9 mm. Flowers 1–5, pale magenta or white; median sepal ovate, saccate, 4–5 × 3 mm, lateral sepals ovate, 6–7 × 2.5–3 mm; petals oblong, 3–5 × 1.5–2 mm; lip blade boat-shaped with reflexed tip, appendage finger-like, pubescent (Fig. 13E, F).

DISTRIBUTION AND PHENOLOGY. — South Africa (KwaZulu-Natal, Gauteng, Mpumalanga) and Zimbabwe; rare in damp montane grassland, often along streams or on rock flushes, also in marshy areas, from 1400 to 2300 m. Flowering in January and February.

67. *Disperis cooperi* Harv.

Thes. Cap. 2: 47 (1863); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 920 (1898); Rolfe, Fl. Cap. 5, 3: 295 (1913); J.C. Manning *in* H.P. Linder & Kurzweil, Orch. S. Afr.: 317 (1999). — Type: South Africa, Free State, *Cooper 1100* (lecto-, W).

Disperis allisonii Rolfe, Fl. Cap. 5, 3: 297 (1913). — Type: South Africa, KwaZulu-Natal, *Allison 8* (holo-, K).

Disperis buchananii Rolfe, Fl. Cap. 5, 3: 296 (1913). — Type: South Africa, KwaZulu-Natal, *Buchanan 1070* (holo-, K).

Disperis ermelenensis Rolfe, Fl. Cap. 5, 3: 296 (1913). — Type: South Africa, Mpumalanga, *Todd ex Wood 3176* (holo-, BOL; iso-, NH).

Plants somewhat pubescent, to 380 mm. Leaves 3–4, alternate, lanceolate, ± 11–20 × 5–7 mm. Flowers 7–11, in secund racemes, cream and pink; median sepal saccate, ovate, 8 × 6 mm, lateral sepals obovate, 10–11 × 4 mm; petals clawed, oblong-obovate, 5.5 × 3 mm; lip blade cordate and navicular, apex adhering to petals and median sepal, appendage oblong, horizontal, pubescent.

DISTRIBUTION AND PHENOLOGY. — South Africa (KwaZulu-Natal, Free State, Mpumalanga); occasional in montane grassland, usually in damp places, sometimes also in vleis from 1200 to 2100 m. Flowering mainly in February and March.

68. *Disperis stenoplectron* Rchb.f.

Otia Bot. Hamburg. 2: 102 (1881); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 921 (1898); Rolfe, Fl. Cap. 5, 3: 295 (1913); J.C. Manning *in* H.P. Linder & Kurzweil, Orch. S. Afr.: 316 (1999). — Type: South Africa, *Ecklon & Zeyher 86* (holo-, W).

Disperis anomala Schltr., Bot. Jahrb. Syst. 26: 333 (1899); Rolfe, Fl. Cap. 5, 3: 298 (1913). — Type: South Africa, KwaZulu-Natal, *Wood 6078* (holo-, NH).

Disperis natalensis Rolfe, Fl. Cap. 5, 3: 297 (1913). — Type: South Africa, KwaZulu-Natal, *Fannin 91* (lecto-, NH).

Plants to 230 mm. Leaves 3–4, alternate, lanceolate to ovate, 20–35 × 8–12 mm. Flowers 5–8, in secund racemes, pink and cream; median sepal broadly elliptic, hooded, mostly 8 × 7 mm, lateral sepals obovate, 7–12 × 4–5 mm; petals oblong-ovate, clawed, 5–6 × 3–4 mm; lip blade horizontal, elliptic, triangular, appendage horizontally reflexed, linear (Figs 1G; 13D).

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal, Mpumalanga) and Lesotho; in montane and subalpine grassland, frequently on slopes from 1200 to 2850 m. Flowering from January to April.

69. *Disperis wealei* Rchb.f.

Otia Bot. Hamburg. 2: 103 (1881), as *wealii*; Schlechter, Bull. Herb. Boissier, ser. 1, 6: 925 (1898); Rolfe, Fl. Cap. 5, 3: 300 (1913), as *wealii*; J.C. Manning *in* H.P. Linder & Kurzweil, Orch. S. Afr.: 319 (1999). — Type: South Africa, Eastern Cape, *Weale 917* (holo-, W; iso-, BOL, K, SAM).

Disperis gracilis Schltr., Bot. Jahrb. Syst. 20, Beibl. 50: 44 (1895), Bull. Herb. Boissier, ser. 1, 6: 925 (1898); Rolfe, Fl. Cap. 5, 3: 299 (1913). — Type: South Africa, “Transvaal”, *Schlechter 4393* (holo-, B†; iso-, K, NH).

Disperis flava Rolfe, Fl. Cap. 5, 3: 300 (1913). — Type: South Africa, KwaZulu-Natal, *Allison 3* (holo-, K).

Plants to 300 mm. Leaves 2-5, alternate, ovate, $\pm 11-20 \times 5-7$ mm. Flowers 1-4, white; median sepal ovate, $6-8 \times 5-7$ mm, hooded, lateral sepals elliptic, $9-11 \times 4-5$ mm; petals falcate, clawed, rotund, $6-8 \times 4-6$ mm; lip blade triangular, up-curved, boat-shaped, appendage oblong, conduplicate, pubescent (Fig. 13H).

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal, one record each from Mpumalanga and Limpopo) and Lesotho; common in moist to wet montane grassland, often along streams or near forest margins from 1500 to 2700 m; once recorded epiphytic on *Encephalartos* (Cycadaceae). Flowering mainly in January and February.

70. *Disperis fanniniae* Harv.

Thes. Cap. 2: 46 (1863); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 944 (1898); Rolfe, Fl. Cap. 5, 3: 310 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 319 (1999). — Type: South Africa, Drakensberg, *Cooper 1092* (lecto-, TCD, here designated).

Plants to 300 mm. Leaves 3, alternate, ovate-lanceolate, $20-80 \times 8-33$ mm. Flowers 1-8, white; median sepal ovate, $8-10 \times 7-9$ mm, hood $10-16$ mm deep, lateral sepals oblong-ovate, $10-13 \times 4.5-5$ mm; petals clawed, rotund, $7-8 \times 5-6$ mm; lip blade pouched, triangular, appendage elongate with two oblong flanges, apex decurved (Fig. 13G).

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal, Free State, Mpumalanga, Limpopo), Lesotho and Swaziland; in leaf litter on the forest floor or in humus on rocks, sometimes on moss-covered rocks in or next to streams, also in pine, cypress and wattle plantations, at (150-)700-2100 m. Flowering mainly in February and March. This species is frequently found in cultivation.

71. *Disperis tysonii* Bolus

J. Linn. Soc., Bot. 22: 79 (1885), as *tysoni*; Schlechter, Bull. Herb. Boissier, ser. 1, 6: 918 (1898); Rolfe, Fl. Cap. 5, 3: 298 (1913), as *tysoni*; J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 317 (1999). — Type: South Africa, Kokstad, *Tyson 1079* (lecto-, K; isolecto-, SAM).

Disperis bicolor Rolfe, Fl. Cap. 5, 3: 300 (1913). — Type: South Africa, KwaZulu-Natal, *Allison 4* (holo-, K).

Disperis kermesina Rolfe, Fl. Cap. 5, 3: 297 (1913). — Type: South Africa, KwaZulu-Natal, *Allison 9* (holo-, K).

Plants to 400 mm. Leaves 4-5, alternate, lanceolate, $15-30 \times 5-8$ mm. Flowers (1-)5-20, in secund racemes, pink to magenta; median sepal ovate, $5-6 \times 3-4$ mm, deeply hooded, lateral sepals obovate, $6-8 \times 2.5-3$ mm; petals clawed, ovate, $4-6 \times 2-2.5$ mm; lip blade erect, ovate to triangular, appendage horizontally reflexed, linear, pubescent.

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape, KwaZulu-Natal, Mpumalanga), Lesotho and Swaziland; on soils derived from sandstone or quartzite in montane and sub-alpine grassland from 1200 to 3050 m. Flowering mostly in February and March.

72. *Disperis oxyglossa* Bolus

J. Linn. Soc., Bot. 22: 76 (1885); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 917 (1898); Rolfe, Fl. Cap. 5, 3: 301 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 314 (1999). — Type: South Africa, Griqualand East, *Tyson 1603* (holo-, BOL).

Plants to 330 mm. Leaves 2-4, alternate, ovate, $10-35 \times 4-8$ mm. Flowers 2-7, pink and cream; median sepal lanceolate, $12-14 \times 4-5$ mm, saccate, lateral sepals \pm horizontal, lanceolate, $14-17 \times 4.5-7$ mm; petals clawed, elliptic, $8-10 \times 2.5-4$ mm; lip blade triangular and shallowly funnel-shaped, appendage ovate, with lateral flanges.

DISTRIBUTION AND PHENOLOGY. — South Africa (Eastern Cape and KwaZulu-Natal); in damp grassland, commonly in seepages or along water courses from 1200 to 2700 m. Flowering mainly from January to February.

73. *Disperis paludosa* Harv. ex Lindl.

London J. Bot. 1: 14 (1842); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 916 (1898); Rolfe, Fl. Cap. 5, 3: 301 (1913); J.C. Manning in H.P. Linder & Kurzweil, Orch. S. Afr.: 314 (1999). — Type: South Africa, Camps Bay, *Harvey s.n.* (syn-, TCD); Table Mountain, *Harvey s.n.* (syn-, TCD); French Hoek Pass, *Harvey s.n.* (syn-, K, K-LINDL).

Plants to 460 mm. Leaves 2-5, alternate, linear-lanceolate, 15-80 × 1.5-7 mm. Flowers 2-5, magenta with green dots; median sepal narrowly elliptic, 10-12 × 3-4.5 mm, lateral sepals deflexed, lanceolate, 10-12 × 3-5 mm; petals clawed, lanceolate, ± 10-11 × 3 mm; lip blade triangular, appendage elliptic (Figs 1H; 13A, B).

DISTRIBUTION AND PHENOLOGY. — South Africa (widespread in the Western and ranging into the Eastern Cape); occurring in both summer- and winter-rainfall regions, in sandy soils in marshy *Restio*-veld from (20-)200 to 1050 m. Flowering mainly from November to December, particularly after fire.

74. *Disperis bosseri* la Croix & P.J.Cribb

Adansonia 24: 82 (2002). — Type: Madagascar, Ankaratra, *Bosser 10869* (holo-, P).

Plants to 180 mm. Leaves 3, alternate, ovate to lanceolate, 10-20 mm long. Flowers 1-2, pale pink; median sepal linear, 6 × 1 mm, hood 6 mm deep, lateral sepals ovate-apiculate, 6-7 × 3 mm; petals spatulate, 6 × 2.5 mm; lip blade lanceolate, navicular, appendage unlobed, rounded, papillose.

The lip of *Disperis bosseri* is very much unlike that of all other Madagascan taxa. The boat-shaped blade and the unlobed appendage suggest that it belongs in subgenus *Disperis*. Its similarity to *D. concinna* was pointed out by LA CROIX *et al.* (2002) but on account of a somewhat different lip structure the plant was described as a distinct new species.

DISTRIBUTION AND PHENOLOGY. — Madagascar; humid places on slopes and open areas in full sun at 2400 m. Flowering in February.

DOUBTFUL NAMES

***Disperis afzelii* Schltr.**

Repert. Spec. Nov. Regni Veg. Beih. 15: 326 (1918); H. Perrier in Humbert, Fl. Madag. (Engl. revis.), Orch.: 115 (1981), as *alfzelii*; Du Puy *et al.*, Orch. Madag.: 133 (1999); la Croix *et al.*, Adansonia 24: 87 (2002). — Type: Madagascar, Andakam-bararata, *Afzelius s.n.* (holo-, B†).

This is possibly synonymous with *Disperis tripetaloides*, but this cannot be confirmed as the type has been lost (see LA CROIX *et al.* 2002: 87).

***Disperis guttata* Frapp. ex Cordem.**

Fl. Réunion: 254 (1895); Schlechter, Bull. Herb. Boissier, ser. 1, 6: 955 (1898). — *Disperis guttata* Frapp., Cat. Orch. Réunion: 10 (1880), *nom. nud.* — Type not designated.

Possibly refers to *Disperis discifera* var. *borbonica*, but this is uncertain as no herbarium specimen is known (LA CROIX *et al.* 2002: 87).

EXCLUDED NAME

Disperis alata Labill., Pl. Nov. Holl. 2: 59, t. 210 (1806) (= *Pterostylis alata* (Labill.) Rchb.f.).

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REFERENCES

- CHESSELET P. 1989. — *Systematic Implications of Leaf Anatomy and Palynology in the Disinae and Coryciinae (Orchidoideae)*. Unpublished M. Sc. thesis, University of Cape Town, South Africa.
CHESSELET P. & LINDER H.P. 1993. — Pollen morphology of the Disieae (Orchidoideae; Orchidoideae). *Grana* 32: 101-110.

- CRIBB P.J. & STEWART J. 1985. — Additions to the orchid flora of tropical Africa. *Kew Bull.* 40: 399-419.
- CRIBB P.J. & THOMAS S. 1997. — Orchidaceae: 193-307, in EDWARDS S., SEBSEBE D. & HEDBERG I. (eds), *Flora of Ethiopia and Eritrea*, vol. 6. Addis Ababa University, Addis Ababa; Uppsala University, Uppsala.
- DOUZERY J.P.E., PRIDGEON A.M., KORES P., LINDER H.P., KURZWEIL H. & CHASE M.W. 1999. — Molecular phylogenetics of Diseae (Orchidaceae): a contribution from nuclear ribosomal ITS sequences. *Amer. J. Bot.* 86: 887-899.
- DRESSLER R.L. 1981. — *The Orchids. Natural History and Classification*. Harvard University Press, Cambridge, Massachusetts; London.
- DRESSLER R.L. 1993. — *Phylogeny and Classification of the Orchid Family*. Cambridge University Press, Cambridge.
- GOVAERTS R. 2004. — *Disperis* (Orchidaceae), in *World Checklist of Monocots*. The Board of Trustees of the Royal Botanic Gardens Kew. Published at: <http://www.kew.org/monocotChecklist/> (accessed May 2005).
- JOHNSON S.D. 1994. — Preliminary observations on the pollination of *Disperis capensis* (Orchidaceae). *S. African Orchid J.* 25: 22-23.
- KURZWEIL H. 1989. — Floral morphology and ontogeny in *Huttonaea pulchra*. *Lindleyana* 4: 1-5.
- KURZWEIL H. 1991. — The unusual structure of the gynostemium in the Orchidaceae-Coryciinae. *Bot. Jahrb. Syst.* 112: 273-293.
- KURZWEIL H. 2005. — Taxonomic studies in the genus *Disperis* in South-East Asia. *Blumea* 50: 143-152.
- KURZWEIL H. & LINDER H.P. 1991. — A comparative study of the floral morphology in the genus *Disperis* (Orchidaceae). *Beitr. Biol. Pflanzen* 66: 433-477.
- KURZWEIL H., LINDER H.P. & CHESSELET P. 1991. — The phylogeny and evolution of the *Pterygodium-Corycium* complex (Coryciinae, Orchidaceae). *Pl. Syst. Evol.* 175: 161-223.
- LA CROIX I. 1988. — A natural hybrid in *Disperis*. *Orchid Rev.* 96: 361-362.
- LA CROIX I.F. & CRIBB P.J. 1995. — Orchidaceae: 1-320, in POPE G.V. (ed.), *Flora Zambesiaca*, vol. 11 [part 1]. Flora Zambesiaca Managing Committee, London.
- LA CROIX I.F., LA CROIX E.A.S. & LA CROIX T.M. 1991. — *Orchids of Malawi*. A.A. Balkema, Rotterdam.
- LA CROIX I., BOSSER J. & CRIBB P.J. 2002. — The genus *Disperis* (Orchidaceae) in Madagascar, the Comores, the Mascarenes and the Seychelles. *Adansonia*, sér. 3, 24 (1): 55-87.
- LINDER H.P. 1981a. — Taxonomic studies on the Disinae: 1. A revision of the genus *Brownleea* Lindl. *J. S. African Bot.* 47: 13-48.
- LINDER H.P. 1981b. — Taxonomic studies on the Disinae: 2. A revision of the genus *Schizodium* Lindl. *J. S. African Bot.* 47: 339-371.
- LINDER H.P. 1981c. — Taxonomic studies on the Disinae. III. A revision of *Disa* Berg. excluding Sect. *Micranthae* Lindl. *Contr. Bolus Herb.* 9: 1-370.
- LINDER H.P. 1981d. — Taxonomic studies in the Disinae (Orchidaceae). IV. A revision of *Disa* Berg. sect. *Micranthae* Lindl. *Bull. Jard. Bot. Nat. Belg.* 51: 255-346.
- LINDER H.P. 1981e. — Taxonomic studies in the Disinae. V. A revision of the genus *Monadenia*. *Bothalia* 13: 339-363.
- LINDER H.P. 1981f. — Taxonomic studies in the Disinae. VI. A revision of the genus *Herschelia*. *Bothalia* 13: 365-388.
- LINDER H.P. 1986. — Notes on the phylogeny of the Orchidoideae, with particular reference to the Diseae. *Lindleyana* 1: 51-64.
- LINDER H.P. & KURZWEIL H. 1994. — The phylogeny and classification of the Diseae (Orchidoideae: Orchidaceae). *Ann. Missouri Bot. Gard.* 81: 687-713.
- LINDLEY J. 1830-1840. — *The Genera and Species of Orchidaceous Plants*. Ridgways, London.
- MANNING J.C. & LINDER H.P. 1992. — Pollinators and evolution in *Disperis* (Orchidaceae), or why are there so many species? *S. African J. Sci.* 88: 38-49.
- PRIDGEON A.M., CRIBB P.J., CHASE M.W. & RASMUSSEN F.N. 2001. — *Genera Orchidacearum*, vol. 2 (Orchidoideae, part 1). Oxford University Press, Oxford.
- ROLFE R.A. 1898. — *Disperis*: 288-292, in THISELTON-DYER W.T. (ed.), *Flora of Tropical Africa* vol. VII. Reeve & Co., London.
- SCHLECHTER R. 1898. — Monographie der Disperideae. *Bull. Herb. Boissier*, ser. 1, 6: 800-821, 846-859, 905-955.
- SEBSEBE D., CRIBB P.J. & RASMUSSEN F.N. 2004. — *Field Guide to Ethiopian Orchids*. Royal Botanic Gardens, Kew.
- STEINER K.E. 1989. — The pollination of *Disperis* (Orchidaceae) by oil-collecting bees in southern Africa. *Lindleyana* 4: 164-183.
- STEWART J. 1996. — *Orchids of Kenya*. St Paul's Bibliographies, Winchester.
- STEWART J., LINDER H.P., SCHELPE E.A. & HALL A.V. 1982. — *Wild Orchids of Southern Africa*. Macmillan South Africa, Johannesburg.
- SUMMERHAYES V.S. 1931. — African orchids II. *Bull. Misc. Inform. Kew* 1931: 378-390.
- SUMMERHAYES V.S. 1933. — African orchids V. *Bull. Misc. Inform. Kew* 1933: 246-254.
- SUMMERHAYES V.S. 1935a. — *Disperis johnstoni*. *Hooker's Icon. Pl.* 33: t. 3269.
- SUMMERHAYES V.S. 1935b. — *Disperis cardiopetala*. *Hooker's Icon. Pl.* 33: t. 3270.
- SUMMERHAYES V.S. 1935c. — *Disperis dicerochila*. *Hooker's Icon. Pl.* 33: t. 3272.

- SUMMERHAYES V.S. 1937. — African orchids IX. *Bull. Misc. Inform. Kew* 1937: 457-466.
- SUMMERHAYES V.S. 1939. — African orchids XI. *Bull. Misc. Inform. Kew* 1939: 489-500.
- SUMMERHAYES V.S. 1952. — African orchids XX. *Kew Bull.* 6: 461-475.
- SUMMERHAYES V.S. 1956. — African orchids XXIII. *Kew Bull.* 11: 217-236.
- SWARTZ O. 1800. — Orchidernes slagter och acter upstalldes. *Kongl. Vetensk. Acad. Nya Handl.* 21: 202-254.
- THOUARS L.-M.A.A. DU PETIT 1809. — Extrait de trois mémoires lus à la première classe de l'Institut, sur l'histoire des plantes Orchidées des îles australes d'Afrique. *Nouv. Bull. Sci. Soc. Philom. Paris* 1: 314-319.
- VERDCOURT B. 1968. — African orchids XXXI: new taxa of *Disperis* from East and Central Africa. *Kew Bull.* 22: 93-99.
- VERDCOURT B. 1977. — A new species of *Disperis* (Orchidaceae) from Zambia. *Kew Bull.* 32: 9-11.
- VERDCOURT B. 1986. — A key to the East African species of *Disperis* (Orchidaceae) with two new species. *Kew Bull.* 41: 51-57.
- VOGEL S. 1959. — Organographie der Blüten kapländischer Ophrydeen. *Akad. Wiss. Abh. Math.-Naturwiss. Kl.* 6-7: 268-532.

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