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Taxonomic studies in the Disinae. VI. A revision of the genus *Herschelia*

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ABSTRACT

The genus *Herschelia* (Disinae, Orchidaceae) is revised. Sixteen species, one subspecies and one variety are recognized. Two new species from tropical Africa (*H.* **chimanimaniensis** Linder and *H.* **praecox** Linder) and a new variety from the Cape Province *H. lugens* (H. Bol.) Kraenzl. var. **nigrescens** Linder are described. Three new combinations are made by transferring the two species of *Forficaria* and *Disa* sect. *Microperistera* (one species) to *Herschelia*. Thirteen species are illustrated, and the nomenclature and the available information about the habitats of the taxa are discussed. The species are grouped into two subgenera, one of which is further divided into two sections and four series. This classification is based on the putative phylogeny, as determined by the method devised by Wagner (1962).

RÉSUMÉ

ÉTUDES TAXONOMIQUES DES DISINAE. VI. UNE RÉVISION DU GENRE HERSCHELIA

Le genre Herschelia (*Disinae, Orchidaceae*) *est révisé. Seize espèces, une sous-espèce et une variété sont reconnues. Deux nouvelles espèces d'Afrique tropicale* (H. **chimanimaniensis** *Linder et* H. **praecox** *Linder*) *et une nouvelle variété originaire de la province du Cap,* H. lugens, (*H. Bol.*) *Kraenzl. var.* **nigrescens** *Linder sont décrites. Trois nouvelles combinaisons sont faites en transférant les deux espèces de* Forficaria *et* Disa *sect.* Microperistera (*une espèce*) *à* Herschelia. *Treize espèces sont illustrées, et la nomenclature ainsi que l'information disponible quant à leurs habitats et taxa sont discutées. Les espèces sont groupées en deux sous-genres, une desquelles est de plus divisée en deux sections et quatre séries. Cette classification est basée sur la phylogénie putative, déterminée selon la méthode décrite par Wagner (1962).*

INTRODUCTION AND HISTORICAL OVERVIEW

Herschelia is one of the 'minor' genera in the subtribe Disinae (Orchidoideae, Orchidaceae). The genus is centred in the Cape Floral Region (Goldblatt, 1978), where 12 of the 16 species occur. The remaining four species occur in the montane grasslands (White, 1978) of southern and south-central Africa, extending marginally into East Africa (Robyns & Tournay, 1955).

There has been a conspicuous lack of consensus about the delimitation of the genus and the species. Lindley, who describe the genus in 1838, included only *H. graminifolia* in it, and placed the other known species into *Disa* sect. *Trichochila*. This treatment was followed by Bentham & Hooker (1883) and Pfitzer (1889). Harry Bolus transferred all the then known species to *Herschelia,* which he treated as a section of *Disa*. Schlechter (1901) followed a similar approach. Bolus provided descriptions and illustrations for the majority of the species, and did excellent work on the nomenclature and morphology of various species in the group (1882, 1889, 1893, et seq.). Although Rolfe (1913), Schelpe (1966) and Dyer (1976) essentially follow the generic delimitations of Bolus and Schlechter, they treat *Herschelia* as a genus. *Forficaria* has generally been regarded as allied to *Herschelia* (or to *Disa* sect. *Trichochila),* but has never been included in the same group. Kraenzlin (1900) produced a rather artificial treatment, where *H. spathulata* s.l., and *Disa lacera* are removed from *Herschelia,* and grouped with *Disa cooperi, D. scullyi* and *D. thodei* in *Disa* sect. *Spathulatae*.

Several species of this genus have from time to time been introduced into cultivation in Europe, but there is little evidence that the plants lasted more than a few seasons. According to Hooker (1886, 1889), *H. hians* and *H. spathulata* subsp. *spathulata* flowered at Kew. In 1905 it was noted that *H. graminifolia, H. spathulata* and an unknown species of *Herschelia* were in cultivation (Anon., 1905). In 1912 Rolfe remarked: 'Though the species (*H. lugens*) has been repeatedly introduced to cultivation in this country, it is by no means easy to maintain in good condition, owing to its tendency to dwindle away after flowering'. In 1955 Dyer remarked that attempts to introduce *H. graminifolia* were still unsuccessful and that all tuberous orchids fared badly in cultivation. At present several species (*H. spathulata* subsp. *spathulata, H. lugens, H. purpurascens, H. barbata* and *H. graminifolia*) are in cultivation in South Africa. It is to be hoped that methods of propagating these species may soon be perfected, as several of the more striking species are already rare in nature, and may soon, if present trends continue, become extinct.

*Bolus Herbarium, University of Cape Town, Rondebosch, 7700.

MORPHOLOGY

In general, the habit of all the species of *Herschelia* is grass-like with a radical tuft of linear, usually rolled, erect leaves, and a slender erect stem. The vegetative structures in this genus appear to be well adapted to the various ecological preferences and phenology of the species, within the framework of the general grass-like structure.

The tubers are rather variable in size and are often remarkably large for the size of the plants. Large tubers are often found on plants collected from well-drained sandy areas.

The radical leaves display three patterns:

(a) In the winter-rainfall and all-the-year rainfall regions, the majority of the species have linear, rolled, erect leaves that are produced before the flowers, and that may be dry or green at anthesis. The leaves do not reach above the base of the inflorescence, presumably as this would obscure the lower flowers from any pollinators.
(b) In the winter-rainfall region, the *H. spathulata* group has flat leaves. The plant is early flowering, before the summer drought starts, and the flat leaves may reflect the absence of xeric adaptations.

(c) In the summer rainfall regions the plants appear shortly after the start of the summer rains. This could be a mechanism to avoid competition with the grasses, which are usually burnt in the winter months. The leaves are produced after the flowers and are often up to three times as long as the inflorescence.

Where fires frequently occur, a sheath of old leaf fibres often accumulates around the base of the stem. This indicates that individual tubers must reach a considerable age, as only 5–15 leaves are produced each season. It is also evidence of their remarkable fire resistance.

The inflorescences do not show any exceptional variation. There is a reduction in the number of flowers with increase in flower size — perhaps an index of the degree of advancement of the species. The floral bracts are of little taxonomic value. In the majority of cases the flowers are resupinate. Only in subgen. *Forficaria* is the lip upper-most, in the one species due to the flowers being twisted through 360°, in the other due to a lack of resupination. In the majority of taxa the flowers are of various shades of blue. In sect. *Microperistera* the flowers are white, whereas they are more or less maroon in subgen. *Forficaria*. In all cases, the flowers are the only brightly coloured element on the plants.

The sepals are strongly differentiated into the patent, shallowly concave, lanceolate to ovate lateral sepals and the galeate or deeply concave dorsal sepal. The latter varies from orbicular to ovate, and in some taxa may be shortly spathulate: probably an advanced character. The galea is usually deep, but it may also be very shallow. Generally, the galea bears a spur, but this is absent in three species. The spur is horizontal at the base, cylindrical, usually obtuse, and only in one case longer than the dorsal sepal. In the bulk of the species the spur is a small conical or cylindrical appendage on the back of the galea. It is not clear whether the absence of a spur should be considered primitive or a derived characteristic, or both, but it clearly arose twice. The presence of a long spur, found only in *H. schlechterana*, is almost certainly a derived state, within the genus.

The inner perianth whorl in *Herschelia* is highly specialized. The petals generally show a very distinct structure, consisting of a basal anticous lobe flanking the stigma, with the basal part of the limb reflexed parallel to the anther, and the apex curved upwards. In subgen. *Forficaria* this structure is peculiar; the basal anticous lobe is rudimentary, the apical half of the petals is villous. Among the remaining taxa, variation is restricted to the width of the limb of the petal, the angle of the upward curvature and the shape of the apex. A lanceolate apex is considered primitive and a bifid or flabellate expanded apex derived.

Three basic types of lip structure occur in the genus:

(1) a patent, reniform lip (subgen. *Forficaria*)
(2) an ovate, acute lip with entire margins (sect. *Microperistera*)
(3) an ovate lip, variously modified or dissected (sect. *Herschelia*)

It is probable that an ovate, entire lip is primitive, as it approaches the undifferentiated form of the organ. The reniform lip structure of subgen. *Forficaria* is unique in the subtribe. With sect. *Herschelia* extensive variation in lip shape occurs. Occasional specimens of *H. hians* have entire lips, and the whole range of variation from them to deeply lacerate lips may be found in the one species. From this basic form both the ovate lips with crisped margins, characteristic of ser. *Herschelia*, and the beard-like lips characteristic of the more advanced members of ser. *Lacerae* may be derived. This bearded state appears to have evolved twice (in *H. lugens* and in *H. multi-*

TABLE 1.–Occurrence of taxonomically useful characters in the genus

	forficaria	newdigateae	schlechterana	spathulata	graminifolia	purpurascens	barbata	venusta	lugens	multifida	hians	forcipata	praecox	baurii	chimanimaniensis	goetzeana
Spur absent	X	X														X
short				X	X	X	X	X	X	X	X	X	X	X	X	
long			X													
Sepals blue				X	X	X		X	X	X	X		X	X	X	X
white			X				X									
red	X	X														
Petals acute			X								X	X				X
bifid													X	X	X	
lacerate									X	X						
expanded apex		X		X	X	X	X	X								
aciculate	X															
Lip sessile	X	X	X		X	X	X	X	X		X	X	X	X	X	X
stalked				X						X						
entire	X	X	X		X	X						X				
crenulate											X					
bearded							X	X	X	X		X	X	X	X	
trilobed				X												
ovate			X	X	X	X	X	X	X	X	X	X	X	X	X	X
reniform	X	X														
Rostellum																
lateral lobes	X	X	X	X				X	X	X	X	X	X	X	X	X
three horns					X	X	X									
Flowers resupinate			X	X	X	X	X	X	X	X	X	X	X	X	X	X
not	X	X														

fida). Spathulate lips also evolved twice: in *H. multifida* and in ser. *Spathulatae*.

The column in *Herschelia* is, to a certain extent, characteristic of the genus. Typically the anther is horizontal, usually with two large viscidia (these may, however, be fused), the rostellum erect, with three equal lanceolate, acute lobes, holding the viscidia between them (Bolus, 1882) and a horizontal, shortly pedicellate stigma with three lobes, the rear or odd lobe much smaller than the lateral lobes. The rostellum and stigma structures are variable, but unfortunately it is rather difficult to get a clear picture of these structures from dried material. Frequently the rostellum consists of two lateral horns, which are canaliculate and hold the viscidia at their apices. The central lobe appears to be highly reduced or lost. It is possible that the central lobe could be formed by the fusion of the inner walls of the canaliculate lateral rostellum horns. This suggestion is made more likely by the fact that the inner rostellum lobe is frequently bilobed or bifid. This would indicate that the trilobed rostellum is derived from the bilobed canaliculate rostellum. Variation in the stigma structure affects the size of the odd lobe, which varies from large as the lateral lobes to much smaller.

The occurrence of taxonomically important characters in the genus is indicated in Table 1.

PHYLOGENY

The construction of a putative phylogeny for the genus is basic to the production of a phylogenetic classification of the species (Funk & Stuessy, 1978). Objective methods for the construction of phylogenies have been proposed by Hennig (1966), Wagner (1962) and several others, and are ably reviewed by Fund & Stuessy (1978) and Bremer & Wanntrop (1978). Essentially, the derived and generalized character states for the taxonomically important characters are postulated, and groups of species are formed on the number of shared derived character states. By using the Wagner method (Wagner, 1962) the more specialized taxa in the genus may be identified.

The determination of derived character states is based on two processes (Bremer & Wanntrop, 1978): detection of transformation series in a structure and determining the distribution of the character state in related groups. Generalized character states are likely to be wide-spread in related groups (Judd, 1979). This analysis was applied to the variation in the lip shape, petal apex shape, spur shape and flower colour. In lip and petal apex shape there are clear transformation series from simple entire structures to variously specialized structures. The simple entire structures, especially in the lip shape, are also widespread within the Disinae. The spur shape is more difficult to rank. It is likely that a short semipendent spur is typical for the subtribe, but there is no such structure in *Herschelia*. Consequently, the spurless state is considered to be primitive or generalized. However, this implies that there must have been a reversal in the evolutionary sequence for this structure, as two clearly unrelated taxa (subgen. *Forficaria* and *H. goetzeana)* are spurless. In the flower colour, blue is assumed to be the generalized state. This implies that white flowers evolved twice: in *H. barbata* and *H. schlechterana*. As these two taxa are not closely related, this is thought to be likely. The characters used for the analysis are listed in Table 2. Generalized characters are scored zero, specialized characters one, and intermediate states are scored 0,5. For several characters there are several specialized states.

TABLE 2.—Characters used for the phylogenetic analysis

Character	Generalized state	Specialized state
Spur	absent	short (0,5) or long
sepals	blue	white or red
petals	acute	bifid, lacerate, expanded or aciculate
lip	sessile	stalked
	entire	crenulate (0,5), bearded or trilobed
	ovate	reniform
rostellum	lateral lobes	three horns
flowers	resuplinate	not resupinate

The summed values for each taxon are used to place the taxon on the 'Wagner Tree'. Species sharing the largest number of derived or specialized character states are linked first, whereas species sharing no specialized characters are linked to the putative ancestor.

The Wagner Tree (Fig. 1) clearly demonstrates the major groups among the species:

(a) the *H. forficaria* group is highly specialized and quite isolated. The basic structure of the petal and the specialization of the lip, as well as the vegetative characters, indicate that it has to be included in *Herschelia*.

(b) *H. schlechterana* also shares the vegetative and petal structures typical of the genus, but has a

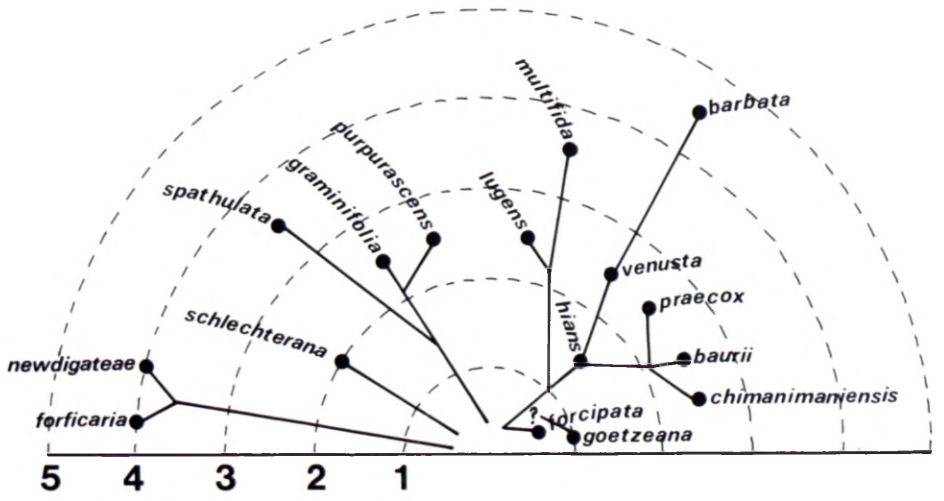

FIG. 1.—Wagner Tree for *Herschelia*. The circles indicate the degree of divergence.

unique spur, white flowers and an entire lip. It may also be derived directly from the ancestral stock of the genus.

(c) The remainder of the genus may be divided into two groups, mainly on the lip and petal apex shapes. *H. spathulata* has a spathulate three-lobed lip, whereas in *H. graminifolia* and *H. purpurascens* the lip is sessile and the lip margins undulate. Both these groups are restricted to the Cape Floral Region (*sensu* Goldblatt, 1978), and show signs of recent, if not ongoing, speciation. The *H. hians* group is characterized by bearded lips. Within the group various lines of development have used different petal shapes. The group may be understood to form a remarkable sequence of geographical and ecologically replacing species. The position of *H. forcipata* is not clear, the species is known only from a single collection. The available data indicate that the taxon may well be ancestral to the group. *H. goetzeana* emerges on the 'Wagner Tree' as being rather primitive. However, it may well be highly specialized, as a reduced form derived from *H. baurii*. At present it is an enigma and is known from a single collection from the summit of Mt Mbeya in southern Tanzania.

HERSCHELIA

Herschelia *Lindl.*, Gen. Sp. Orch. 362 (1838); Benth. & Hook. f., Gen. Pl. 3: 630 (1883); Pfitzer in Natürl. Pflfam. 2,6: 98 (1889); Kraenzl., Orch. Gen. Sp. 1: 801 (1900); Rolfe in Fl. Cap. 5,3: 199 (1913); Senghas in Schltr., Die Orchideen 1: 275 (1973), excl. syn.; Dyer, R.A. Gen. 2: 995 (1976). Type species: *Herschelia coelestis* Lindl. [= *H. graminifolia* (Spreng.) Dur. & Schinz]

Disa Berg. sect. *Herschelia* (Lindl.) H. Bol. in Trans S. Afr. phil. Soc. 5: 168 (1888); Schltr. in Bot. Jb. 31: 282 (1901), excl. *Disa* sect. *Amphigena* in synonymy; Summerh. in Fl. Trop. E. Afr. 156: 154 (1968).

Disa Berg. sect. *Trichochila* Lindl., Gen. Sp. Orch. 353 (1838); Pfitzer in Natürl. PflFam. 2,6: 98 (1889). Type species: *Disa barbata* (L. f.) Swartz. [= *H. barbata* (L. f.) H. Bol.], lectotype.

Forficaria Lindl., Gen. Sp. Orch. 362 (1838); Benth. & Hook. f., Gen. Pl. 3: 631 (1883), Pfitzer in Natürl. PflFam. 2,6:97 (1889); Kraenzl., Orch. Gen. Sp. 1: 722 (1900); Rolfe in Fl. Cap. 5,3: 207 (1913); Senghas in Schltr. Die Orchideen, 1: 271 (1973); R. A. Dyer, Gen. 2: 995 (1976). Type species: *Forficaria graminifolia* Lindl. [= *Herschelia forficaria* (H. Bol.) Linder].

Disa Berg. sect. *Forficaria* (Lindl.) Schltr. in Bot. Jb. 31: 297 (1901).

Disa Berg. sect. *Spathulatae* Kraenzl., Orch. Gen. Sp. 1: 793 (1900). Type species: *Disa spathulata* (L. f.) Swartz [*Herschelia spathulata* (L. f.) Rolfe], lectotype.

Disa Berg. sect. *Microperistera* H. Bol. in Trans. S. Afr. phil. Soc. 16: 149 (1907). Type species: *Disa schlechterana H. Bol.* [= *Herschelia schlechterana* H. Bol.) Linder].

Herschelia is named after Sir John F. W. Herschel (1792–1871), an astronomer who spent some years at the Cape.

Characteristic of this genus are the radical, linear, subsclerophyllous leaves, dry floral bracts, lax inflorescences, the rarely entire lip, usually variously dissected or stalked, petals with a basal anticous lobe, and the limb initially horizontally reflexed, soon falcately or geniculately curved upwards behind the anther, anther horizontal with one or two viscidia, rostellum generally with three equal erect, lanceolate lobes, stigma horizontal, the odd lobe smaller than the lateral lobes.

Plants slender, grass-like, erect 100–1 000 mm tall; tubers testicular, rarely three present, very variable in size, from 10–60 mm long, hirsute; roots unbranched, thick; base of the stem usually with a sheath of old leaf fibres; radical leaves 5–20, linear, flat or rolled, subsclerophyllous, shorter than or longer than the base of the inflorescence, produced during, before or after flowering; cauline leaves lax or imbricate, brown, acuminate, usually longer and overlapping to the base of the stem; inflorescence lax with 1–30 flowers; bracts usually broadly ovate, acuminate to setaceous, dry, varying from half as long as to slightly longer than the ovary; ovaries usually spreading from the stem, slender, 10–30 mm *long. Flowers* resupinate, usually blue or shades of blue, to white with pale blue veins, rarely purplish red or with green parts; dorsal sepal erect or angled forwards, generally galeate, rounded to acuminate, usually ovate in front view with the galea about half as deep as tall; spur horizontal from the base of the galea, at length straight, decurved or curved upwards, rarely longer than the sepals, cylindrical or conical; lateral sepals usually patent, lanceolate to ovate, obtuse to acute, 6–30 mm long; petals with a basal anticous lobe flanking the stigma, oblong to ovate, and a limb which is linear or lorate, the basal part of which is reflexed to the horizontal, flanking the anther, the apical part of which is curved falcately or geniculately upwards behind or near the apex of the anther, the apex of which may be lanceolate, expanded fan-like or more or less bifid; lip generally more or less dissected, rarely entire, usually ovate in outline, rarely spathulate, always specialized in some way; anther horizontal or somewhat pendent, the two cells parallel, with two viscidia which may be separate or fused; rostellum generally with the three lobes equal, erect, lanceolate, acute, rarely with the lateral lobes canaliculate and the central lobe not present; stigma horizontal, shortly pedicellate, the odd lobe smaller than the lateral lobes, the whole structure usually wider than the rostellum.

Subgen. **Forficaria** (*Lindl.*) *Linder,* stat. nov.

Forficaria Lindl., Gen. Sp. Orch. 362 (1838). Type species: *Forficaria graminifolia* Lindl.

Flowers with the lip facing towards the axis, dorsal sepal without a spur, lip reniform.

This subgenus contains two closely related species: *H. forficaria and H. newdigateae,* that appear to be vicariants as defined by Davis & Heywood (1963).

KEY TO THE SPECIES

1a Lip entire:
2a Lip kidney-shaped; petals ciliate:
3a Petals obscurely bilobed, flattened; from the southern Cape Province ..... 2. *H. newdigateae*
3b Petals aciculate; from the western Cape Province ..... 1. *H. forficaria*
2b Lip ovate to lanceolate; petals glabrous:
4a Spur 30–35 mm long ..... 3. *H. schlechterana*
4b Spur less than 15 mm long:
5a Apex of the petals obtriangulate, flabellate, truncate:
6a Spur conical, tapering; lip margins curved upwards ..... 6. *H. purpurascens*
6b Spur subclavate; lip margins curved downwards ..... 5. *H. graminifolia*
5b Apex of the petals acute, entire or bifid:
7a Spur bifid ..... 12. *H. forcipata*
7b Spur obtuse ..... 11. *H. hians*
1b Lip more or less lacerate or bearded:
8a Lip stalked:
9a Lip blade deeply lacerate ..... 10. *H. multifida*
9b Lip blade entire, 3-lobed or ovate:
10a Central lobe of lip (12–) 16–22 mm long; from east of Swellendam ..... 4b. *H. spathulata* subsp. *tripartita*
10b Centra lobe of lip less than 14 mm long; from west of Swellendam ..... 4a. *H. spathulata* subsp. *spathulata*
8b Lip sessile:
11a Petals deeply bilobed; from north of the Limpopo River:
12a Lateral sepals 6–8 mm long; from the Chimanimani Mountains in Zimbabwe ... 15. *H. chimanimaniensis*
12b Lateral sepals 8–25 mm long;
13a Petals as long as the galea; lip almost entire; from the Nyika Plateau in Malawi ..... 13. *H. praecox*
13b Petals about ½ as long as the galea; lip deeply lacerate:
14a Spur present ..... 14. *H. baurii*
14b Spur absent ..... 16. *H. goetzeana*
11b Petals obtriangulate or obscurely bilobed; from south of the Limpopo River:
15a Lip longer than the lateral sepals, green or almost black:
16a Flower blue to green ..... 9a. *H. lugens* var. *lugens*
16b Flower almost black ..... 9b. *H. lugens* var. *nigrescens*
15a Lip shorter than the lateral sepals, more or less blue:
17a Lateral sepals longer than 15 mm; galea acuminate ..... 7. *H. barbata*
17b Lateral sepals less than 16 mm long; galea rarely acuminate:
18a Limb of the petal linear, apex somewhat expanded; lateral sepals 12–16 mm long ..... 8. *H. venusta*
18b Limb of the petals lorate, apex lanceolate or obtriangulate; lateral sepals less than 13 mm long:
19a Petals lanceolate; lip shallowly dissected; from west of Grahamstown ..... 11. *H. hians*
19b Petals obtriangulate; lip deeply dissected; from east of Grahamstown ..... 14. *H. baurii*

1. **Herschelia forficaria** (*H. Bol.*) *Linder*, comb. nov.

Forficaria graminifolia Lindl., Gen. Sp. Orch. 362 (1838); Kraenzl., Orch. Gen. Sp. 1: 723 (1900); Rolfe in Fl. Cap. 5, 3: 207 (1913). *Disa forficaria* H. Bol., Icones Orch. Austro-Afr. 1: t. 87 (1896), nom. nov. Type: Cape Province, Paarl Division, Du Toit's Kloof, *Drège* 2211b (K, holo.!).

Icon: Flower. Pl. Afr. 11: t. 415 (1931)

Plants up to 500 mm tall; tubers c. 50 mm long; stems often with a sheath of old leaf fibres around the base; radical leaves linear, erect, reaching to the base of the inflorescence, acute; cauline leaves lax, narrowly ovate, acuminate, 20–40 mm long; inflorescence lax, c. 100 mm long; bracts shorter than the ovaries, ovate, acuminate, dry; ovaries c. 15 mm long. *Flowers* twisted through 360°, sepals greenish red, petals and lip deep maroon; dorsal sepal erect to reflexed at anthesis, deeply concave, orbicular, apiculate, 8–12 mm in diameter; lateral sepals patent narrowly ovate, acute to shortly acuminate, shallowly concave, 8–12 mm long; petals with the basal half lorate, reflexed parallel to the anther, 4–6 mm long, the apical half aciculate, geniculately bent forwards, terete, acute, tomentose; lip reniform, patent, 4–5 mm long and c. 6 mm wide, the distant margin somewhat swollen and shortly villose; anther horizontal, 4–5 mm long, caudicles short; rostellum small with well-developed staminodes; stigma pedicellate, almost equally trilobed. Fig. 2.

Diagnostic features. Dorsal sepal spurless, lip reniform, petal apex almost setaceous and tomentose, flowers twisted through 360°.

Flowering time: January and February.

A rare reed-like plant that occurs on well-drained gravelly slopes in the Caledon and Cape Peninsula Division (Fig. 3).

*In the treatment of each taxon only representative specimens have been cited. A full list of all specimens studied is given in the Appendix, pp. 387–388.

CAPE.*—3418 (Simonstown): Klaver Valley (–AB), Jan. 1922, *Pillans 4125* (BOL). 3419 (Caledon): Viljoenspass (–AA), Feb. 1933, *McGillett 718* (BOL).

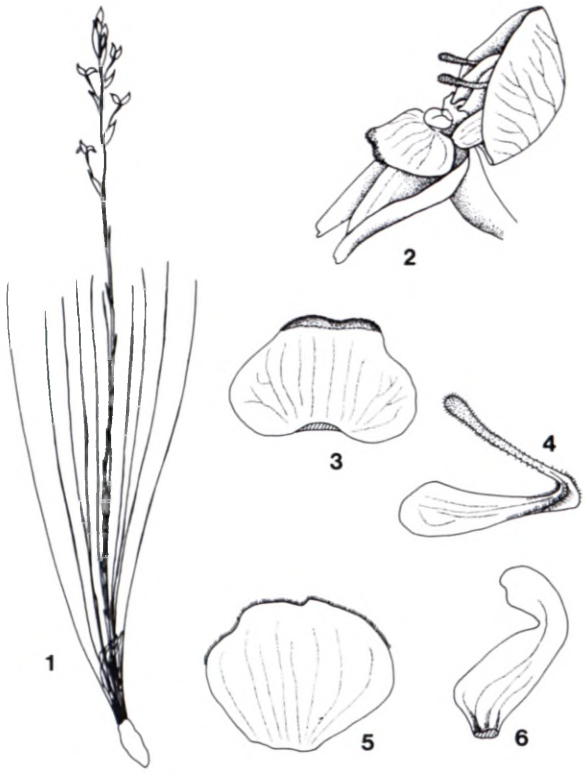

FIG. 2.—*Herscnelia forficaria* (1–4) and *H. newdigateae* (5–6). 1, habit, ×0,25, from *Gillett* 718. 2, flower, ×3. 3, lip, ×5. 4, petal, ×5 (2–5 from *Rosenbruck* s.n.) 5, lip of *H. newdigateae*, ×5. 6, petal, ×5. (5 & 6 from *Bolus* 6327.)

Very little is known about this rather peculiar species. It appears to grow on well-drained gravelly mountain slopes, but I have not succeeded in finding any populations in the field. Several collections were made shortly after veld fires, but this may be due merely to the greater ease of finding these rather cryptic plants in the restioid vegetation that dominates the habitat. The plants occur singly and widely scattered. The altitude range of the species is from about 100 m to 600 m. Rainfall is concentrated in the winter months, and totals about 800 mm p.a. (Jackson, 1961).

The specific epithet '*graminifolia*', under which the species is commonly known, cannot be transferred to *Disa* nor to *Herschelia*, as Sprengel described a *Disa graminifolia* in 1826, which Durand and Schinz transferred to *Herschelia* (1894). When Bolus (1896) transferred *Forficaria graminifolia* to *Disa*, he proposed *D. forficaria* as a *nomen novum*. This epithet is here transferred to *Herschelia*.

2. **Herschelia newdigateae** (*L. Bol.*) *Linder*, comb. nov.

Disa newdigateae L. Bol. in Flower. Pl. Afr. 11: t. 415 (1931). Type: Cape Province, Knysna, Forest Hall, *Newdigate* in BOL 6327 (BOL, holo.!).

Icon: H. Bol., Icones Orch. Austro-Afr. 1: t. 87 (1896), as *Disa forficaria*.

Plants up to 500 mm tall, radical leaves linear, acute up to 300 mm long; cauline leaves lax to subimbricate, acuminate, 30–50 mm long, completely sheathing; inflorescence lax, c. 100 mm long; bracts about as long as the ovaries, acuminate, narrowly ovate; ovaries c. 15 mm long. *Flowers* not resupinate; sepals greenish red, petals and lip deep maroon; dorsal sepal somewhat spathulate with a very short limb, the blade deeply concave, orbicular, apiculate, c. 8 mm in diameter, the margin somewhat dentate; lateral sepals ovate, acute, concave, c. 8 mm long; petals with the basal 4 mm narrowly ovate, parallel to the anther, the apical ⅓ curved up behind the anther, somewhat expanded apically and shallowly bilobed, tomentose; lip reniform, 4 mm long and 6 mm wide with the front margin ciliate; anther horizontal, c. 2 mm long; rostellum with the lateral lobes canaliculate, very small, central lobe apparently obsolete, viscidia big; stigma horizontal, flat. Fig. 2.

Diagnostic features. Dorsal sepal spurless, lip reniform, petal apex somewhat flattened and shallowly bilobed, tomentose, ovary not twisted.

Flowering time: March–April.

Very rare in the area between Nature's Valley and Plettenberg Bay (Fig. 3), from where it is only known from two collections. It grows on dry slopes in short macchia vegetation facing the sea. Superficially this species resembles *H. forficaria*, but a study of the flower soon reveals several distinguishing characters (shape of petal and galea, apex of lip and relative length of anther. Fig. 2). These two taxa are clearly eco-geographic vicariants.

The differences between the two taxa were not observed by the several taxonomists, who had studied the available material. Bolus (1896) published an illustration of *H. newdigateae* under the name *H. forficaria*. It was only when more fresh material of *H. forficaria* became available that the differences between the taxa were detected.

Subgen. **Herschelia**

Flowers resupinate, dorsal sepals (with one exception) spurred, lip more or less ovate and generally lacerate.

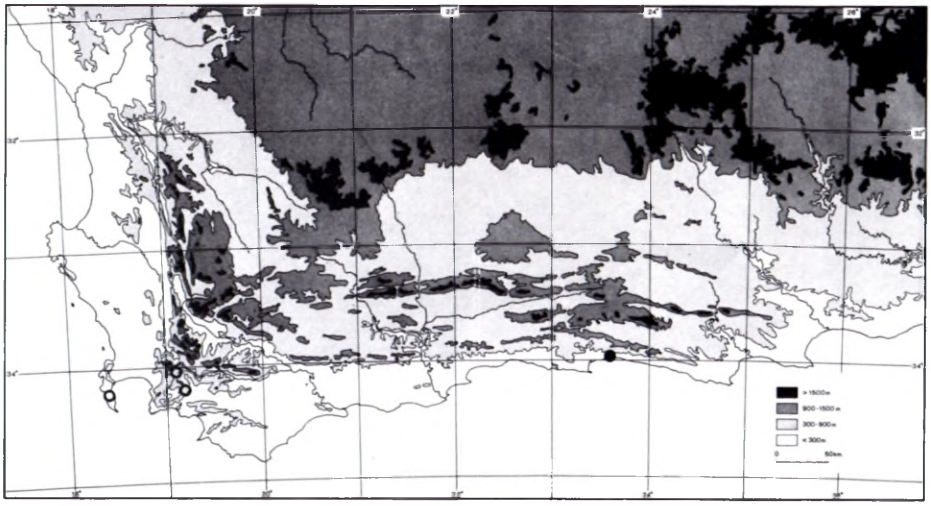

FIG. 3.—Distribution of *H. forficaria* (open circles) and *H. newdigateae* (closed circles).

Type species: *H. graminifolia* (Spreng.) Dur. & Schinz.

This subgenus contains those species which have traditionally been placed in *Herschelia* and which are often popularly known as 'Blue Disas'. The group contains a wide range of forms and is here further subdivided.

Sect. **Microperistera** *H. Bol.* in Trans. S. Afr. phil. Soc. 16: 149 (1907).

Type species: *Herschelia schlechterana* (H. Bol.) Linder.

Lip entire, sessile, ovate, spur longer than sepals.

3. **Herschelia schlechterana** (*H. Bol.*) *Linder,* comb. nov.

Disa schlechterana H. Bol. in Trans. S. Afr. phil. Soc. 16: 149 (1907); Rolfe in Fl. Cap. 5,3: 250 (1913). Type: Cape Province, Riversdale District, Garcias Pass *Luyt* in BOL 10571 (BOL, holo.!; BM!; BR!; K!; W!).

Icon: H. Bolus, Icones Orch. Austro-Afr. 2: t. 75 (1911).

Plants about 600 mm tall; tubers c. 4 mm long and 15 mm in diameter; base of the stem often with the fibrous remains of old leaves; radical leaves about 10, 300–400 mm long and about 2 mm wide, sulcate, the inner leaf surface smooth and the outer ridged longitudinally; cauline leaves about 9, lax or subimbricate, completely sheathing, dry, acute, 30–50 mm long; inflorescence lax, 100–200 mm long and with 3–12 flowers; bracts about ⅔ as long as the ovaries, lanceolate, acuminate, dry; ovaries about 30 mm long at anthesis, slightly curved. *Flowers* cream with mauve veins; dorsal sepal erect, galea obtuse, 22–25 mm tall, c. 16 mm wide and 8 mm deep, the margins curved outwards; spur from a shortly conical base, horizontal at the base and at length gradually decurved, slender cylindrical, subacute, 30–50 mm long; lateral sepals patent, lanceolate to narrowly oblong, suboblique acute 20–25 mm long, aciculus 0,5–1 mm long; petals with the basal anticous lobe orbicular, c. 3 mm in diameter, decurrent with the limb of the petal, limb lorate, 14 mm long, the basal part horizontal, soon geniculately curved through 135° to face forwards, the apex lanceolate, acute; lip patent, flat, narrowly oblong to lorate, acute, 15–20 mm long; anther somewhat pendent, 4,5 mm long with two globular viscidia; rostellum equally 3-lobed, 4 mm tall; stigma unequally 3-lobed, the odd lobe smaller than the lateral lobes, horizontal and c. 3 mm in diameter.

Diagnostic features. Flowers large, lateral sepals 20–25 mm long, spur 30–35 mm long; lip entire, narrowly oblong to lorate.

Flowering time: December.

This striking species has only been recorded from the dry north-facing slopes of the Langeberg (Fig. 4) in the vicinity of Riversdale, where it appears to grow amongst the sclerophyll bush in moister places.

CAPE.—3321 (Ladismith): Garcias Pass (–CC), Dec. 1930, *Ferguson s.n.* (BOL).

Sect. **Herschelia**

Lip sessile or stalked, usually lacerate, spur shorter than the sepals.

Type species: *H. graminifolia* (Spreng.) Dur. & Schinz.

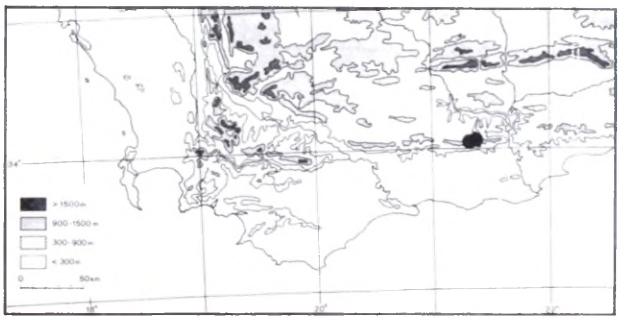

FIG. 4.—Distribution of *H. schlechterana.*

Within this section four clear groups may be recognized, mainly on the basis of petal and lip morphology, and secondarily on the shape of the spur. The exact relationships among these series is not clear, but it is likely that ser. *Spathulatae* and ser. *Herschelia* are closely related rather than to ser. *Hians* and ser. *Ecalcaratae.* The former two series both occur in the western Cape Province and have expanded apical petal lobes and non-lacerate lips, whereas the latter two sections have lacerated lips and extend into East Africa.

Ser. **Spathulatae** (*Kraenzl.*) *Linder,* stat. nov.

Disa sect. *Spathulatae* Kraenzl., Gen. Sp. Orch. 1: 793 (1900).

Type species: *H. spathulata* (L. f.) Rolfe, lectotype.

Lip spathulate, with a short or long stalk and the apical lobe obtusely trilobed to deeply trifid, petals expanded apically.

This series contains a single species complex and is restricted to the western and southern Cape Province.

4. **Herschelia spathulata** (*L. f.*) *Rolfe* in Fl. Cap. 5,3: 205 (1913). Type: Cape of Good Hope, *Thunberg* s.n. (LINN, holo.!; UPS!; W!).

Plants 120–300 mm tall, tubers 15–30 mm long; base of the stems often with a sheath of fibrous leaf remains; basal sheaths 2–3, hyaline, acute radical leaves 5–20, linear, 50–150 mm long and 2–4 mm wide, narrower towards the base, semi-erect, curved falcately; cauline leaves (2–) 3, dry, 20–30 mm long, completely sheathing, acuminate, grading to the floral bracts; inflorescence laxly 1–5-flowered, up to 100 mm long; bracts varying from half as long as the ovary to longer than the ovary, broadly ovate, acuminate to setaceous, dry; ovaries straight or slightly curved, 15–30 mm long. *Flowers* variable in colour from maroon to pale lime or green and blue; dorsal sepal erect, subspathulate, the limb horizontal, 1–3 mm long, the blade usually galeate, rarely flat, erect, 9–17–20 mm long, broadly ovate, obtuse, usually 5 mm deep; spur usually clavate, rarely cylindrical, obtuse, straight or strongly curved downwards, 1,5–3 mm long; lateral sepals patent or curved up in front of the flowers, narrowly ovate to ovate, oblique, acute the apical part conduplicate, 6–16 mm long; petals with the basal anticous lobe oblong, 3 mm long, decurrent with the limb; petal limb linear to lorate, 7–12 mm long, the basal part parallel to the anther, the apical part curved upwards behind the anther, the apex dilated, unequally bilobed, up to 4 mm wide; lip spathulate, the claw linear, 5–35 mm long and 1–2 mm wide, the blade obscurely trilobed to deeply trifid, the margins gene-

rally undulate, the central lobe usually longer than the lateral lobes, lip may be held horizontally with the blade pendent, or the whole structure may be pendent; anther more or less horizontal, 1–3 mm long, viscidia separate; rostellum equally trifid, erect, the lobes acute, 1–2 mm tall; stigma with the lateral lobes much larger than the odd lobe, horizontal, 2–3 mm wide and 1 mm tall.

Diagnostic features. Petal spathulate, claw linear, 5–35 mm long, blade obscure trilobed to deeply tripartite; leaves linear, flat, green at anthesis.

Two subspecies are recognized in this species. There are no absolute differentiating characters between the two postulated taxa, but the overlap in variation is minimal (see Fig. 5). The taxa are allopatric, with about 500 km between the two distribution areas. They may therefore be recognized as geographical subspecies.

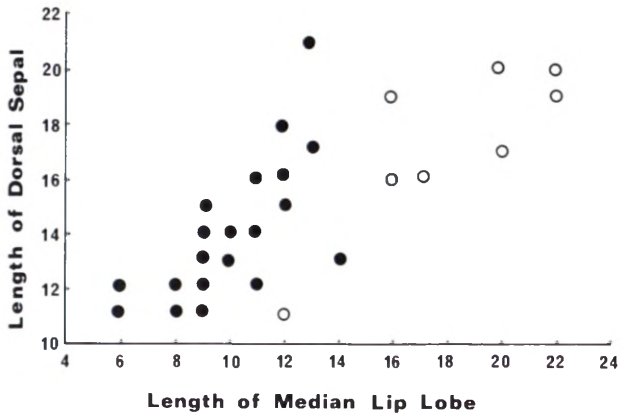

FIG. 5.—Variation in flower size (measured by the length of the dorsal sepal) and lip shape (measured by the length of the median lip lobe) in *H. spathulata*.

(a) subsp. **spathulata**

Orchis spathulata L. f., Suppl. Pl. 398 (1781). *Satyrium spathulatum* (L. f.) Thunb., Prod. 5 (1794). *Disa spathulata* (L. f.) Swartz in Vet. Acad. Handl. 21: 213 (1800); Lindl., Gen. Sp. Orch.353 (1838); Kraenzl., Orch. Gen. Sp. 1: 794 (1900); Schltr. in Bot. Jb. 31: 283 (1901), pro parte. *Herschelia spathulata* (L. f.) Rolfe in Fl. Cap. 5, 3: 205 (1913). Type: Cape of Good Hope, *Thunberg* s.n. (LINN, holo.!; UPS!; W.!).

Disa propinqua Sond. in Linnaea 19: 95 (1847). Type: Cape Province, Clanwilliam Division, Brakfontein, *Ecklon & Zeyher* s.n. (S, holo.!; K!; W!).

D. propinqua Sond. var. *trifida* Sond. in Linnaea 19; 96 (1847). Type: not seen.

D. atropurpurea Sond. in Linnaea 19: 96 (1847); Kraenzl., Orch. Gen. Sp. 1: 794 (1900). *D. spathulata* var *atropurpurea* (Sond.) Schltr. Bot. Jb. 31: 284 (1901). *Herschelia atropurpurea* (Sond.) Rolfe in Fl. Cap. 5, 3: 205 (1913). Type: Cape Province, Tulbagh District, Tulbagh Waterfall, *Ecklon & Zeyher* s.n. (S, holo.!; K!).

Icones: Curtis's bot Mag. t. 6891 (1886), as *Disa atropurpurea;* H. Bol., Icones Orch. Austro-Afr. 3: t. 53 (1913), as *D. spathulata;* 3: t. 54, as *D. spathulata* var. *atropurpurea;* Rice, Wild. Flow. Cape G. H. 163.2 (1950).

Central lobe of lip 5–14 mm long, inflorescence with 1 – 5 flowers (Fig. 6). Distributed in the western Cape Province from Caledon to Nieuwoudtville. Flowering time: September and October.

Widespread in the western Cape Province (Fig. 7) on both sandstone and shale, in a range of habitats, usually occurring in small populations.

CAPE.—3119 (Calvinia): in mountains near Twakfontein, Nieuwoudtville (–AC), *Leipoldt 601* (BOL). 3218 (Clanwilliam): in sand near Swartboschkraal (–BC), Sept. 1894, *Schlechter 5165* (BOL; P; PRE; W; Z). 3319 (Worcester): Tulbagh (–AC), Oct., *Pappe* s.n. (BOL; SAM). 3419 (Caledon): Boontjieskraal (–AA), Sept. 1977, *Linder 1458, 1459* (BOL).

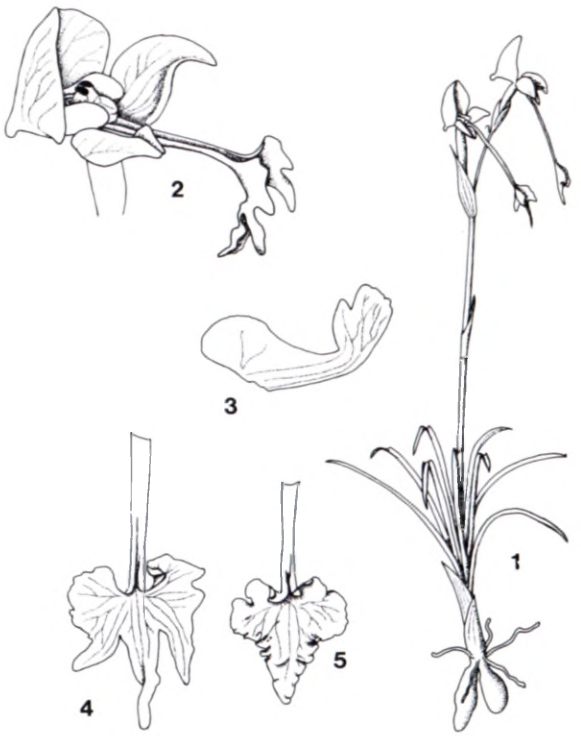

FIG. 6.—*Herschelia spathulata* subsp. *spathulata*. 1, habit, ×0,5, from *Linder* 1244. 2, flower, ×1,5, from *Linder* 1453. 3, petal, ×3, from *Linder* 1453. 4, lip, ×1,5, from *Linder* s.n. 5, lip, ×1,5, from *Linder* 1245.

The altitude range of this species is from 150 to 1 000 m and the precipitation ranges from 200 to 800 mm p.a., mostly occurring in the winter months. The species has been recorded from both gravelly and deep alluvial sands derived from Table Mountain Sandstone, as well as clayey soils derived from Malmesbury shales. Populations growing on shales occurred most frequently on the cooler south-facing slopes, whereas those located on sandstone derived soils ranged from well-drained sites to the margins of temporary vleis.

The variation patterns in this subspecies are complex, with four characters varying extensively (flower size, lip lobe shape, flower colour and the three-dimensional position of the lateral sepals). The characters are to some extent correlated and a small-flowered form (probably *Disa atropurpurea)* and a large-flowered form may be recognized. The small-flowered form has dark red flowers, the lip lobe is more or less ovate and the lateral sepals appear to close at night, whereas the large-flowered form has pale lime or green or pale red flowers, the lip lobe is deeply three-lobed, and the lateral sepals are always spreading. Both forms may be found over the whole distribution range of the subspecies. However, a survey of the available herbarium material indicated that the variation range of each character is continuous, and the characters are not perfectly correlated. No formal taxa are therefore recognized.

The subspecies was studied in the field in several localities. Only at two localities, Wolseley and Caledon, did both forms occur together. At Wolseley (near Worcester) the small-flowered form occurred on a well-drained slope, whereas the large-flowered form occurred about 3 km distant on the margin of a temporary vlei (*Linder* 1244, 1245). At Caledon both forms occurred on the same slope, and the individuals of the two forms occurred intermixed. The

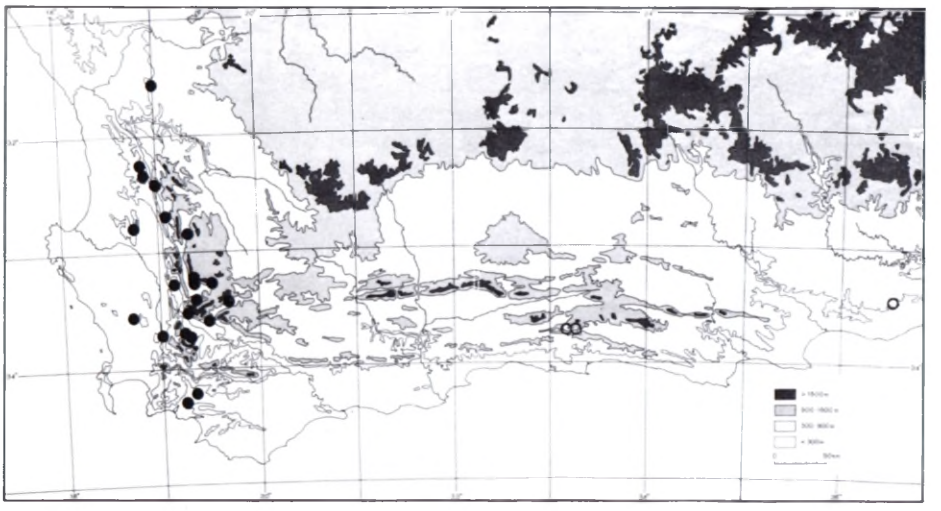

FIG. 7.—Distribution of *H. spathulata* subsp. *spathulata* (solid circles) and subsp. *tripartita* (open circles).

small-flowered form was much rarer than the large-flowered form. An analysis of this population for two characters (flower size and the lip shape) (Fig. 8) clearly shows a bimodal distribution, with a few rare intermediate forms.

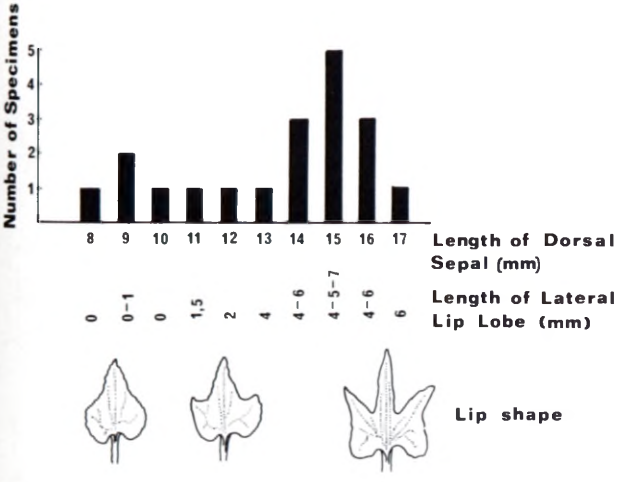

FIG. 8.—Variation in the lip shape, length of the lateral lip lobe and flower size in one population of *H. spathulata* subsp. *spathulata*.

The treatment here is provisional. A detailed study is required to elucidate the mechanism by which this complex polymorphism is maintained. Could this be a case of incipient sympatric speciation?

Sonder (1847) distinguished his *Disa propinqua* from *H. spathulata* by its generally more robust nature. I have studied the type specimen: it is not much different from the type of *H. spathulata* and is clearly included in the range of variation of the latter taxon. *Disa atropurpurea* was distinguished from its congeners by the shorter lip claw and the maroon colour of the flowers (Bolus, 1913; Rolfe, 1913). Lip claw length varies continuously in *H. spathulata* from shorter than that of the type of *D. atropurpurea* to 35 mm. Flower colour and the lip shape indicate, however, that it may well belong to the cryptic small-flowered form discussed above. It appears as if Hooker (1886) and subsequent botanists have misunderstood the complex nature of the so-called *H. atropurpurea*.

(b) subsp. **tripartita** (*Lindl.*) *Linder,* stat. et comb. nov.

Disa tripartita Lindl., Gen. Sp. Orch. 353 (1838); Kraenzl., Orch. Gen. Sp. 1: 797 (1900). Type: Eastern Cape Province, Albany, Geelhoutboom, *Drège* 3577a (K, holo.!; P!; S!).

D. spathulata (L. f.) Swartz, Schltr. in Bot. Jb. 31: 284 (1901), pro parte.

Herschelia tripartita (Lindl.) Rolfe in Fl. Cap. 5, 3: 204 (1913).

Central lobe of the lip (12–) 16–22 mm long, inflorescence with 1–2 flowers. Recorded from the Uniondale area in the Langkloof.

Flowering time: October.

Distribution: Fig. 7.

CAPE.—3323 (Willowmore): Haarlem (–CB), Oct. 1930, *Fourcade 4344* (BOL); Louterwater (–DC), Sept. 1969, *Marsh 1408* (PRE).

This subspecies is rather local in the renosterbosveld near the summit of the Langkloof, near Uniondale. The rainfall in the area is about 600 mm p.a. which is distributed over the whole year.

The type locality for this subspecies is on the Bushmans River, near Grahamstown. This is about 250 km to the east of other known distribution records. It is difficult to decide whether Drège's locality is incorrect, or whether this species is more widely distributed than the present records indicate.

Ser. **Herschelia**

Lip sessile, narrowly elliptical to elliptical, margins crenulate, petals with apices expanded into flabellate structures.

Type species: *H. graminifolia* (Spreng.) Dur. & Schinz.

Two closely related species are included in this series: *H. graminifolia* and *H. purpurascens*. The former species is widespread from the Cape Peninsula to Port Elizabeth, and the latter is restricted to the southern Cape Peninsula and the coastal areas of the Caledon Division. The habitat differences between the two taxa are summarized in Table 3. Although populations of the two species occur within a few kilometres of each other, it is clear that the species occupy quite different habitats. These differences are maintained by the prevention of gene flow between the two species by allochronic flowering (Table 4). The earlier flowering of *H. purpurascens* might be the result of this species occupying a drier habitat but, as the flowering time remains the same under cultivation, it appears to be genetically fixed.

TABLE 3.—A comparison of the habitats of *H. graminifolia* and *H. purpurascens* in the western Cape

Environmental factor	*H. graminifolia*	*H. purpurascens*
Altitude	50 – 1 350 m	0 – 100 m
Rainfall annual*	1 500 – 2 500 mm	800 – 1 200 mm
Rainfall in January*	30 – 80 mm	15 – 25 mm
Fog in summer	Frequent	Never
Snow in winter	Occasional	Never

*Measured at Simonstown and Kleinmond for *H. purpurascens*, and at Table Mountain (Maclears Beacon) and Steenbras Dam (Caledon Division) for *H. graminifolia*.

TABLE 4.—Flowering times of *H. graminifolia* and *H. purpurascens*

Month	*H. graminifolia*	*H. purpurascens*
October	26%	–
November	70%	–
December	4%	12%
January	–	24%
February	–	41%
March	–	22%
Number of collections	27	49

5. **Herschelia graminifolia** (*Spreng.*) *Dur. & Schinz,* Consp. Fl. Afr. 5: 111 (1894); Kraenzl., Orch. Gen. Sp. 1: 802 (1900).

Disa graminifolia Ker-Gawl. ex Spreng. in Linn. Syst. Veg. 3: 699 (1828); Schltr. in Bot. Jb. 31: 290 (1901). Type: Cape of Good Hope, *Masson* s.n. (BM, holo.).

Herschelia coelestis Lindl., Gen. Sp. Orch. 363 (1838); Rolfe in Fl. Cap. 5,3: 201 (1913). Type: Cape of Good Hope, *Burchell* 7801 (K, holo.!).

Icones: Ker-Gawler in Q. Jl Sci. Arts t. 1, fig. 2 (1819); H.Bol. Icones Orch. Austro-Afr. 1: t. 37 (1893); Rice, Wild Flow. Cape G. H. 167.2 (1950); Flower Pl. Afr. 30: t. 1172 (1955).

Plants 500–1 000 mm tall; the base of the stem often with a sheath of old leaf fibres; radical leaves usually 5, 200–500 mm long and up to 5 mm wide, frequently rolled acute, semi-erect; cauline leaves lax, 6–9, 20–40 mm long, acuminate, closely sheathing; inflorescence lax, 40–120 mm long and with 2–6 flowers; bracts about ⅔ as long as the ovaries, dry, broadly ovate, acuminate to setaceous; ovaries 15–25 mm long, straight or slightly curved. *Flowers* blue to violet-purple, apices of the petals green and the lip more purple than the sepals; dorsal sepal erect, galea obtuse, 15–20 mm tall and 5–10 mm deep; spur from the base of the galea, usually straight, 2–4 mm long, clavate, rounded rarely cylindrical and obtuse; lateral sepals narrowly oblong to oblong, obtuse, apiculate, patent, 13–18 mm long and 6–10 mm wide; petals with the basal anticous lobe orbicular to rarely oblong, margins usually entire, 3–4 mm in diameter, limb of the petal lorate, 11–16 mm long, geniculately upcurved through 90° about ⅔ down the length, the apex expanded into a flabellate structure with entire or dentate margins and a diameter of 4–6 mm, twisted to stand erect behind the anther; lip narrowly elliptical to elliptical, margins usually denticulate and down-curved, obtuse, patent, 11–16 mm long; anther c. 5 mm long, viscidia separate or fused; rostellum with three equal lanceolate lobes; stigma flat, unequally three-lobed. Fig. 10.

Diagnostic features. Lip entire, spur 2–4 mm long, clavate, lip flat or the margins somewhat down-curved.

Flowering time: (December–) January to March.

Widespread and local along the coastal mountains from the Cape Peninsula to Port Elizabeth on soils derived from Table Mountain Sandstone, usually in well-drained stony habitats (Fig. 9).

CAPE.—3319 (Worcester): Slanghoek Ridge Peak, 1 350 m (–CA), March 1952, *Esterhuysen* 19990 (BOL). 3318 (Cape Town): Table Mountain, 750 m (–CD), February 1884, *MacOwan & Bolus* 167 (BOL; BM; K; P; SAM; W; ZT). 3320 (Montague): Langeberg near Swellendam (–CD), January 1893, *Schlechter 2061* (BOL; Z). 3323 (Willowmore): Louterwater (–DC), January 1941, *Compton 10499* (NBG).

Although this species is widespread, there appear to be sizeable gaps in the distribution range. This could reflect the lack of botanical exploration of the Langerberg. Distinct populations may be readily recognized, although individuals are quite far apart. There appears to be rather little variation among the populations. Occasional, presumably recessive, white-flowered plants have been found.

The altitude range of the species is from 300 m to 1 500 m, and the majority of collections are from areas receiving in rainfall, an excess of 1 000 mm p.a., usually with no long dry season.

The species was first referred to in the literature by Ker-Gawler, who published a plate of it in 1819. The

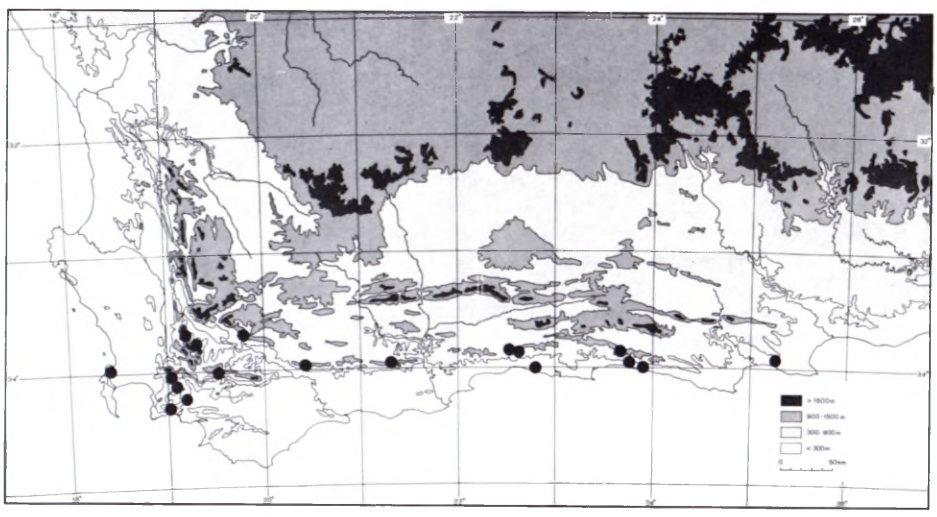

FIG. 9.—Distribution of *Herschelia graminifolia*.

plate was prepared by a 'Dutch' soldier, 'an artist of great skill as a designer of the objects of natural history', whom Francis Masson met at the Cape. Although Ker-Gawler annotated the plate as '*Disa graminifolia*', he provided neither a description nor a diagnosis. According to Article 32.1 (c) of the I.C.B.N. (1978), the name has to be regarded as a *nomen nudum*. In 1828 Sprengler lists *Disa graminifolia,* providing it with a Latin description and refers to the Masson collection. Sprengler therefore validly published the name.

Lindley (1838) refers the name *Disa graminifolia* to the synonymy of his *Herschelia coelestis*. Rolfe (1913), following the Kew Rule, upheld *Herschelia coelestis* in preference to *H. graminifolia*. *H. graminifolia,* as the oldest available name, has to be upheld as correct.

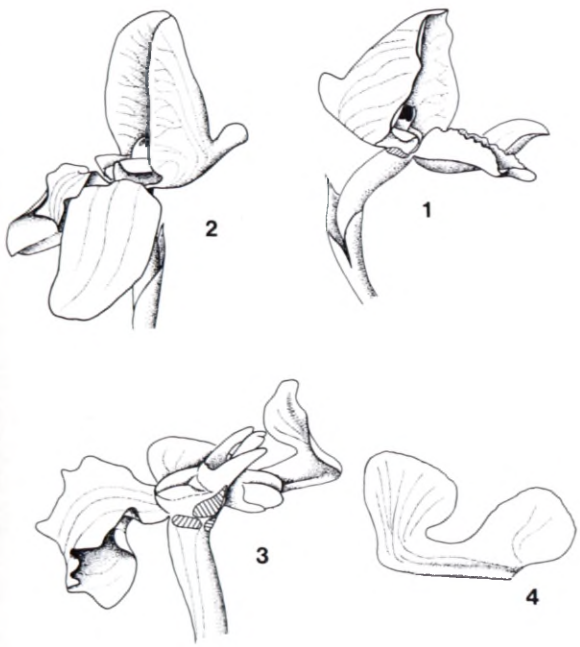

FIG. 10.—*Herschelia purpurascens* (1) and *H. graminifolia* (2–4). 1, flower of *H. purpurascens* with one lateral sepal removed, ×1,5, from *Linder* 759. 2, flower of *H. graminifolia,* ×1,5. 3, lip, column and petal of *H. graminifolia,* ×1,5. 4, petal, ×3. (2–4 from *Linder* 1763.)

6. **Herschelia purpurascens** (*H. Bol.*) *Kraenzl.*, Orch. Gen. Sp. 1: 803 (1900); Rolfe in Fl. Cap. 5,3: 200 (1913). Type: Cape Province, Cape Peninsula, Muizenberg Mountain, *Bolus* 4893 (BOL, holo.!; K!).

Disa purpurascens H. Bol. in J. Linn. Soc., Bot. 20: 482 (1884); Schltr. in Bot. Jb. 31: 291 (1901).

Icones: H. Bol., Icones Orch. Austro-Afr. 1: t. 86 (1896); Rice, Wild Flow. Cape G. H. 146.3 (1950).

Plants 250–500 mm tall; tubers c. 30 mm long and 10 mm in diameter; base of the stem frequently with a sheath of old leaf fibres; radical leaves about 10, from half as long as the stem to as long, up to 1 mm wide, rigid and erect, the midrib sclerenchymatous and prominent; cauline leaves completely sheathing, 5–7, acuminate, dry, 20–40 mm long, grading apically into the floral bracts; inflorescence lax, up to 15 mm long and with 1–2–7 flowers; bracts ½ to ⅔ as long as the ovaries broadly ovate, acuminate to setaceous, dry; ovaries 15–20 mm long, straight or slightly curved. *Flowers* blue, the lip more purplish than the sepals, the rear lobes of the petals yellow or green; dorsal sepal erect, galea subacuminate, 15–25 mm tall and 10–15 mm deep, ovate; spur from the base of the galea, horizontal or slightly curved upwards, conical obtuse, 1–4 mm long; lateral sepals oblong, acute, patent, 15–18 mm long; petals with the basal anticous lobe oblong to semicircular, 3–4 mm in diameter, the margin entire or crenulate, the limb of the petal lorate, 8–10 mm long, falcately curved upwards inside the galea, the apex expanded into a 4–5 mm wide fan with a crenulate margin; lip broadly ovate, obtuse, with a short limb, margins crisped and curved upwards, 12–18 mm long; anther horizontal, 3 mm long, with two viscidia that may be partially fused; rostellum equally 3-lobed, 2,5 mm tall; stigma sub-equally 3-lobed, horizontal, 4 mm in diameter. Fig. 10

Diagnostic features. Lip margin undulate, curved upwards; spur conical, tapering to an obtuse point, lateral sepals 15 – 18 mm long.

Flowering time: October and November.

Local near the coast at low altitudes in the southern Cape Peninsula and the Caledon Division, (Fig. 11), growing in well-drained localities.

CAPE.—3418 (Simonstown): Simonstown (–AB), November 1892, *Fair in BOL 7992* (BOL); Cape Point (–AD), November 1947, *Compton 20236* (NBG). 3419 (Caledon): Betty's Bay (–BD), November 1977, *Linder 759* (BOL).

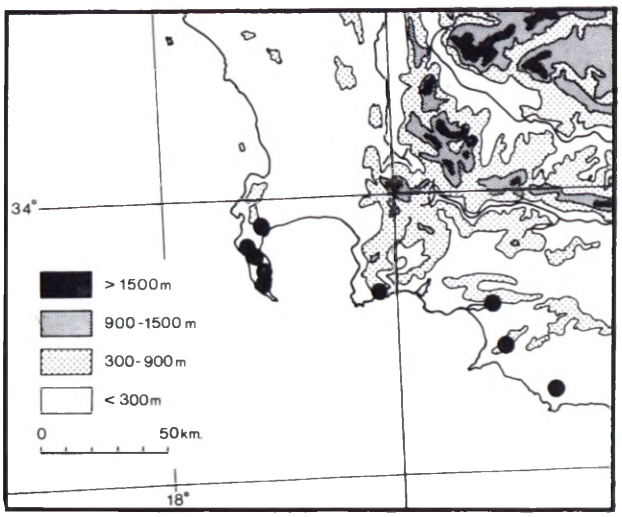

FIG. 11.—Distribution of *Herschelia purpurascens*.

This species has a rather restricted distribution along the coast line along the southern Cape Peninsula and between Cape Hangklip and Cape Agulhas. The altitude range of the species is from sea level to about 100 m. The summers tend to be dry, with only occasional rain. The rainfall in this region varies from 800 to 1 200 mm p.a. Although this species is not common, populations are not as scattered as in *H. graminifolia*. There is not much variation in the species, but occasional plants with white flowers have been recorded (possibly the recessive condition).

H. purpurascens is very close to *H. graminifolia,* from which it may be distinguished by the conical spur, the upcurved lip margins and the much earlier flowering time.

Ser. **Lacerae** *Linder,* ser. nov., labello crenato vel lacero, petalis bidentatis laceris vel acutis. dignoscenda.

Type species: *H. lugens* (H. Bol.) Kraenzl.

Lip sessile or spathulate, the apical blade generally lacerate, rarely entire, petals bidentate, lacerate or acute.

This series contains nine species, all closely related. If a species such as *H. forcipata* or *H. hians* is selected as the starting point, several clear lines of development of the petal and lip structures may be detected. The lines all lead from an entire to a bearded lip, and from a simple acute petal to a lacerate or bifid petal apex. These postulated relationships are graphically shown in Fig. 12.

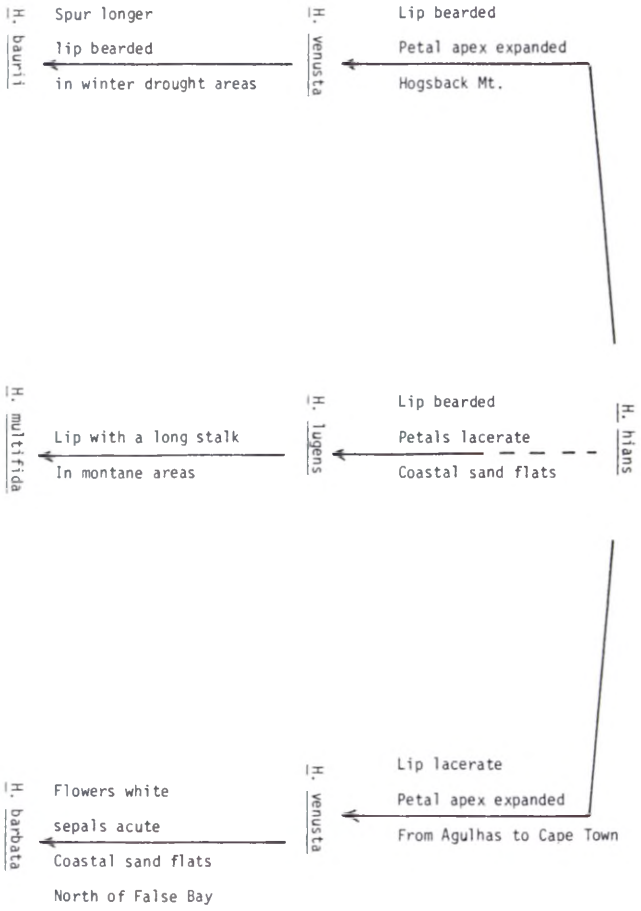

FIG. 12.—Relationships and putative evolution of *Herschelia* ser. *Lacerae*.

The relationships of *H. hians, H. venusta* and *H. forcipata* are not clear, and Hall (1973b) included the former two in the same species. *H. hians* is well established in the southern Cape Province, and the majority of the collections do not show much variation; however, in some populations the lip margins may vary from almost entire to deeply lacerate, as opposed to the normal crenulate condition. *H. forcipata* is clearly very closely related to *H. hians,* but differs in the shallowly bidentate spur and the long floral bracts. It is quite possible that further fieldwork may show that these forms also lie within the range of variation of *H. hians*. The position of *H. venusta* is somewhat clearer. The lip is irregularly lacerated, and the petal somewhat expanded towards the apex (Fig. 14). The distribution of this species is puzzling, with records from the Caledon and Cape Peninsula Divisions, and the Hogsback Mountains near King William's Town. Either the species has had a polytopic origin, or it is merely an extreme form of *H. hians*.

From this postulated basal group three lines of development may be suggested:

(a) to *H. barbata*. This species is quite closely related to *H. venusta,* especially to the forms of that species occurring on the Cape Peninsula. Compared to *H. venusta, H. barbata* shows many of the characteristics of a more recently derived species: an almost unique flower colour (white) in the genus, an inflorescence with few large flowers (cf. Linder, 1981), and a small, probably neo-endemic distribution range. Until a few decades ago, the two species overlapped on the Cape Peninsula, but with the extinction of the Cape Peninsula populations of *H. barbata,* the interaction between the two taxa in the overlap zone can no longer be investigated.

(b) to *H. multifida*. *H. lugens* and *H. multifida* are closely related, sharing several peculiar characters: lacerate petals, green bearded lips, a shortish conical spur. Morphologically they can only be separated by the length of the lip stalk. Within *H. multifida* there is extensive variation in the length of the lip stalk, but the great majority of the populations possess a lip stalk, longer than 20 mm, whereas only a few populations on the fringes of the distribution range of the species have shorter lip stalks. One collection from the Cape flats, *Schelpe* 6313, possesses some flowers typical of *H. lugens* (Fig. 14); others have a lip stalk up to 10 mm long, approaching the type collection of *H. multifida*. With the exception of the populations around Grahamstown, *H. lugens* occurs on coastal sandy flats, and *H. multifida* occurs in the montane areas. *H. lugens* occasionally grows mixed with *H. hians* (*Hall* 664), but the relationship to this species is not clear.

(c) to *H. baurii*. *H. baurii* is linked to *H. hians* via *H. venusta,* and again the differences between the species are not very clearcut. Morphologically the South African populations of *H. baurii* may be separated from *H. venusta* by the longer spur and the more deeply dissected lip, whereas the northern populations of *H. baurii* are distinguished by the equally bidentate petals. Ecologically, *H. baurii* is the tropical extension of a Cape genus, and it occurs in areas of winter drought. *H. baurii* shows extensive geographical variation, but in only two places does this result in speciation: in the Chimanimani Mountains (*H. chimanimaniensis*) and the Nyika Plateau (*H. praecox*). Detailed analysis of populations may result in the recognition of geographical subspecies within the species, but at present the data for this are inadequate.

7. **Herschelia barbata** (*L. f.*) *H. Bol.* in J. Linn. Soc., Bot. 19: 236 (1882); Kraenzl. in Orch. Gen. Sp. 1: 804 (1900); Rolfe in Fl. Cap. 5,3: 201 (1913). Type: Cape of Good Hope, *Sparrman* s.n. (LINN, holo.!; S!).

Orchis barbata L. f., Suppl. Pl. 399 (1781). *Satyrium barbatum* (L. f.) Thunb., Prod. 5 (1794). *Disa barbata* (L. f.) Swartz in Vet. Acad. Handl. 21: 212 (1800); Lindl., Gen. Sp. Orch. 354 (1838); Schltr. in Bot. Jb. 31: 286 (1901).

Icones: H. Bol. Icones Orch, Austro-Afr. 3: t. 51 (1913), as *Disa barbata;* Mason, Western Cape Sandveld flowers, Pl. 34.2 (1972).

Plants 250–500 mm tall, the base of the stem often with a sheath of fibrous leaf remains; tubers oval to cylindrical, 20–40 mm long; radical leaves often reaching the base of the inflorescence but never overtopping the flowers, c. 1 mm wide, the base expanded to clasp the stem, conduplicate, 4–7, sclerenchymatous; cauline leaves completely sheathing, lanceolate,

acuminate, 20–40 mm long, dry, grading into the floral bracts; inflorescence lax, about 60 mm long and with 2–6 flowers; bracts dry, half as long to as long as the ovary, lanceolate, acuminate; ovaries 15–20 mm long, straight or slightly curved. *Flowers* white to very pale blue, veins and lip more or less blue, spur often green, no scent detected; dorsal sepal angled forwards, galea acuminate, 15–25 mm long, 13–18 mm wide and 8–12 mm deep, ovate; spur conical, not clearly distinct from the galea, usually obtuse to shallowly bifid, rarely acute, straight or rarely upcurved, 1–5 mm long; lateral sepals patent, narrowly oblong, acute, suboblique, 15–25 mm long; petals with the basal anticous lobe oblong, c. 2 mm in diameter, flanking the stigma, usually decurrent with the rest of the petal, the limb linear, straight or subfalcate, 5–6 mm long, apex obtriangular, incised to bifid, 3–4 mm long and c. 3 mm wide; lip horizontal at the base and soon decurved, ovate, deeply lacerate, c. 15 mm long, the entire central part lanceolate, c. 3 mm wide; anther 3 mm long with 2 distinct viscidia, often only partially separated, elliptical to ovate, taller than wide; rostellum almost equally trilobed, lobes awn-shaped, 1,5 mm long, erect; stigma unequally tripulvinate, the odd lobe much smaller than the lateral lobes, horizontal, fused to the base of the rostellum. Fig. 14.

Diagnostic features. Lip deeply lacerated or bearded; flowers white to pale blue with pale blue veins; inflorescence with 2–6 flowers; dorsal sepal acuminate, 15–25 mm long.

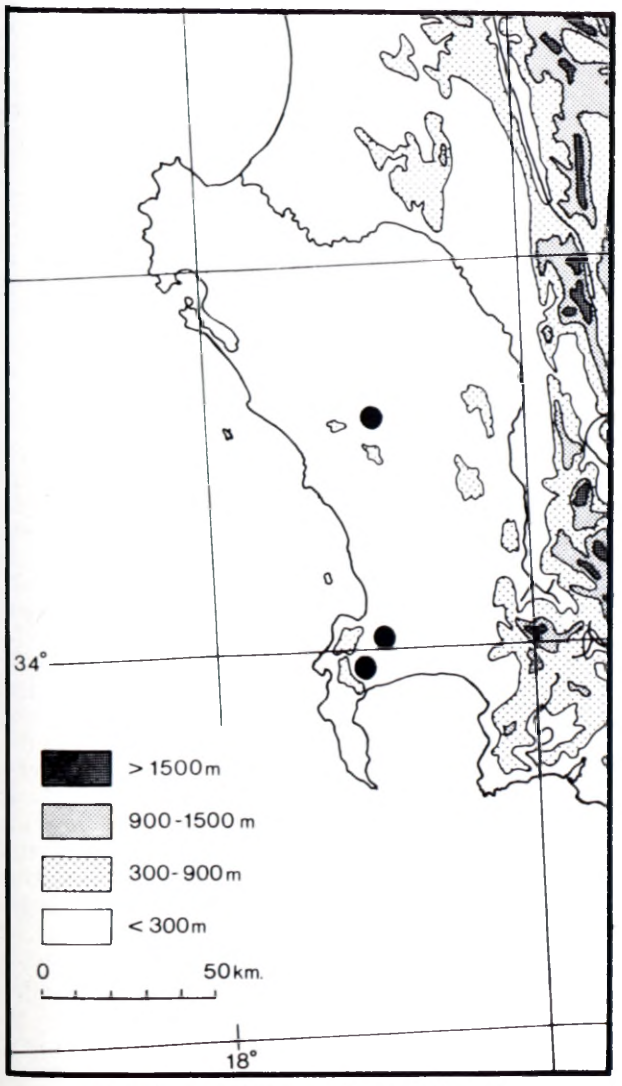

FIG. 13.—Distribution of *Herschelia barbata*.

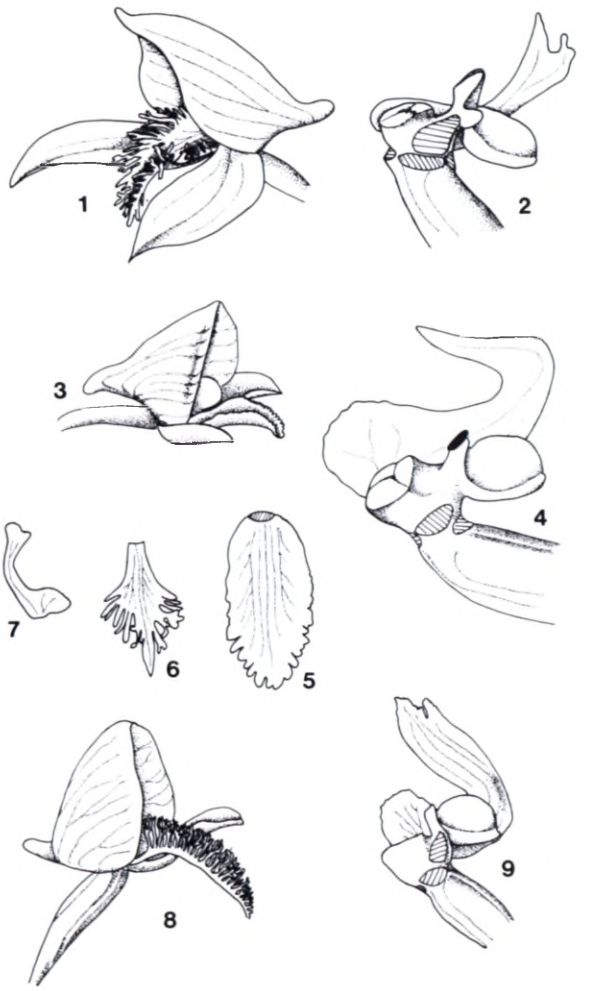

FIG. 14.—*Herschelia barbata* (from *Linder* 1806): 1, flower, ×1,5; 2, column and petal, ×5. *Herschelia hians* (from *Linder* 1731): 3, flower, ×1,5; 4, column and petal, ×6; 5, lip, ×3. *Herschelia venusta* (from *Bolus* 17494): 6, lip, ×3; 7, petal, ×3. *Herschelia lugens:* 8, flower with one lateral sepal removed, ×1,5, from *Schelpe* 6313; 9, column and petal, ×3, from *Jacot-Guillarmod* s.n.

Flowering time: October and November.

Very local and rare in damp sandy localities on the Cape Flats and sandy coastal flats to the north of the Cape Peninsula, mostly extinct (Fig. 13).

CAPE.—3318 (Cape Town): Mamre Road, 150 mm (–BC), November 1978, *Linder 1806* (BOL); sand dunes on the Cape Peninsula, 30 m, (–CD), October 1883, *MacOwan & Bolus* 166 (BM; BOL; K; P; W; ZT).

This species is at present known from a single locality near Darling. Formerly it appears to have been relatively common on the Cape Flats, where it was frequently collected: the populations in these localities now all appear to be extinct. It occurs in damp to wet areas on Recent Sand, near sea level. The rainfall in these areas occurs almost wholly in the winter months, and is approximately 400–600 mm p.a.

This species is closely related to *H. venusta,* from which it may be distinguished by the more acuminate sepals and the white flowers. Formerly the two taxa overlapped on the Cape Peninsula, and both were recorded from the Kenilworth Race Course. Due to human activities during the last decades, the taxa are now allopatric.

8. **Herschelia venusta** (*H. Bol.*) *Kraenzl.*, Orch. Gen. Sp. 1: 805 (1900); Rolfe in Fl. Cap. 5,3: 202 (1913), excl. syn. Type: Cape Province, Cape Flats, *Bolus* 4556 (BOL, lecto.!; K!; PRE!).

Disa venusta H. Bol. in J. Linn. Soc., Bot. 20: 482 (1884).

D. lacera Swartz, Schltr. in Bot. Jb. 31: 287 (1901), pro parte.

Icones: H. Bol., Icones Orch. Austro-Afr. 3: t. 52 (1913), as *D. lacera;* Flower. Pl. Afr. 6: t. 234 (1926), as *D. lacera.*

Plants 300–600 mm tall; tubers up to 40 mm long; base of the stems often with a sheath of old leaf fibres; radical leaves 6–12, reaching to the base of the inflorescence or shorter, less than 2 mm wide, sclerophyllous with the veins prominent, rigid-erect; cauline leaves lax, acuminate, 15–40 mm long, brown; inflorescence lax with 2–5–12 flowers; bracts dry, as long as the ovary or half as long as the ovary, ovate, acuminate; ovaries 15–20 mm long, straight or curved. *Flowers* blue; dorsal sepal erect, acuminate, galea 10–18 mm tall and 4–8 mm deep; spur horizontal from the base of the galea, conical, acute, 1,5–3 mm long; lateral sepals patent, oblong to narrowly oblong, obtuse to acute, 12–16 mm long; petals with small basal anticous lobes, oblong, 1,5 mm long, the limb linear, falcate, 6 mm long, apically expanded to form a fan up to 3 mm wide or unequally and often obliquely bilobed; lip more or less ovate in outline, variably lacerate, shorter than the lateral sepals, curved downwards, 7–12 mm long; anther horizontal, 2 mm long, possibly with the two viscidia fused; rostellum with 3 equal narrowly lanceolate lobes, 1 mm tall; stigma unequally 3-lobed, 2 mm wide and 1 mm tall, horizontal. Fig. 14.

Diagnostic features. Flowers with the lateral sepals 12 – 16 mm long; spur 1,5 – 3 mm long; lip variably lacerate; petals with the basal anticous lobe less than 2 mm long, the limb linear, falcate with an expanded apex or strongly unequally bifid.

Flowering time: October—January.

Local along the coast of the Cape Peninsula and the Caledon Divisions, growing probably in sandy or damp localities, rare in the Hogsback Mountains near King William's Town (Fig. 15).

CAPE.—318 (Cape Town): Kenilworth, 30 m (–CD), *Bolus* s.n. (BOL). 3419 (Caledon): Hermanus Flower Show exhibit (–AD), *Specimen in BOL 17494* (BOL); Vogelgat (–AD), *Schlechter 9544* (BOL; BR; PRE). 3227 (Stutterheim): Hogsback Mountain (–CA), *Rattray in BOL 15770* (BOL).

I have not seen this species in the wild. It occurs from the Cape Peninsula to Hermanus on the Caledon Coast, and near King William's Town. Collector's notes indicate damp habitats, generally under sandy conditions. The taxon is possibly extinct on the Cape Peninsula, where it has only been recorded from the Kenilworth Race Course and from Steenberg. However, it appears to be locally common in the Betty's Bay and Hermanus areas, only flowering after fire.

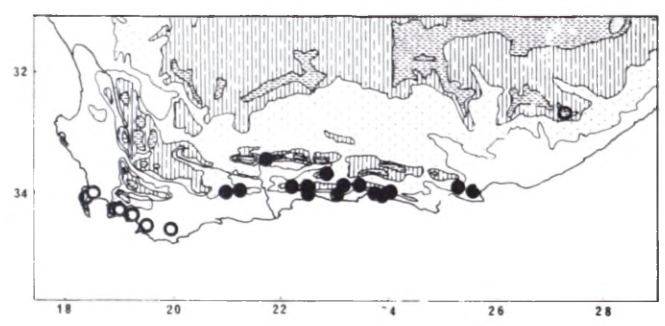

FIG. 15.—Distribution of *Herschelia venusta* (open circles) and *H. hians* (closed circles).

There are two collections from the Hogsback Mountains near King William's Town which have to be referred to this species. However, there are numerous slight differences, difficult to quantify, which raise the possibility that the Hogsback population may have been derived independently from *H. hians.*

This species has previously been included in *H. hians,* as the lip shape was used as the sole differentiating character. Although the lip shape in *H. venusta* is somewhat different from that in *H. hians,* the extensive variation that may be found in a single population in both species is convincing evidence that this character may not be sufficiently reliable for specific delimitation. *H. venusta* may also be differentiated from *H. hians* by the shorter spur, the much more slender petal with a more slender limb, a smaller basal anticous lobe and the enlarged bifid apex, and by the shallower galea. On this evidence, it is here regarded as distinct.

Bolus (1884) cited two syntypes. *Bolus* 4566 occurs in three herbaria, and the material is in better condition, than *Harvey* 140. The former was therefore selected as lectotype.

9. **Herschelia lugens** (*H. Bol.*) *Kraenzl.*, Orch. Gen. Sp. 1; 806 (1900); Rolfe in Fl. Cap. 5,3: 203 (1913). Types: Cape Province, near Cape Town, *Bolus* 3810 (BOL, lecto.!; K!); near Kuils River, *Pappe* 377 (BOL!; SAM!), *Pappe* 39 (BOL!; K!; SAM!), *Ecklon* 1566 (G!; S!; SAM!; W!).

Icones: H. Bol., Icones Orch. Austro-Afr. 2: t. 76 (1911); Curtis's bot. Mag. t. 8415 (1912); Rice, Wild Flow. Cape G. H. 148.2 (1950).

Plants 450–1000 mm tall; tubers 2–3, c. 50 mm long and 20 mm wide: base of the stem often with a sheath of old leaf fibres; radical leaves 8–15, from ½ to ⅔ as long as the shoot, never overtopping the lowest flower in the spike, c. 2 mm wide, rigid erect, the veins sclerified and prominent; cauline leaves lax, acuminate, 60–20 mm long with the longest at the base of the stem, dry, grading into the floral bracts; inflorescence lax, 70–150–400 mm long and with 5–10–25 flowers; bracts about half as long as the ovaries broadly ovate, acuminate to setaceous, dry; ovaries slender, slightly curved, 15–25 mm long. *Flowers* with a cream-green galea, mauve lateral sepals, a green to grey-green lip and white petals, but with some variation in the colour rarely almost black; dorsal sepal erect, galea obtuse, 12–16 mm tall and about 10 mm deep, narrowly ovate; spur from the base of the galea, generally slender, cylindrical, straight or curved upwards, 1–5 mm long, sometimes conical; lateral sepals patent, narrowly oblong, obtuse or acute, 8–13 mm long, subconduplicate in the apical half; petals with the basal anticous lobe oblong, c. 4 mm long, parallel to the stigma; limb linear, 10–15 mm long, with a geniculate bend through c. 90° near the middle, the distal half of the petal varying from obliquely obtriangulate to lorate, acute or deeply lacerate; lip ovate, c. 13–19 mm long, deeply dissected and beard-like, horizontal at the base but soon decurved, longer than the lateral sepals; anther horizontal or semi-pendent, 3 mm long, viscidia separate; rostellum equally 3-lobed, c. 1,5 mm tall; stigma unequally 3-lobed with the odd lobe smaller than the lateral lobes, horizontal, 3 mm in diameter. Fig. 14.

Diagnostic features. Flowers medium-sized, lateral sepals 8–13 mm long; lip bearded, longer than the lateral sepals, greenish or almost black.

Flowering time: October to November (–March).

This species occurs locally along the coastal flats between the Cape Peninsula and Port Elizabeth, usually in sandy well-drained conditions, and around Grahamstown in macchia on sandstone derived soils (Fig. 16).

(a) var. **lugens**

Disa lugens H. Bol. in J. Linn. Soc. 20: 483 (1884); Schltr. in Bot. Jb. 31: 288 (1901).

Flowers cream-green, lip usually much longer than the lateral sepals, widespread from the Cape Peninsula to Grahamstown.

CAPE.—3318 (Cape Town): sand dunes near Cape Town, 30 m (–CD), Nov. 1886, *MacOwan & Bolus 494* (BOL; P; Z; ZT). 3421 (Riversdale): Yzervarkfontein (–BC), May 1913, *Muir 908* (BOL; PRE). 3325 (Port Elizabeth): marshy flats near Van Staadens Railway Station, 300 m (–CC), Oct. 1958, *Hall 664* (BOL). 3326 (Grahamstown): mountains near Grahamstown (–BC), *MacOwan 700* (GRA; SAM).

This variety has a wide distribution, occurring rather locally on the coastal flats. The only inland locality is in macchia on the hills surrounding Grahamstown. In most localities and all localities south-west of Knysna, it occurs on deep sand, and usually grows inside restioid tussocks. A population studied near Grahamstown occurred on soils derived from quartzite. The majority of the populations occur in well-drained conditions, under a rainfall regime that varies from 500 to 1 000 mm p.a., in some areas evenly distributed over the whole year, and in others with a period of summer drought.

The association between plants of this species and restioid tussocks might be a result of predation, as plants under cultivation do not require restioid tussocks for normal growth.

This variety is becoming rare in the western Cape, owing to the spread of urban development in the coastal areas, and the spread of alien vegetation into the remaining habitats. It may already be extinct on the Cape Flats.

It was for some time confused with *Herschelia barbata,* because of the superficial similarity of the two taxa, especially when the plants are dried. Bolus (1884) cited several syntypes in his protologue, indicating that the material was known for some time without being recognized.

(b) var. **nigrescens** *Linder,* var. nov., a var. *lugenti* floribus nigrescentibus differt.

Flowers purplish black, recorded only from the coast at Cape St Francis, near Humansdorp.

TYPE.—Cape, 3424 (Humansdorp): near Oyster Bay in the vicinity of White Point (–BA), *Muller s.n.* (NBG, holo.!).

This almost black variety of *H. lugens* was only discovered in 1979 in the Humansdorp area, and as yet not much information is available about it. It appears to grow in the vicinity of the common *H. lugens var. lugens,* but may be distinguished by the almost black flowers, which also appear to be somewhat larger than is common for the typical variety. It is desirable to recognize this form formally, to prevent any confusion should the taxon be introduced into cultivation.

Information on the genetic status of the variety would doubtlessly give greater certainty about the rank of this taxon.

The two varieties grow sympatrically. Leaves and underground parts of the new variety were not seen.

10. **Herschelia multifida** (*Lindl.*) *Rolfe* in Fl. Cap. 5, 3: 206 (1913). Type: Cape Province, Clanwilliam District, Blouberg, *Drège* 3577b (K, holo.).

Disa multifida Lindl., Gen. Sp. Orch. 353 (1838); Schltr. in Bot. Jb. 31: 285 (1901).

D. charpentieriana Reichb. f. in Linnaea 20: 668 (1847); Schltr. in Bot. Jb. 31: 285 (1901). *Herschelia charpentieriana* (Reichb. f.) Kraenzl., Orch. Gen. Sp. 1: 807 (1900); Rolfe in Fl. Cap. 5, 3: 206 (1913); Hall in Flower. Pl. Afr. 42: t. 1673 (1973). Type: Cape of Good Hope, *Gueinzius* s.n. (W, holo.!).

D. macroglottis Sond. ex Drège in Linnaea 20: 219 (1847), nom. nud.

Icones: H. Bol., Icones Orch. Austro-Afr. 2: t. 77 (1911), as *Disa charpentieriana;* Rice, Wild Flow. Cape G. H. 1771 (1950), as *Herschelia charpentieriana;* Flower. Pl. Afr. 42: t. 1673 (1973), as *H. charpentieriana.*

Plants 400–600 mm tall; tubers up to 40 mm long; base of the stem often with a sheath of old leaf fibres; radical leaves 10–20, usually about half as long as the stem and rarely reaching to the base of the inflorescence, c. 1 mm wide, rigid with sclerenchymatous veins; cauline leaves completely sheathing, 20–50 mm long, lanceolate, acuminate, lax, grading into the floral bracts; inflorescence lax, 40–100 mm long and with 3–8 flowers; bracts

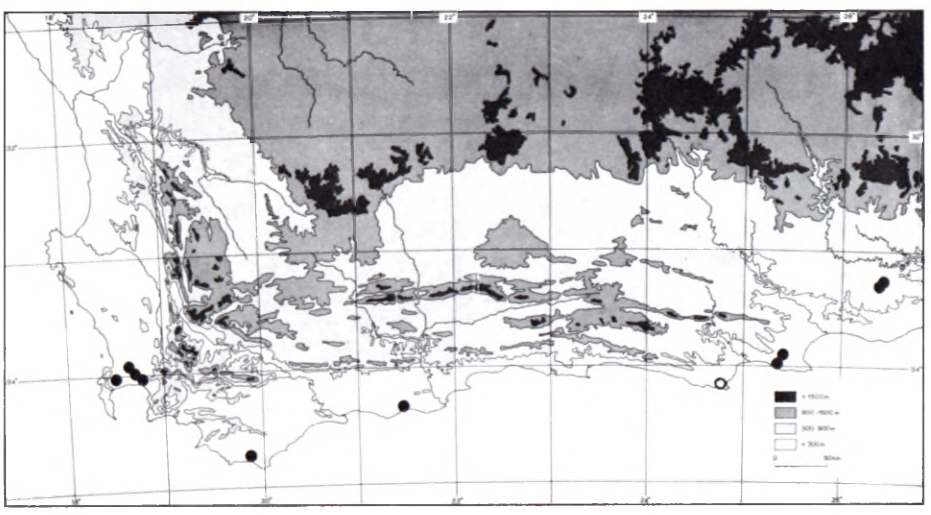

FIG. 16.—Distribution of *Herschelia lugens* var. *lugens* (closed circles) and var. *nigrescens* (open circle).

usually ¾ as long as the ovaries, broadly ovate, very acuminate to setaceous, dry; ovaries 15–20 mm long; straight or slightly curved. *Flowers* blue; with a green lip, often with greenish veins and a brownish spur; dorsal sepal erect, galea ovate, acuminate, 10–20 mm tall and c. 6 mm deep; spur conical, subacute, rarely cylindrical, obtuse or almost absent, generally curved downwards, 1–4–6 mm long; lateral sepals patent, lanceolate to narrowly ovate, acute, 10–15 mm long, the apical halves deeply concave; petals with the basal anticous lobe oblong, 3–4 mm long, the margins entire or crenulate, rarely decurrent with the limb, the limb falcate or rarely geniculate, linear, 7–10 mm long, the apex acute or narrowly obtriangular, occasionally lacerate; lip with a linear (10–) 30–65–100 mm long limb, the blade narrowly ovate, deeply lacerate; anther 3–4 mm long, viscidia narrowly ovate, c. 1 mm long; rostellum equally 3-lobed, lobes lanceolate, 1 mm long; stigma with the lateral lobes better developed than the odd lobe, on a 1 mm tall pedicel, 3,5 mm in diameter. Fig. 17.

Diagnostic features. Lip dissected, with a claw at least twice as long as the dissected blade and usually much longer.

Flowering time: November and December.

Herschelia multifida is a very distinct species that may always be recognized by its peculiar lip with a long claw. It is rather widespread in the mountains of the Cape Floral Region, from Prince Albert in the south-east to the Vanrynsdorp Bokkeveld in the north-west (Fig. 18).

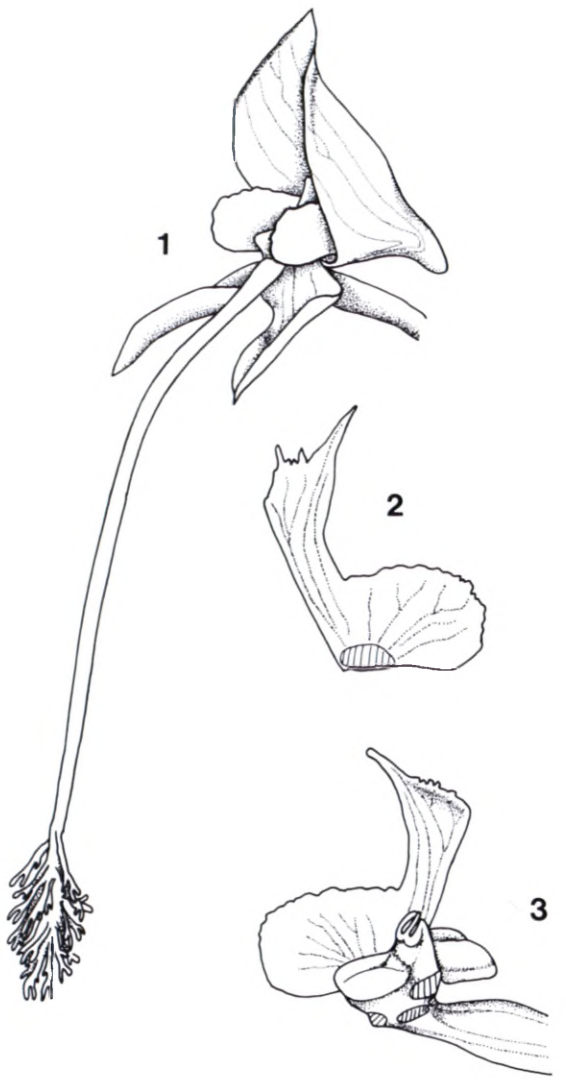

FIG. 17.—*Herschelia multifida*, from *Linder* 1642. 1, flower, × 1,5. 2, petal, × 3. 3, column, × 3.

CAPE.—3219 (Wuppertal): Cedarberg, Nov. 1913, *Pattison in BOL 14455* (BOL). 3319 (Worcester): Agterwitzenberg Vlakte (–AA), Nov. 1967, *Powrie 168* (BOL); Darling Bridge (–CA), Nov. 1940, *Esterhuysen 3802* (BOL). 3419 (Caledon): base of mountains at Highlands Forest, Elgin (–AA), Nov. 1965, *Oliver in STE 29974* (PRE; STE). 3322 (Oudtshoorn): Swartberg Pass, slopes of Krevasberg, 1 200 m (–AC), Dec. 1942, *Stokoe 8679* (BOL).

This species occurs on slightly damp mountain sides: 'swampy slope' (Esterhuysen 20907) on the Roodeberg near Ceres; well-drained soil near a stream on the Piketberg (*Linder* 1642), a slight seepage on a mountain side in the Skurfteberge near Ceres (*Linder* 1656) and a dry, well-drained stony mountain side, in the mist belt, on the Swartberg at Prince Albert (*Linder* 1743). Many of the populations receive snow almost every winter. Rainfall is also concentrated in the winter months, and is about 1 000 mm p.a. The altitude range of the species is from 300 to 1 500 m.

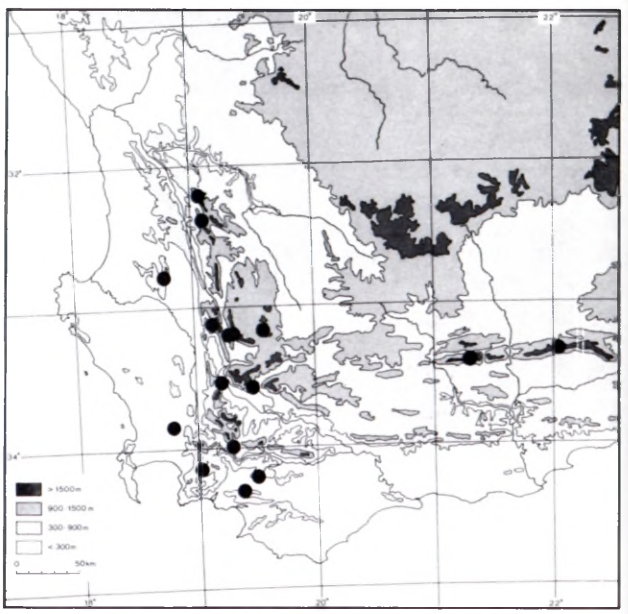

FIG. 18.—Distribution of *Herschelia multifida*.

There is considerable variation in the lip length in this species: this is the basis on which *H. charpentieriana* and *H. multifida* had been separated (Schlechter, 1901; Rolfe, 1913). An analysis of the distribution of the short-spurred forms indicated that these collections all exist at the margin of the distribution area of the species as defined here, i.e. on the Swartberg above Prince Albert and in the Cedarberg and northwards to the Vanrhynsdorp Bokkeveld. It is suggested that the short-spurred form is a variation that occurs in the marginal areas of the species and cannot be formally separated.

Although the type collection of *H. multifida* should be at Kew, I have not seen it. There is a photograph of the type at the Bolus Herbarium and from this the nature of Lindley's *Disa multifida* is clear. There is some uncertainty about the type locality, which Drège indicates as 'Blaauwberg'. It appears to be between Boskloof and Heuningvlei, near Clanwilliam in the northern Cedarberg.

Disa macroglottis Sond. ex Drège has to be treated as a *nomen nudum*, as the name, listed with a reference to an *Ecklon & Zeyher* collection, was published without a description.

11. **Herschelia hians** (*L. f.*) *Hall* in Flower. Pl. Afr. 42: t. 1674 (1973). Type: Cape of Good Hope, *Thunberg* s.n. (LINN, holo.!; UPS!).

Satyrium hians L. f., Suppl. Pl. 401 (1781). *Limodorum hians* (L. f.) Thunb., Prod. 3 (1793). *Disa hians* (L. f.) Spreng., Linn. Syst. Veg. 3: 698 (1826). *Eulophia hians* (L. f.) Spreng., Linn. Syst. Veg. 3: 720 (1826); Rolfe in Fl. Cap. 5,3: 32 (1912).

Disa excelsa sensu Lindl., Gen. Sp. Orch. 356 (1838), non (Thunb.) Swartz; H. Bol. in J. Linn. Soc., Bot. 25: 203 (1889); Schltr. in Bot. Jb. 31: 292 (1901). *Herschelia excelsa* sensu Rolfe, in Fl. Cap. 5,3: 200 (1913), non (Thunb.) Rolfe.

Disa lacera Swartz in Vet. Acad. Handl. 31: 212 (1800); Lindl., Gen. Sp. Orch.: 354 (1838); H. Bolus in J. Linn. Soc., Bot 25: 202 (1889); Kraenzl., Orch. Gen. Sp. 1: 797 (1900); Schltr. in Bot. Jb. 31: 287 (1901). *Herschelia lacera* (Swartz) Fourc. in Trans. R. Soc. S. Afr. 21: 81 (1932). Type: Cape of Good Hope, *Sparrman* s.n. (W, holo.!).

Disa outeniquensis Schltr. in Ann. Transv. Mus. 10: 246 (1924). Type: Cape Province, Mossel Bay District, Robinson Pass, *Bolus* 12327 (BOL, lecto.!).

D. lacera Swartz var. *multifida* N. E. Br. in Gdnrs' Chron. 1888 2: 664 (1888). Iconotype: Gdnrs' Chron. 1888, 2, fig. 93 (1888).

Icones: Curtis's bot. Mag. 115: t. 7066 (1889); Flower. Pl. Afr. 42: t. 1674 (1973).

Plants 400–600 mm tall; tubers up to 20 mm long; base of the stem often with a sheath of old leaf fibres; radical leaves 8–13, often hysteranthous, reaching up to the base of the inflorescence or shorter, less than 2 mm wide, sclerophyllous with prominent veins, semi-rigid erect; cauline leaves completely sheathing, lax, acuminate, brown, 20–40 mm long; inflorescence lax, up to 200 mm long and with 3–16 flowers; bracts from half as long to as long as the ovaries, ovate to broadly ovate, acuminate to setaceous, dry; ovaries 15–20 mm long, slender, usually curved. *Flowers* varying in colour from very pale blue to purplish blue, the lip frequently darker coloured than the sepals; dorsal sepal erect, obtuse to more commonly acute, galea 10–15 mm long and 8–10 mm deep, ovate to broadly ovate; spur horizontally from the base of the galea, at length decurved, conical, tapering to a subacute apex, 4–6 mm long; lateral sepals patent, oblong-narrowly ovate to rarely narrowly oblong, usually rounded, rarely acute, the apical part subconduplicate, 8–12 mm long; petals with the basal anticous lobe broadly oblong, rounded or truncate, the margins entire or shallowly serrulate, subdecurrent with the limb, 3–4 mm long, the limb lorate, 7–10 mm long, the apex acute or rarely with the small tooth to the rear, curved falcately or geniculately upwards behind the anther; lip patent with the margins curved upwards, narrowly oblong, oblong or broadly elliptical, rarely broadly auriculate at the base, the margins rarely entire, the distal margin usually more or less crenulate to rarely lacerate, 7–12 long; anther horizontal, 2–3 mm long, viscidia separate; rostellum with 3 equal narrowly lanceolate lobes, 1 mm tall; stigma unequally 3 lobed with the odd lobe smaller than the lateral lobes, horizontal, 2–2,5 mm in diameter and on a 1 mm tall pedicel. Fig. 14.

Diagnostic features. Flowers with the lateral sepals 8–12 mm long; lip narrowly oblong to broadly elliptical, the margins entire or more commonly with the distal margin crenulate; petals with the limb lorate, the apex acute; spur 4–6 mm long.

Flowering time: December to January (–February).

Widespread and fairly common in the southern Cape Province on the coastal flats and the first range of mountains, occurring mostly on well-drained and often stony sandstone mountain slopes and flats (Fig. 15).

Cape.—3419 (Caledon): Hermanus (–AC), Jan. 1920, *Burtt Davy 18483* (BOL). 3321 (Ladismith): Garcias Pass (–CC), Dec. 1977, *Linder 1714* (BOL). 3322 (Oudtshoorn): mountains near George (–CD), Jan. 1897, *Bolus 13514* (BOL). 3422 (Mosselbay): near Sedgefield, near Knysna, 30 m (–BB), Oct. 1963, *Chater* s.n. (BOL; PRE; STE). 3323 (Willowmore): Outeniqua mountains near Joubertina (–DD), Jan. 1947, *Esterhuysen 13599* (BOL; K; PRE). 3325 (Port Elizabeth): Port Elizabeth (–DC), Feb. 1889, *Galpin 391* (PRE).

This species forms open scattered populations throughout the southern Cape Province, generally on well-drained and often stony soils. The rainfall in the area is almost evenly distributed over the whole year, and the total rainfall ranges from 600 to over 1 000 mm p.a. The altitude range of the species if from 80 m to over 1 000 m.

Extensive variation in flower colour and lip laceration occurs. The majority of populations investigated showed extraordinary colour variation, from pale sky-blue to deep purple-blue flowers. Colour variation commonly occurs within populations, but lip variation tends to be rather between populations. In the Knysna area the lip is occasionally entire. Despite extensive searching, I have failed to locate any such populations, but occasional herbarium specimens with entire lips are known from the Knysna area. Over the rest of the range the distal margin of the lip tends to be shallowly crenulate. In the Langeberg near Riversdale the lip frequently shows two broad auricles at the base, and the apex is variably shallowly lancerate (type of *D. lacera* Swartz agrees with this lip shape) (*Linder* 1714). Some collections from near Port Elizabeth also show lips that are variably lacerate (e.g. *Hall* 1160).

Hall (1973b) partially resolved the nomenclatural confusion surrounding the correct name for this taxon. *Satyrium hians* L. f. [= *Limodorum hians* (L. f.) Thunb.] was transferred to *Eulophia* by Sprengel and was mistaken for *Eulophia clavicornis* by subsequent botanists (Lindley, 1838; Bolus, 1889; Rolfe, 1912). Sprengel cited Thunberg's *Limodorum hians* as basionym. However, Sprengel had also transferred the epithet to *Disa*, citing *Satyrium hians* L. f. as basionym.

Thunberg (1794) proposed *Satyrium excelsum* as a *nomen novum* for *Orchis tripetaloides* L. f. As *Orchis tripetaloides* is a perfectly good name, *S. excelsum* has to be regarded as a superfluous name. Swartz (1800) transferred the epithet to *Disa*. Lindley (1838) noted that Thunberg's descriptions of *D. excelsa* (Thunb.) Swartz did not agree with the type of *O. tripetaloides* and maintained it as a distinct species. However, since the name is derived from a superfluous name, *Disa excelsa* sensu Lindley has to be regarded as a illegitimate name. The same then applies to *Herschelia excelsa* (Thunb.) Rolfe.

Disa lacera has generally been regarded as the same species as *D. venusta*. However, a study of the type found in Vienna showed that *D. lacera* agrees more with the form of *H. hians* found in the Langeberg at Riversdale than with *D. venusta*. Swartz's protologue, describing the lip as oblong, substantiates this finding, and *D. lacera* is included as a synonym under *H. hians*. The var. *multifida* which N. E. Brown described appears to be a more lacerate version of *D. hians*, of which a few collections from the Knysna area had been recorded. It does not show the characters of *H. venusta*.

Disa outeniquensis of Schlechter agrees in all characters with the most common form of *H. hians*.

12. **Herschelia forcipata** (*Schltr.*) *Kraenzl.*, Orch. Gen. Sp. 1: 807 (1900); Rolfe in Fl. Cap. 5, 3: 200 (1913). Type: Cape, *Trimen* s.n. (BM, holo.!).

Disa forcipata Schltr. in Bot. Jb. 24: 428 (1897); in Bot. Jb. 31: 292 (1901).

Plant 600 mm tall; radical leaves and tubers not known; cauline leaves closely sheathing, acuminate, subimbricate, 40–50 mm long, dry; inflorescence laxly 25-flowered, 200 mm tall, cylindrical; bracts as long as the ovaries, lanceolate, acuminate, dry; ovaries slender, generally straight, c. 20 mm long. *Flowers* greenish yellow; dorsal sepal acute, galea broadly ovate, c. 13 mm long and 6 mm deep; spur horizontal from the base of the galea, slender cylindrical, straight, 3–4 mm long, the apex bifid; petals with a smaller orbicular basal anticous lobe, decurrent with the limb, 2 mm in diameter, the limb lorate, geniculately curved up through 90° behind the anther, c. 10 mm long, the apex unequally bifid, the lobes acute, the anterior lobe longer than the posterior lobe; lip lanceolate, acute, the margins entire, c. 10 mm long; anther reflexed width the connective shorter than the cells; rostellum erect, trifid, the lobes acute; stigma pulvinate.

Diagnostic features. Lip lanceolate, acute, entire; petals with the apices bilobed, spur horizontal, slender, bifid.

This species is known from the single plant in Trimen's collection, made somewhere in the Cape in 1870, probably in the Knysna area (Schelpe pers. com). It is a very distinct taxon by virtue of the bilobed petals, the entire lip, the peculiar spur and rather dense inflorescence. It appears to be related to *H. hians*, rather than to the *H. graminifolia* group, as Schlechter (1897, 1901) and Rolfe (1913) suggested. The greenish yellow colour indicated by the collector, however, is reminiscent of *H. lugens*.

13. **Herschelia praecox** *Linder*, sp. nov., a *H. baurii* (H. Bol.) Kraenzl. labello fere integro, petalis pro ratione majoribus differt. Crescit in graminosis montis Nyikae Malaworum.

Type.—Zambia, Northern Province, Nyika Plateau, Sept. 1967, *Williamson* 312 (K, holo.!).

Plants 200–400 mm tall; tubers ovate, about 30 mm long; stems usually with a basal sheath of fibrous leaf remains; radical leaves produced after flowering, about 6, c. 300 mm long and 1–2 mm wide, semi-erect, subsclerophyllous; cauline leaves lax, acuminate, completely sheathing, c. 20 mm long; inflorescence laxly 2–10 flowered and 40–130 mm long; bracts ovate, acuminate, dry, about 10 mm long; ovaries 10–15 mm long, usually curved. *Flowers* white to blue or dark mauve, occasionally the apices of the petals green; dorsal sepal erect, galea acuminate with the apex reflexed, ovate, 10–12 mm tall, c. 8 mm wide and 4–6 mm deep; spur horizontal from the base of the galea, often gradually ascending, cylindrical to laterally flattened, rounded, c. 2 mm in diameter and 3–5 mm long; lateral sepals patent, narrowly ovate to lanceolate, subacuminate, 10–12 mm long, shallowly concave; petals with an ovate basal anticous lobe, c. 2 mm in diameter, the limb lorate, falcately curved up next to the anther inside the galea, c. 12 mm long and 1,5–2 mm wide, the apex widened and unequally acutely bilobed with the anterior lobe longer than the posterior lobe; lip narrowly ovate to lanceolate, 11–13 mm long, margins varying from almost entire to shallowly fimbriate, curved upwards; anther horizontal, c. 3 mm long, the connective longer than the anther; rostellum with 1,5 mm tall canaliculate erect lateral lobes; stigma subsessile, somewhat angled forwards. Fig. 20.

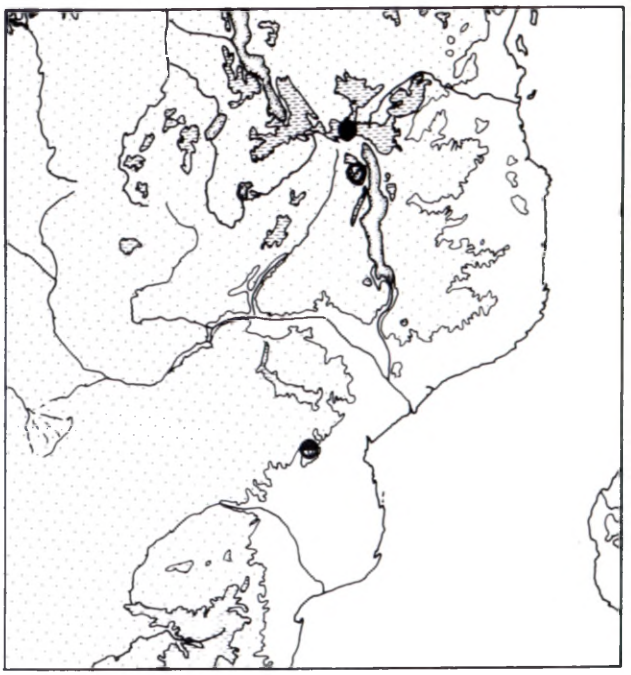

FIG. 19.—Distribution of *Herschelia praecox* (open circle), *H. goetzeana* (solid circle) and *H. chimanimaniensis* (half-solid circle).

Diagnostic features. A short plant, flowering in September, shortly after the winter grass fires, re-

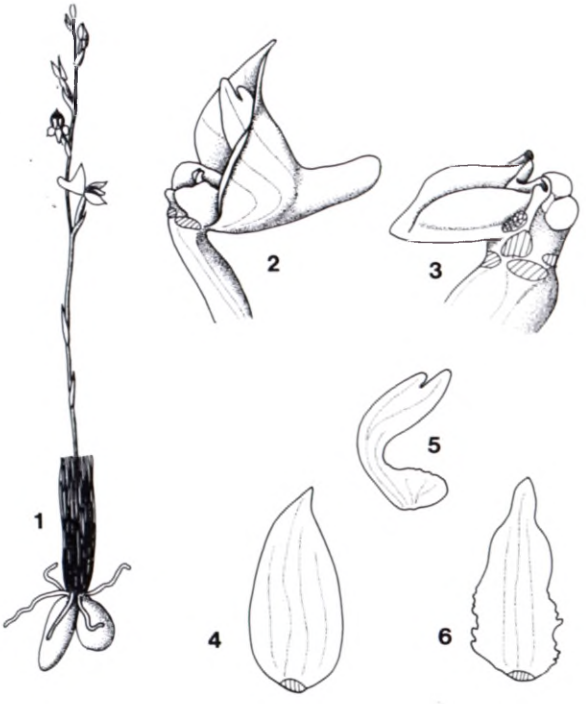

FIG. 20.—*Herschelia praecox*. 1, habit, ×0,5. 2, flower with the lateral sepals and the lip removed, ×6. 3, column, ×8. 4, lateral sepal, ×6, 5, petal, ×6. 6, lip, ×6. 1 from *Tyrer* 726, 2–6 from *Williamson* 312.

stricted to the montane grasslands on the Nyika Plateau, Malawi and Zambia.

MALAWI.—Northern Province, Rumphi District, Nyika Plateau, September 1962, *Tyrer* 966 (BM; SRGH).

ZAMBIA.—Northern Province, Lundazi District, Nyika Plateau, September 1964, *Robinson 6259;* September 1968, *Williamson 1023* (K; SRGH).

The epithet *'praecox'* refers to the early flowering time, shortly after the winter fires.

H. praecox is very similar to *H. baurii,* and if it were compared with all the variations of the latter taxon over its whole range, it might be found difficult to maintain as a distinct taxon. The entire distribution area of *H. praecox* is included in that of *H. baurii.* In the overlap region, on the Nyika Plateau, the flowers of *H. baurii* are larger than anywhere in the rest of its range (Fig. 22), therefore creating a size differential from *H. praecox.* There is also a shift in flowering time: on the plateau, *H. baurii* flowers in October and November, whereas *H. praecox* flowers in September. This difference was also noted by Williamson (1977). Morphologically, the lack of deep dissection of the lip and the large petals provide substantiation for what is clearly a biological micro-species.

H. praecox grows in well-drained short montane grassland on the Nyika Plateau (Vesey-Fitsgerald, 1963; Chapman & White, 1970), under a rainfall regime of 1 000–2 000 mm p.a., mostly concentrated during the summer months. The winter months are dry, with occasional frost and frequent grass fires. *H. praecox* appears to flower after the fires, possibly before the first rains and before the grasses grow tall, therefore the flower spikes do not have to compete with the grasses and are consequently short. Leaves are only produced when flowering is completed, possibly after the rains start. As such, this species occupies the temporal niche before that of *H. baurii.*

14. **Herschelia baurii** (*H. Bol.*) *Kraenzl.,* Orch. Gen. Sp. 1: 804 (1900); Rolfe in Fl. Cap. 5, 3: 204 (1913. Type: Mt Baziya, *Baur* 814 (K, holo.!).

Disa baurii H. Bol. in J. Linn. Soc., Bot. 25: 174 (1889); Schltr. in Bot. Jb. 31: 289 (1901).

D. hamatopetala Rendle in Trans. Linn. Soc., 2, 4: 47 (1894); N. E. Br. in Fl. Trop. Afr. 7: 286 (1898); Summerh. in Fl. Trop. E. Afr. 156: 177 (1968). *Herschelia hamatopetala* (Rendle) Kraenzl., Orch. Gen. Sp. 1: 803 (1900). Type: Malawi, Mt Mlanje, *Whyte* s.n. (K, lecto.!).

Herschelia bachmanniana Kraenzl., Orch. Gen. Sp. 1: 805 (1900). Type: Transkei, East Pondoland, *Bachmann* 414 (?B†).

Disa longilabris Schltr. in Bot. Jb. 38: 150 (1907). *Herschelia longilabris* (Schltr.) Rolfe in Orch. Rev. 27: 9 (1919). Type: Tanzania, Kinga Mountains, slopes of Mt Buongwe, *Goetze* 1222, 1226 (B, holo. †; Z!).

Icones: H. M. L. Bol. in Ann. Bolus Herb. 4: Pl. 11 (1926); Williamson, The orchids of south-central Africa, Pl. 71 (1977).

Plants 200–400 mm tall; tubers 20–30 mm long; base of the stem frequently with a thick sheath of old leaf fibres; radical leaves 5–10, produced after flowering, frequently overtopping the spike, up to 300 mm long and less than 2 mm wide, semirigid and subsclerophyllous; cauline leaves lax, completely sheathing, acuminate, 15–25 mm long, larger towards the base of the stem; inflorescence lax, rarely subsecund, with 2–14 flowers; bracts usually about ½ as long as the ovaries, rarely as long as the ovaries, ovate, acuminate, dry; ovaries straight or curved, 10–15 mm long. *Flowers* varying from pale sky-blue to deep purple-blue, the lip frequently a darker blue than the sepals; dorsal sepal erect, galea ovate, acute, (8–) 10–20 mm tall, 6–12 mm wide and 5–10 mm deep; spur horizontal from the base of the galea, often somewhat ascending, cylindrical, rounded, 4–6 mm long; lateral sepals patent, oblong to rarely lanceolate, acute to rounded, (8–) 10–18 mm long, shallowly concave; petals with the basal anticous lobe oblong to ovate, 1–2,5 mm in diameter, rounded, the margin rarely crenulate, limb linear, 8–13 mm long, the apex variously expanded, deeply bifid to lacerate to acute; lip horizontal, at least at the base, broadly to narrowly ovate, 10–25 mm long, more or less deeply dissected; anther horizontal, 2–5 mm long, viscidia separate, ovate; rostellum erect, 2–3 mm tall, equally 3-lobed; stigma horizontal, 1 mm tall and 1,5–2,5 mm in diameter. Fig. 22.

Diagnostic features. Flowers with the lateral sepals 10–18 mm long; lip deeply and unevenly lacerate, generally longer than the lateral sepals; petals with usually a bilobed apex; spur generally cylindrical and obtuse,

Flowering time: mostly September and October, but with occasional collections from almost every month of the year.

A variable plant with hysteranthous leaves which occurs widespread in the montane grassland in southern and south-central Africa (Fig. 21), flowering at the beginning of the rainy season.

TRANSKEI.—3129 (Port St Johns): Msimkaba River mouth (–BA), Aug. 1976, *Venter & Vorster 195* (PRE).

NATAL.—2929 (Underberg): Kamberg (–BD), Oct. 1941, *Schelpe 013* (NU).

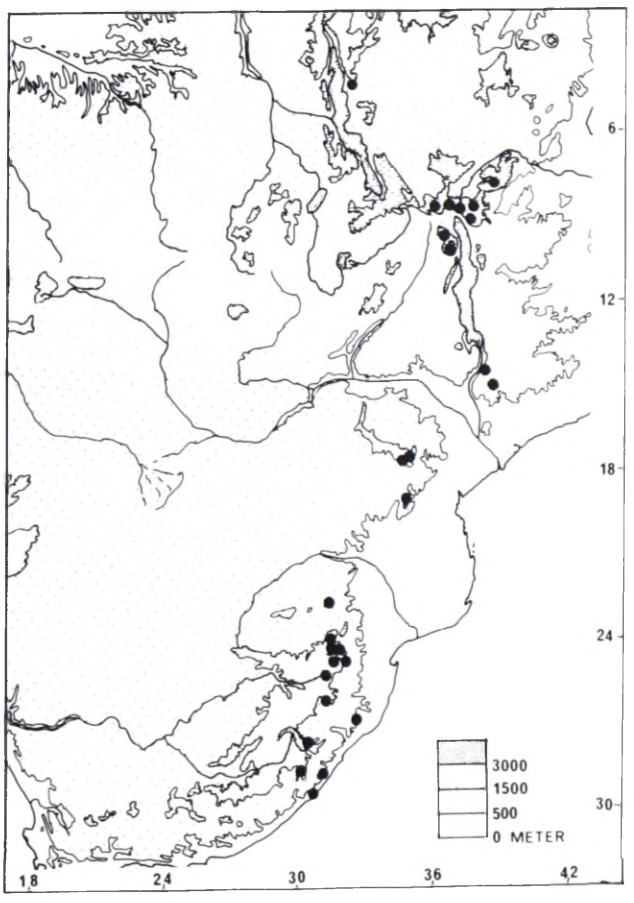

FIG. 21.—Distribution of *Herschelia baurii.*

SWAZILAND.—Sept. 1910, *Steward 8875* (PRE).

TRANSVAAL.—2630 (Carolina): Brereton P.S. (–CD), Sept. 1945, *Acocks 11731* (PRE). 2531 (Komatipoort): Saddleback Mountains, Barberton (–CC), Sept. 1889, *Galpin 427* (BOL, PRE). 2330 (Tzaneen): Woodbush Mountains (–CC), Sept. 1927, *Moss 15432* (PRE).

ZIMBABWE.—Melsetter District, Mt Musapa, 2100 m, *Wild 3556* (K; SRGH). Inyanga District, World's View, Sept. 1956, *Davies 2120* (K; SRGH). Inyanga District, head on Nyamaziwa River, 1800 m Sept. 1965, *Biegel 257* (SRGH).

MALAWI.—Southern Province, Mulanje District, Mt Mlanje, 2 000 m, Oct. 1941, *Greenway 6318* (K). Northern Province, Rumphi District, Nyika Plateau, Oct. 1958, *Robson 297* (K).

TANZANIA.—Southern Highlands, Njombe District, Elton Plateau, Nov. 1963, *Richards 18500* (K); Mbeya District, summit of Mt Mbeya, Oct. 1957, *Watermeyer 167* (K).

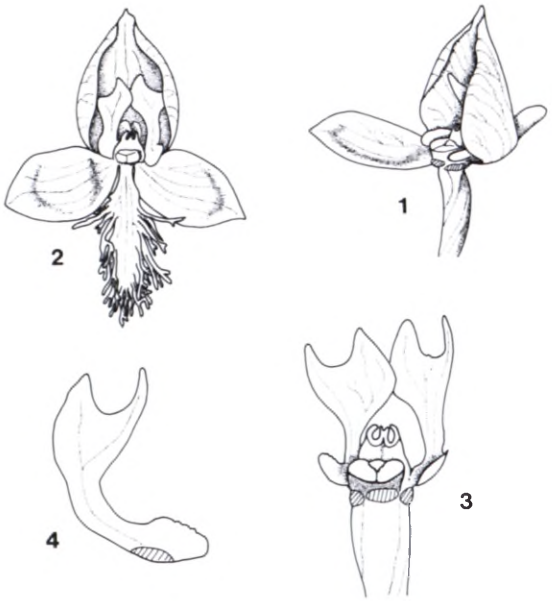

FIG. 22.—*Herschelia baurii,* from *Williamson* 119. 1, flower with the lateral sepal and the lip removed, ×1,5. 2, front view of flower, ×1,5. 3, front view of column and petals, ×3. 4, petal, ×3.

This species occurs in the grasslands of the Montane Region (White, 1978), between Grahamstown in the eastern Cape Province and Kigoma in western Tanzania. Robyns & Tournay (1955) also recorded this species from the Ruwenzori Mountains in Zaire. In general, the altitude range of these grasslands is from 1 000 to 2 400 m, and they receive approximately 1 000 to 1 500 m rainfall p.a., concentrated in the summer months, usually with about four dry months in winter (Jackson, 1961; Phipps & Goodier, 1962; Chapman & White, 1970). Vesey-Fitzgerald (1963) notes that the grasslands are generally burnt in the winter months, after which the geophytes flower. During the rainy season the grasses grow rapidly, to flower at the end of the rainy season. *H. baurii* exploits the temporal niche at the beginning of the rainy season, before the grasses grow tall. This lack of height competition is manifested by the rather short flowering spikes. The leaves are produced after flowering is completed.

As might be expected from such a wide-ranging species, there is extensive geographical variation. Plants from Malawi tend to have much larger flowers, and relatively shorter spurs, than plants from Zimbabwe or South Africa (Fig. 23). In South Africa the petals usually do not have deeply bifid apices, but are narrowly obtriangulate towards the apex, often obliquely bifid or lacerate, whilst over the rest of the range the petals are deeply bifid. The geographical variation in flower size is shown in Fig. 23. This variation has been used to maintain separate taxa for South Africa and the areas north of South Africa (Summerhayes, 1968). However, a detailed study has shown that there is extensive overlap for all characters, with collections from Zimbabwe frequently intermediate between those from South Africa and those from Malawi.

In south Tanzania a smaller-flowered form occurs, which has been kept distinct as *Disa longilabris* by Summerhayes (1968). However, it only appears to be smaller in all its parts than *H. baurii,* and the characters mentioned by Summerhayes (1968) were found to be variable. However, there is little material of *D. longilabris* and the available evidence indicates that it is best treated as a depauperate form of *H. baurii.*

The type material of *H. bachmanniana* could not be traced. Kraenzlin (1900) notes that it is very similar to *H. baurii,* but that it possesses a much shorter spur, rounded sepals, dissected petals and flattened lip fimbriae. However, the type specimen of *D. baurii* is peculiar in that the spur is about twice as long as is typical for the species and this probably confused Kraenzlin. The other characters mentioned by Kraenzlin occur in *H. baurii.*

15. **Herschelia chimanimaniensis** *Linder,* sp. nov., a *H. baurii* (H. Bol.) Kraenzl. floribus minoribus, sepalis lateralibus 6 – 8 mm longis differt.

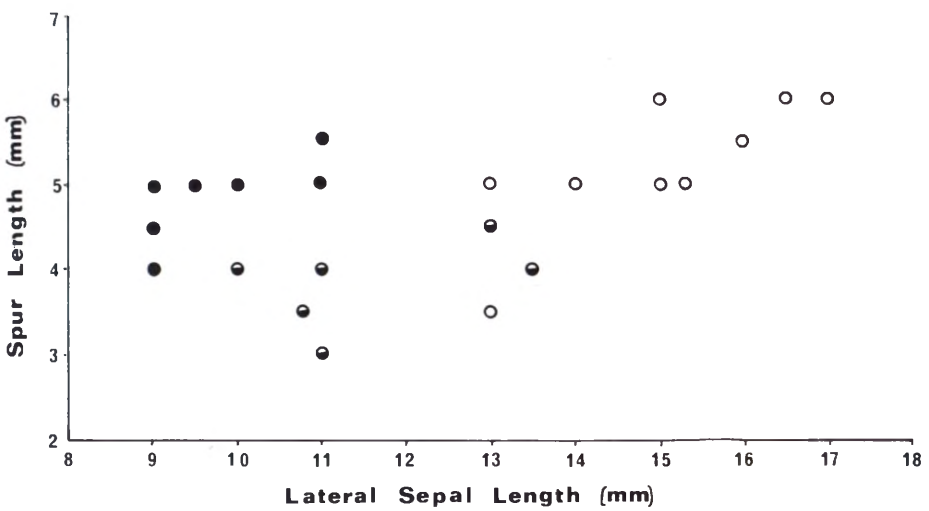

FIG. 23.—Geographical variation in flower size and spur length in *Herschelia baurii.* Material from South Africa plotted in solid circles, from Zimbabwe in half-solid circles and from Malawi and Tanzania in open circles.

Crescit in montibus Chimanimanorum Zimbabwe.

TYPE.—Zimbabwe, Chimanimani, *Ball* 577 (K, holo.!; SRGH!).

Plants slender, 200–400 mm tall; base of the stem occasionally with a sheath of the fibrous leaf remains; radical leaves apparently produced after flowering, 3–6, 150–200 mm long and 1–2 mm wide, subsclerophyllous; cauline leaves closely sheathing, 4–8, 15–20 mm long, acuminate, the lower 2–3 much larger and imbricate; inflorescence laxly 2–8-flowered, 30–80 mm long; bracts ovate, acuminate, about half as long as the ovary, dry; ovaries 5–15 mm long. *Flowers* pink-mauve to white, rarely blue; dorsal sepal erect, galea ovate, acute, 5–7 mm tall, 4 mm wide and 4 mm deep; spur horizontal from the base of the galea, often gradually ascending, straight, cylindrical or somewhat laterally flattened, rounded, 3–4 mm long; lateral sepals patent, narrowly oblong – ovate, acute, 6–8 mm long, shallowly concave; petals with the basal anticous lobe ovate, 1–1,5 mm in diameter, the limb lorate, falcately curved up next to the anther, included in the galea, c. 5,5 mm long and 1 mm wide, the apex acutely bifid; lip ovate, 8–10 mm long, deeply dissected, the margins curved upwards; anther horizontal, c. 1,5 mm long; rostellum lateral lobes canaliculate, erect, 1–1,5 mm tall; stigma horizontal, c. 0,6 mm tall, flat, c. 1 mm in diameter. Fig. 24.

Diagnostic features. Plants slender, flowers small with the lateral sepals 6–8 mm long. Occurs in the Chimanimani Mountains of Zimbabwe.

Flowering time: September and October.

A small-flowered and very slender plant which occurs between about 1 500 and 1 800 m in the Chimanimani Mountains in eastern Zimbabwe and the neighbouring areas in Mozambique (Fig. 19).

ZIMBABWE.—Melsetter District, Chimanimani Mountains, Oct. 1950, *Munch 327* (K; SRGH); *Grosvenor 178* (K; SRGH).

MOZAMBIQUE.—Manica e Sofala District, Chimanimani Mountains, August 1964, *Whellan 2145* (SRGH).

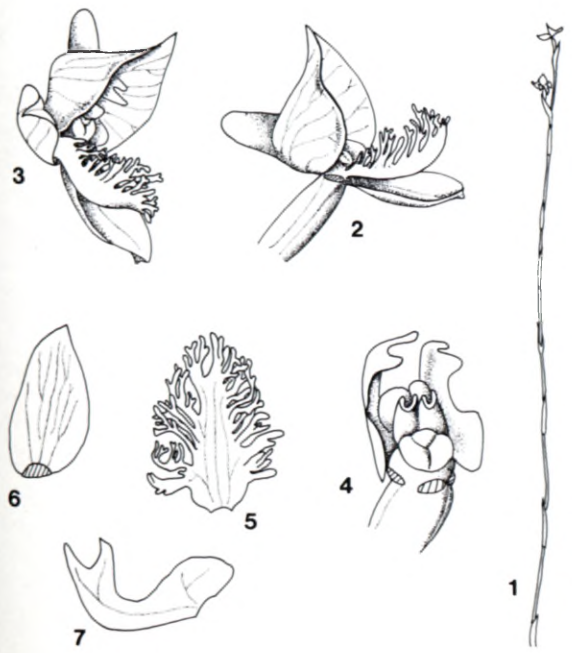

FIG. 24.—*Herschelia chimanimaniensis*, from *Ball* 577. 1, habit, ×0,5. 2, flower with the lateral sepal removed, ×4. 3, flower, ×4. 4, front view of column and petals, ×8. 5, lip, ×4. 6, lateral sepal, ×4, petal, ×4.

From collectors' notes it appears as if the species has a wide ecological range, as it has been recorded from montane grassland, cliff faces, rocky ground, seasonally damp ground and bogs. Phipps & Goodier (1962) describe the climate as cool, with frequent mist in the summer and frequent frost in the winter months. Available records indicate that rainfall is highly dependent on local topography and varies from 800 to 3 000 mm p.a.

This new species is clearly closely related to *H. baurii*. The ecological relationships of the two taxa in the Chimanimani Mountains are not clear. The majority of collectors recognized the two taxa as being distinct and collected them under different numbers. It also appears as if *H. baurii* occurs at higher altitudes than *H. chimanimaniensis*, but no explicit data are available. *H. chimanimaniensis* may be distinguished by the smaller flowers and more slender habit.

Ser. **Ecalcaratae** *Linder*, ser. nov., labello lacero, calcari obsoleto dignoscenda. Flowers with a bearded lip, spur obsolete.

Type species: *H. goetzeana* Kraenzl.

The single species in this series is most peculiar. Although it is clearly related to ser. *Lacerae* in the bearded lip and petal shape, it differs from *H. baurii* in the absence of a spur and the acute entire petal. It is difficult to explain the origin of this species. If it cannot be derived from *H. baurii*, it must be seen as a relic of a previous expansion of *Herschelia* from the south.

16. **Herschelia goetzeana** *Kraenzl.* in Bot. Jb. 30: 286 (1901). Type: Tanzania, Njombe District, Bulongwa, *Goetze* 925 (B, holo. †).

Disa goetzeana (Kraenzl.) Schltr. in Bot. Jb. 38: 150 (1906), in obs. non Kraenzl. (1900), nom. illegit. *D. walteri* Schltr. in Bot. Jb. 53: 544 (1915), nom. nov.; Summerh. in Fl. Trop. E. Afr. 156: 176 (1968).

Plants 200–600 mm tall; tubers about 20 mm long; base of the stem with a sheath of old leaf remains; radical leaves 5–10, 150–250 mm long and 1–3 mm wide, suberect, veins prominent, subsclerophyllous; cauline leaves lax, acuminate, about 25 mm long, completely sheathing; inflorescence closely 1–9-flowered; bracts ovate, acuminate, as long as the ovary, dry; ovaries about 10 mm long. *Flowers* foam-pink to crimson–cherry-coloured; dorsal sepal erect, galea hemispherical, almost orbicular from the front, 8–14 mm tall and 10–16 mm wide; spur obsolete; lateral sepal oblong, obtuse, spreading downwards, 10 mm long; petals with the basal anticous lobe oblong, 2 mm long, limb narrowly oblong to lorate, falcate, subacute, c. 7 mm long; lip patent, 20–25 mm long and up to 12 mm wide, entire at the base, obscurely 3-lobed, deeply and finely lacerate; anther horizontal, 7,5 mm long and with two distinct viscidia; rostellum with 3 linear erect lobes; stigma pulvinate, c. 2,5 mm in diameter.

Diagnostic features. Flowers with the lateral sepals c. 11 mm long; lip pectinate or lacerate; spur obsolete.

Flowering time: March.

Known from a single collection from southern Tanzania (Fig. 18), where it is said to be restricted to rock crevices on Mt Mbeya between 2 700 m and 2 900 m.

TANZANIA.—Southern Highlands, Mbeya District, Mbeya Peak, 2 700 m, March 1960, *Kerfoot 1632* (K).

Kerfoot (1964) describes the vegetation of the Mbeya Range, and notes for the high-altitude lithophytic communities that cloud and mist occur frequently. Growth is highly seasonal, with flowering occurring between February and April, and the flora is dominated by Orchidaceae.

Morphologically, this species is quite distinct, but clearly related to the species in Ser. *Lacerae* It is therefore, other than *H. praecox* and *H. chimanimaniensis,* unlikely to be a neo-endemic. It is difficult to understand where this species fits in with the rest of the genus and in the classification proposed here it is anomalous. It would be most interesting to see more material of this species and to confirm its limited distribution.

The type collection has been lost, but from the description there cannot be any doubt about the identity of the species. The name 'goetzeana' cannot be transferred to *Disa,* as there is already a *Disa goetzeana* Kraenzl. Schlechter (1915) proposed *D. walteri* as a *nomen novum* for the species. The name is derived from Walter Goetze, the original collector of the species.

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UITTREKSEL

Die genus Herschelia (Disinae, *Orchidaceae*) *is hersien. Sestien spesies, een subspesie en een variëteit word erken. Twee nuwe spesies uit tropiese Afrika* (H. **chimanimaniensis** *Linder en* H. **praecox** *Linder sowel as 'n nuwe variëteit ui die Kaap* [H. lugens (*H. Bolus*) *Kraenzl var.* **nigrescens** *Linder*] *word hier beskryf. Drie nuwe kombinasies word gemaak deur die oorplasing van die twee spesies van* Forficaria *en* Disa *seksie* Microperistera (*een spesie*) *na* Herschelia. *Dertien spesies word geïllustreer en die nomenklatuur en die beskikbare gegewens in verband met die groeiplekke van die taksons word bespreek. Die spesies is in twee subgenera gegroepeer waarvan een in twee verdere seksies en vier series verdeel is. Hierdie klassifikasie is gebaseer op die veronderstelde filogenie soos bepaal deur die metode opgestel deur Wagner (1962).*

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APPENDIX: SPECIMENS STUDIED

The specimens are listed alphabetically according to the name of the collector. The figures in brackets refer to the number of the taxon in the text. Herbaria from which each collection has been studied are indicated by the letter codes of Holmgren and Keuken (1974).

Acocks 2087 (6) S; 3678 (10) S; 11731 (14) PRE. *Alchenck* 549 (5) Z. *Andraea* 278 (5) STE. *Atherstone* 29 (9a) K.

Baker 37 (6) K. *Ball* 577 (15) K, SRGH. *Balsinhas-Kersberg* 2054 (14) PRE. *Barker* 56 (4a) NBG; 620 (11) NBG; 625 (11) NBG; 3042 (4a) NBG; 444 (6) NBG; 4785 (4a) NBG; 5760 (4a) NBG; 6043 (11) (NBG; 8476 (6) NBG; 8828 (11) NBG. *Barkley* in BOL 4884 (5) BOL. *Bayliss* 3067 (11) NBG; 4162 (11) NBG. *Benson* 149 (13) BM; 189 (13) BM. *Bergius* s.n. (5) P. *Biegel* 257 (14) BOL, SRGH. *Bodkin* 494 (9a) BOL, K, SAM. *Bolus* 494 (9a) BOL, K, SAM; 1552 (11) BOL; 3810 (9a) BM, BOL, GRA, PRE, Z; 4393 (4a) PRE; 4566 (8) BM, BOL, K, PRE; 4566b (7) BM; 4857 (7) BOL, GRA, K; 4893 (6) BOL, GRA, K; 5278 (10) BOL, K; 7992 (6) Z; 9788 (14) BOL, K; 11379 (5) GRA; 11645 (10) BOL, PRE; 12327 (11) BOL, BR; 13514 (11) BOL; 17494 (8) BOL; s.n. (46) BOL; s.n. (5) BOL; (6) SAM; s.n. (8) BOL; s.n. (11) BOL. *Bond* 878 (11) NBG. *Bowie* 12 (5) BM; 13 (4a) BM; s.n. (11) BM. *Breach* s.n. (10) BOL. *Britten* 1058 (11) GRA, PRE; 6575 (9a) GRA. *Brook* s.n. (4a) PRE. *Buchanan* 1016 (14) K. *Buchholz* s.n. (5) STE. *Buhr* 5 (11) BOL. *Burchell* 747 (11) K; 808a (5) K; 7001 (5) K; 7801 (5) K; 4572 (11) K; 4592 (11) K; 7182 (11) K; 7372 (5) W. *Burtt Davy* 1915 (14) K; 4245 (5) PRE; 12004 (11) PRE; 18483 (11) BOL; 22070 (14) K; s.n. (14) BOL.

Carter & Barres s.n. (4a) BOL. *Chapman* 148 (14) BM; 330 (14) BM, SRGH. *Chase* 2949 (14) BM, BOL, K; 4059 (14) SRGH. *Chater* s.n. (11) BOL, PRE. *Clarke* in NBG 2184/31 (9a) BOL. *Codd* 523 (14) BM, PRE; 9714 (14) GRA, K, PRE, UPS. *Collins* 1538 (4a) K. *Compton* 4150 (4a) BOL, NBG; 4515 (11) BOL, NBG; 10499 (5) NBG; 12322 (6) NBG; 16644 (8) NBG; 20236 (6) NBG; 24487 (14) NBG; 25150 (14) NBG; s.n. (5) BOL. *Cookson* 3 (14) PRE, SRGH. *Cooper* 1464 (11) BM, K, W; *sub Eyles* 2743 (14) PRE, SRGH. *Cresswell* s.n. (9a) SAM. *Crook* 136 (14) SRGH; 409 (14) K, SRGH. *Crundall* s.n. (14) PRE Culver 20 (14) BM, BOL, BR, K. *Cuthbert* 5 (14) K. *Cutting s.n.* (9a) BOL; s.n. (11) BOL.

Dahlstrand 2586 (11) GRA. *Daly & Sole* 527 (9a) GRA. *Davidson* s.n. (4a) SAM. *Davies* 2120 (14) PRE, SRGH; s.n. (4a) SAM. *Dart* s.n. (9a) BOL, STE. *Delhaye* s.n. (14) K. *Denman* 237 (11) GRA. *De Villiers* s.n. (11) STE. *De Vos* 738 (8) PRE. *Doe* s.n. (8) BOL. *Drège* 1234 (4a) K, P; 2211a (11) K, W; s.n. (5) SAM; 63 (11) GRA. *Drummond* 8956 (14) SRGH; 8981 (14) SRGH; 8982 (15) SRGH. *Dümmer* 756 (9a) BM; 1502 (14) BM. *Duthie* 1027 (11) STE. *Du Toit* s.n. (9a) BOL. *Dyer* 229 (9a) PRE.

Ecklon 1565 (9a) W. *Edwards* 2157 (14) NU; s.n. (14) BOL. *Esterhuysen* 3802 (10) BOL; 4628 (11) BOL; 7298 (10) BOL; 8207 (4a) BOL; 13599 (11) BOL, K, PRE; 13664 (5) BOL; 15154 (5) K, PRE; 17441 (4a) BOL, PRE; 19990 (5) BOL; 20353 (4a) BOL; 20907 (10) BOL; 22712 (5) BOL, K. *Eyles* 2743 (14) PRE, SRGH.

Fair in BOL 3810 (9a) PRE; in BOL 7992 (6) BOL, GRA, PRE. *Ferguson* s.n. (3) BOL; s.n. (11) BOL. *Flugge-De Smit* s.n. (5) BOL. *Fourcade* 542 (11) GRA; 548 (5) BOL, GRA; 3167 (9a) K; 4309 (11) K, STE; 4344 (4b) BOL; 6443 (4b) PRE. *Franks* 9810 (14) PRE. *Froemling* s.n. (9a) NBG. *Frowein* 16131 (8) PRE.

Galpin 294 (9a) PRE; 427 (14) BOL, GRA, K, PRE, SAM; 428 (14) GRA; 4917 (5) PRE; 12545 (5) PRE. *Garley* 167 (14) SRGH. *Garside* 46 (9a) K, PRE. *Gemmell* 5037 (11) PRE. *Gerloin* 249 (11) GRA. *Germain* 1563 (14) BR. *Gillett* 326 (11) K; 718 (1) BOL; 1602 (4b) BOL; 17648 (14) K, PRE; 17799 (14) K; s.n. (5) STE; s.n. (9a) K; s.n. (11) BOL. *Gillett & Bolus* in BOL 18506 (11) BOL. *Gillies* 107 (14) NU. *Glass* s.n. (9a) GRA, PRE. *Goatcher* s.n. (4a) BOL. *Goetze* 1222 (14) BM. *Grant* 2464 (4a) BR, M, PRE; s.n. (14) BM. *Greenway* 6318 (14) K, PRE. *Grice* s.n. (14) NU. *Grosvenor* 178 (15) K, SRGH; 257 (14) K, SRGH. *Gueinzius* s.n. (10) W. *Guthrie* 871 (4a) BOL; 4383 (11) NBG; 8384 (11) NBG; in BOL 6861 (10) GRA.

Hafström & Acocks 2087 (6) PRE, Z, S. *Hall* 664 (9a) BOL; 1043 (4a) BOL; 1160 (11) BOL. *Hallack* in BOL 6210 (11) BOL, GRA. *Hall-Martin* 429 (14) PRE. *Handel Hamer* in BOL 16964 (11) BOL. *Harvey* 116 (9a) K; 148 (7) K; s.n. (5) BM, K, W. *Harwood* s.n. (14) PRE. *Hayes Palmer* s.n. (11) NBG. *Haynes* 304 (5) STE; 528 (5) STE. *Hendrickx* 3465 (14) PRE. *Hermann* 871 (4a) NBG. *Hill* 2 (14) K. *Hilliard & Burtt* 10404 (14) NU. *Huysteen* s.n. (6) STE.

Immelmann 246 (4a) BOL.

James in BOL 23178 (11) BOL. *Jameson* s.n. (6) K. *Jenkins* 8228 (14) PRE. Jeppe in PRE 3383 (5) PRE; in PRE 33384 (4b) PRE; in PRE 33385 (11) PRE. *Johnson* s.n (14) K. *Joubert* s.n. (5) K.

Karsten s.n. (14) NBG. *Keet* 1154 (11) GRA. *Kennedy* s.n. (5) PRE. *Kensley* 280 (11) GRA. *Kensit* 9339 (8) BOL. *Kerfoot* 1632 (16) K. *Kettle* 18 (13) PRE. *Kettlewell* in BOL 25392 (6) BOL. *Keulder* s.n. (9a) STE. *Kirk* s.n. (14) K. *Kolbe* 2412 (9a) GRA. *Krauss* s.n. (5) M.

Lavis s.n. (4a) BOL. *Leach* 4121 (14) K, SRGH; 14941 (14) BOL, SRGH; 21121 (14) S. *Lees* 99 (14) K. *Leighton* 402 (4a) BOL; 3067 (11) BOL, PRE. *Leipoldt* 601 (4a) BOL; 3233 (4a) BOL; 3234 (4a) BOL; 3810 (4a) BOL; 4243 (11) BOL; in BOL 11379 (5) PRE; s.n. (4a) BOL. *Lewis* 828 (8) SAM; 1837 (4a) SAM; 2402 (6) SAM; 2404 (7) SAM; 2680 (4a) SAM; 4737 (4a) SAM; 5202 (4a) NBG. *Liebenberg* 7805 (11) K, PRE. *Linder* 759 (6) BR, BOL; 1244 (4a) BOL; 1245 (4a) BOL; 1453 (4a) BOL; 1458 (4a) BOL; 1460 (4a) BOL; 1471 (4a) BOL; 1549 (4a) BOL, BR, K; 1656 (10) BOL; 1714 (11) BOL; 1729 (11) BOL; 1731 (11) BOL; 1743 (10) BOL; 1763 (5) BOL; 1806 (7) BOL. *Long* 165 (9a) K; 494 (9a) K; 507 (11) K, PRE; 520 (11) K, PRE. *Luyt* in BOL 10571 (3) BOL, PRE; 11379 (5) BOL.

MacOwan 700 (9a) BM, GRA, K, SAM; 1045 (11) BM, GRA, K, SAM; 1045b (5) SAM, W; 2587 (4a) SAM; 2690 (9a) SAM; s.n. (5) NBG. *MacOwan & Bolus* 166 (7) BM, BOL, K, P, W, ZT; 167 (5) BM, BOL, K, P, SAM, UPS, W, ZT; 494 (9a) BOL, P, PRE, W, Z, ZT. *MacNicol* s.n. (11) NBG. *Magennis* s.n. (4a) BOL, PRE. *Mahon* s.n. (14) K. *Marloth* 332 (6) BOL, PRE; 425 (5) PRE; 483 (10) PRE; 1601 (9a) BOL; 2310 (4a) PRE; 6678 (10) BOL, PRE; 7273 (7) PRE; 7941 (4a) PRE; 8337 (10) PRE; 8435 (4a) PRE; 8847 (9a) PRE; 10061 (11) PRE; 11008 (9a) PRE; s.n. (5) BOL; s.n. (6) SAM. *Marsh* 1408 (4b) PRE, SRGH. *Matthews* 28 (14) SRGH. *Mauve* 5005 (14) PRE. *McClounie* 10 (14) K; 92/3 (14) BM. *McLoughlin* 362 (14) BOL; 92/3 (14) K, P, PRE, S, UPS; s.n. (11) BOL. *Mgaza* 488 (14) K. *Michael* et al. 971 (13) SRGH. *Middlemost* 1721 (4a) NBG; 1954 (11) NBG. *Minicki* s.n. (1) BOL. *Moorshead sub Moss* 17594 (11) BM. *Morris* 52 (14) K; in BOL 13478 (4a) BOL. *Moss* 15432 (14) K, PRE; 17594 (11) BM, 18237 (11) BM. *Muir* 621 (11) PRE; 908 (9a) BOL, PRE, SAM; in PRE 16266 (9a) PRE; s.n. (4a) PRE. *Munch* 274 (14) SRGH; 327 (15) K, SRGH. *Myburg* s.n. (9a) NBG.

Newbould & Jefford 1849 (14) K. *Newdigate* in BOL 6327 (2) BOL; s.n. (11) BOL.

O'Brien s.n. (9a) BM; s.n. (11) K, Z. *O'Connor* 216 (14) NU; 368 (14) NU. *Oldevig-Roberts* s.n. (11) S. *Oliver* 3181 (9a) PRE, STE; 3006 (6) PRE; in STE 29974 (10) PRE.

Pappe 38 (4a) SAM; 39 (9a) BOL, SAM; 377 (9a) BOL, GRA, SAM; in BOL 4393 (4a) BOL; s.n. (4a) K; s.n. (11) K, SAM. *Parker* s.n. (6) BOL. *Paterson* 106 (5) GRA; 488 (11) GRA, Z; 1277 (11) BOL, GRA; s.n. (6) BOL. *Pattison* in BOL 14455 (10) BOL. *Pawek* 1409 (13) SRGH; 3800 (14) K; 10275 (14) SRGH. *Penther* 50 (11) BM, M, W; 154 (5) M, W; 251 (4a) W; in PRE 10575 (11) PRE. *Peters* s.n. (4a) SAM. *Pillans* 3530 (6) PRE; 4056 (5) PRE; 4125 (1) BOL; 8275 (8) BOL; 9723 (10) BOL. *Plowes* 2807 (15) K, SRGH; 2808 (14) K, SRGH. *Pott* 1278 (9a) PRE. *Powrie* 168 (10) BOL. *Prentice* s.n. (4a) PRE.

Rattray in BOL 15770 (8) BOL. *Rauh & Schlieben* 9761 (14) M, PRE. Rehmen 529 (11) BM, Z; 571 (5) Z. *Reynolds* 4200 (14) PRE.

Richards 6804 (14) K; 18500 (14) K; 22561 (14) K; 22574 (14) K, P. *Robinson* 6259 (13) K, M, SRGH. *Robson* 297 (14) K; 358 (14) BM, K, SRGH. *Rogers* 10550 (5) Z; 16554 (11) Z; 19079 (14) PRE; 19767 (14) GRA, K, P, S; 21404 (14) BOL, K, Z; 26487 (11) Z; 26865 (11) Z; 27643 (11) Z; 30155 (14) BR, K, P, Z. *Rosenbruck* in BOL 27817 (1) BOL. *Rycroft* 2559 (4a) NBG. *Ryder* in NBG 40/28 (11) BOL, K; s.n. (3) K.

Salter 8703 (8) NBG; 325/1 (5) BM; 325/2 (6) BM; 325/3 (7) BM; 325/4 (8) BM; in SAM 53195 (8) SAM. *Schelpe* 013 (14) NU; 826 (14) NU; 4267 (11) BOL; 4994 (11) BOL; 5006a (11) BOL; 6313 (9a) BOL. *Schlechter* 481 (5) P, Z; 2061 (5) BOL, Z; 4997 (4a) PRE, Z; 5165 (4a) BOL, GRA, P, W, Z; 5928 (11) Z; 9544 (8) BM, BR, GRA, K, PRE; s.n. (4a) BR, K. *Schlieben* 1366 (14) BM, G, M, P, S, Z. *Schmidt* 3 (5) M. *Schnisterhol* 213 (5) S. *Schonland* 1519 (9a) GRA, Z; 2410 (9a) PRE; 3662 (11) GRA; sub *Galpin* 4917 (5) PRE. *Seltzer* s.n. (9a) NBG. *Seltzer & Parke* s.n. (9a) BOL. *Shirley* 234 (14) NU. *Sidey* 490 (14) PRE; 1498 (14) PRE, S; 4057 (11) PRE. *Sim* 2457 (14) BOL, PRE. *Skead* 210 (14) NU. *South* 127 (9a) GRA; s.n. (11) GRA, PRE. *Stander* s.n. (11) STE. *Starke* 127/27 (11) BOL; NBG 60/27 (11) BOL. *Stewart* 8875 (14) GRA, PRE. *Stokoe* 2560 (1) BOL; 7324 (5) BOL, SAM; 7386 (5) BOL; 8679 (10) BOL; in SAM 54389 (11) SAM; in SAM 54714 (11) SAM; s.n. (5) SAM. *Stolz* 127 (14) BM, G, K, M, W, Z; 2192 (14) C, G, M, S, W, Z; 2193 (14) C, G, M, Z. *Strey* 9853 (14) PRE. *Sturgeon* in SRGH 30524 (14) K, SRGH. *Symons* 22 (14) SAM; in PRE 14847 (14) PRE.

Taylor 191 (14) NU; 634 (11) NBG; 1713 (14) NU; 1755 (14) NU; 1786 (14) NU, SRGH; 1791 (15) NU; 5455 (9a) STE; 6220 (5) STE. *Tennant* 5 (5) NBG. *Thode* A48 (5) PRE; A387 (14) K, PRE; A1022 (11) K, PRE; in STE 5247 (5) STE; in STE 5307 (11) STE; in STE 6104 (5) STE; in STE 6526 (11) STE; in STE 8128 (5) STE. *Thomas* s.n. (4a) NBG; s.n. (6) NBG. *Thorncroft* 2478 (14) K, PRE. *Thornton* s.n. (14) PRE. *Thulin & Mhoro* 1201 (14) K, UPS; 1207 (14) K. *Thunberg* 21429 (9) UPS; 21443 (11) UPS. *Trauseld* 412 (14) PRE. *Trimen* s.n. (12) BM; s.n. (9a) BM. *Tyrer* 726 (13) BM, SRGH; 966 (13) BM, SRGH; 978 (13) BM. *Tyson* 1537 (14) BOL.

Wahlberg s.n. (5) S. *Wall* s.n. (3) S; s.n. (4a) S; s.n. (5) S; s.n. (9a) S; s.n. (11) S. *Wallich* 113 (11) BM. *Watermeyer* 167 (13) K. *West* 256 (11) W. *Westwood* 694 (14) SRGH. *Whellan* 1493 (11) SRGH; 2137 (14) SRGH; 2145 (15) SRGH. *Whyte* 345 (14) K; s.n. (14) K; s.n. (14) K. *Wild* 1366 (14) K, SRGH; 3556 (14) PRE, SRGH; 4668 (14) SRGH; 4669 (14) K. *Willan* 176 (14) K; in BOL 24915 (14) BOL. *Williamson* 119 (14) K; 312 (13) K; 1023 (13) K, SRGH. *Wilms* 1406 (14) BM. *Wolley-Dodd* 358 (9a) BM; 359 (7) K; 391 (8) BM, K; 840 (5) BM; 885 (5) K; 1798 (9a) K; 2005 (6) BM, K. *Wood* 9290 (14) BOL, K; 10599 (14) K, PRE. *Worsdell* s.n. (4a) K; s.n. (9a) K; s.n. (14) K. *Wright* 2412 (14) NU. *Wurts* 558 (5) NBG; 2136 (11) NBG. *Wylie sub Wood* 10599 (14) GRA, PRE, SAM; in *Dümmer* 1502 (14) BM.

York 34 (9a) K.

Van Zinderen Bakker 56 (11) NBG. *Venter* 848 (14) PRE. *Venter & Vorster* 195 (14) PRE; 196 (14) PRE. *Vogelpoel* s.n. (14) BOL. *Voigt* in PRE 13199 (14) PRE.

Zeyher 504 (11) P; 628 (11) K; 1566 (9a) K, S, SAM; 1567 (7) K, P, SAM, W; 3917 (11) S; 3918 (10) BM, K, P, S, W; s.n. (5) SAM; s.n. (6) K. *Zinn* s.n. (5) SAM.

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