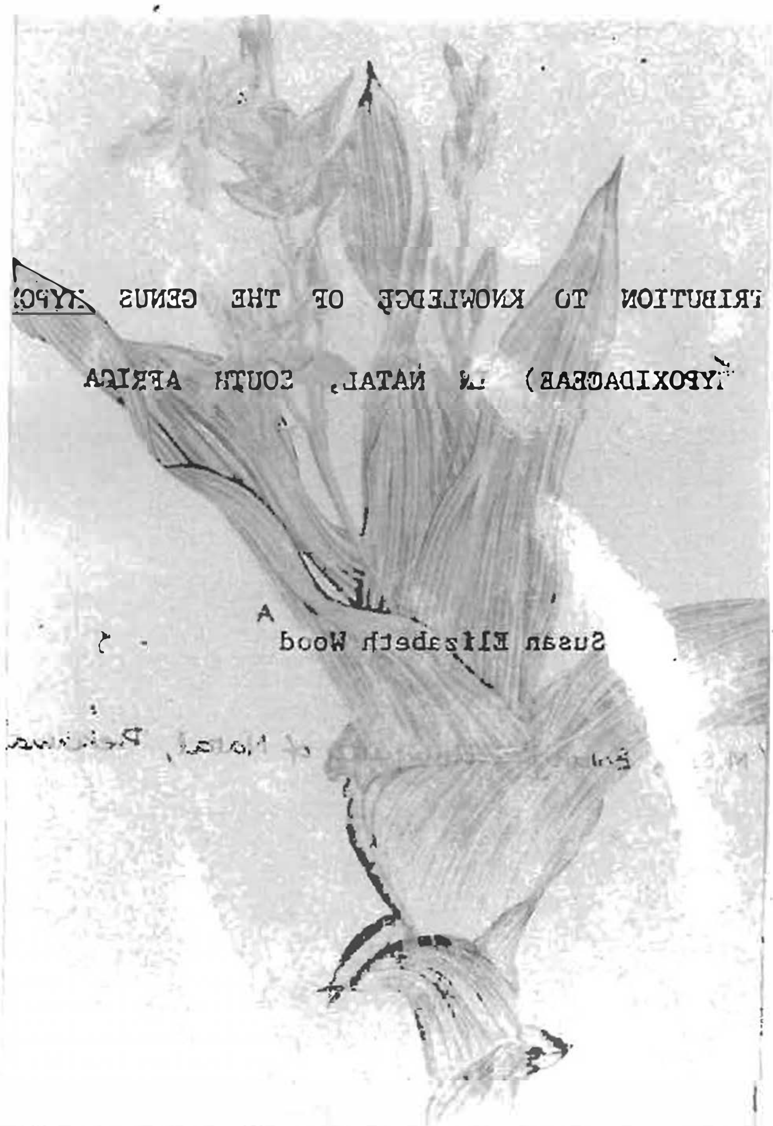
UNIVERSITY OF NATAL

A CONTRIBUTION TO KNOWLEDGE OF THE GENUS HYPOXIS L. (HYPOXIDACEAE) IN NATAL, SOUTH AFRICA.

S.E. WOOD

FRONTISPIECE



Hypoxis latifolia Hook.

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INTRODUCTION

The genus Hypoxis was established by Linnaeus in 1759. It was only a brief description, "Corolla 6 parts, stamens short, ovary inferior." From this unimposing beginning Hypoxis has become known to be pantropical in distribution, and a well known geophyte from the Cape Peninsula to Ethiopia, but especially in South Africa.

Baker (1878 & 1896) and Nel (1914) are the only authors to have revised the genus in southern Africa and indeed to have made any substantial contributions to knowledge of the species. However, both authors, but particularily Baker, were limited by the number of specimens available for study and the amount of field work that could be undertaken, if any at all. Thus concepts of the genus were not complete and no effective key to identification was produced. Nel extended Baker's work but did not attempt to improve upon this author's species descriptions. This, in itself, is a short-coming in Nel's revision because, although he cited more specimens than did Baker, he did not revise the diagnostic characters by which species were recognized. Not surprisingly, the worker attempting to use Nel's monograph for identification of species, often becomes confused and hesitant to be definite about the application of names.

Nel covered all African species. Within this continental framework he recognized eleven groups, six of which were almost exclusively tropical except that in some instances, one southern African species was included.

Because of its greater conciseness and more direct relevance to the flora, it is Baker's work (1896), and especially his key, which is the more widely used by South African botanists. However, as Nel suggested, this work is somewhat unreliable because of the variable nature of the characters on which diagnoses are based.

This thesis has attempted to clarify knowledge of the genus in Natal, and to construct a more effective key to species identification. However as plants of Hypoxis are not restricted to political limits, the boundaries of Natal were not considered in studying species represented within this province. Choice of Natal species as a group for detailed consideration was for two reasons; firstly field work was practical in this area, and secondly, as the genus is not easily subdivided into groups of similar species, some criterion had to be used to decrease the number of species involved.

Thus twenty-one species of Hypoxis were worked on, following their distribution throughout South Africa. Obviously when revisions of the Cape and Transvaal species are undertaken amendments may have to be made to the Natal section. It is hoped that similar revisions for other areas will follow, and that in the foreseeable future there will be an amalgamated revision of the genus in southern Africa, which will include South West Africa, Swaziland, Lesotho and South Africa.

CHAPTER I

THE GENUS

1.1 History

The genus Hypoxis was established by Linnaeus in 1759. Of the three specimens cited by this author only two now belong in this genus, and they are the American species H. erecta L. and H. decumbens L. The third is a member of the genus Colchicum L. (C. montanum L.), of the family Liliaceae.

Since its establishment, Hypoxis has been placed in the families Amaryllidaceae (including subfamily Hypoxidoideae and tribes Hypoxideae and Haemodoreae) and Hypoxidaceae by different authors. Geerinck (1969) in the introduction to his work on the genera of Haemodoraceae and Hypoxidaceae, summarized these placements without discussing them. He maintained Hypoxis in the family Hypoxidaceae, implying that this was the most satisfactory position for the genus. This relationship is accepted in this study of the Natal species.

Descriptions of the genus were compiled by Roemer & Schultes (1830), Herbert (1837), Endlicher (1840), and Salisbury (1866). The last named author grouped the genera Spiloxene and Ianthe with Hypoxis, placing them under Section 2 of the order Hypoxideae. There was no key to the genera, but he listed their main characters (see Table 1). Salisbury did not include species in his work.

Baker in 1878 was the first author to prepare a synopsis of the genus Hypoxis and to construct a key to its world taxa. In his introduction he stated:

genus / character	Hypoxis	Spiloxene	Ianthe
duration of growth	perennial	annual	annual
leaves	3-farious, generally pubescent, sharply keeled	scarious and crenulated at edge	attenuated
perianth segments	yellow	with dark spot at base	yellow
anthers	rachis not confluent with filament	rachis confluent with filament	rachis confluent with filament

Table I. Summary of characters distinguishing Spiloxene and Ianthe from Hypoxis (Salisbury, 1866)

"Another group of petaloid monocotyledons of which a synopsis is greatly needed for daily use is Hypoxidaceae. The latest that is practically usable is that of Roemer and Schultes, published in the second part of the 7th volume of their "Systema Vegetabilium" in 1830. This, for the date, is a full summary of what was known and had been written about these plants; but of a large proportion of the species the authors had no opportunity of examining specimens, and could therefore only cite the descriptions of other writers, without being able to reduce them to one common formula. An author writing under such circumstances is both sure to admit too many species and to fail to appreciate their true relationship."

Baker recognized 4 genera within Hypoxidaceae: Hypoxis, Molineria, Curculigo and Pauridia, and between 60-70 species. He distinguished the genera thus (translation from the Latin):

Perianth tube above ovary lacking or very short. Stamens epigynous.

1. Hypoxis. Fruit capsulate, circumscissile, operculate. Leaves sessile not plicate. C.B. Spei, Afric. trop., Asia australis, America.
2. Molineria. Fruits berry-like. Leaves petiolate, plicate. Asia trop., Australia bor., Ins. Seychell?

Perianth tube extended above ovary. Stamens perigynous.

3. Curculigo. Tube elongated, filiform. Stamens 6. Reg. trop. "utriusque orbis", C.B. Spei.
4. Pauridia. Tube short, funnel-shaped. Stamens 3. C.B. Spei.

In his revision Baker (1878) subdivided the genus Hypoxis into two subgenera, Ianthe (Ianthe et Spiloxene, Salisb.) and Euhypoxis, (Hypoxis, Salisb.).

Ianthe: Plants totally glabrous. (Corm always small, annual. Anthers linear, basifixed. Stigma ± discrete).

Euhypoxis: Plants ± hairy. (Ovary nearly always clothed with setose, erect outspreading dense hairs. Leaves nearly always pilose. Tuber small or large. Anthers nearly always slightly versatile, base sagittate. Stigma nearly always concrete).

In 1896 in Flora Capensis, Baker revised the South African species of Hypoxidaceae. He formulated a more comprehensive, but nevertheless not easily usable, key to the species employing such characters as corm size (an unreliable parameter in perennial plants); flower size; form, nature and hairiness of the leaves; and inflorescence type. Nel commented later: "Such a key is virtually not usable."

Baker's use of "perianth tube" in the generic descriptions was regarded by Nel (1914) as "false terminology" and this was emended by both Bentham & Hooker (1883) and Nel to "rostrum" (beak). It is the extended sterile apex of the inferior ovary.

The most recent monograph of the African genera of Hypoxidaceae is that of Nel (1914). In this he recognized six genera: Hypoxis (Baker's subgenus Euhypoxis), Ianthe (Baker's subgenus Ianthe), Curculigo, Forbesia, Molineria and Rhodohypoxis (Nel, new genus).

Nel was of the opinion that previous authors had attached too great an importance to the nature of the fruit in classification of the genera, and thus species which had nothing in common except the same fruit, were found together in one genus. Forbesia and Curculigo could be separated from Hypoxis and Molineria by the presence of a beak on the fruit, but within the genus Rhodohypoxis several species are beaked (for example R. rubella (Baker) Nel) and others (for example R. baurii (Baker) Nel) are not. This is confirmed by Hilliard & Burtt (1973) who stated: "Thus we find an ovary beak occurs in several groups of monocotyledons, while at the same time it is not always constant in a genus, even in such a small and distinctive one as Rhodohypoxis."

Nel referred to characters used to differentiate genera by previous authors as "by no means constant," and "ambiguous." He distinguished his genera primarily on the form of attachment of the anthers to the filaments.

Molineria, Forbesia, Ianthe: anthers adnate, connate with the base of the filaments (translation from the Latin):

Rhodohypoxis, Curculigo, Hypoxis: anthers basifixed.

Curculigo was distinguished from Hypoxis by the presence of a thread-like beak and berry-like fruit, whereas the latter ~~species~~ genus has perianth segments free to the base while the fruit is a dehiscent capsule.

Rhodohypoxis is the closest genus to Hypoxis (Baker's species H. baurii and H. milloides (Baker) Hilliard & Burtt, were reinstated under Rhodohypoxis). Rhodohypoxis was separated from Hypoxis by Nel by virtue of its red or white flowers, the presence of a perianth tube and its epipetalous, sessile anthers which are different in shape from those of *Hypoxis.* On these characters Nel felt justified in establishing *Rhodohypoxis* as a new genus. Another characteristic used to distinguish these two genera was commented on by Hilliard & Burtt (1973):

> "*Rhodophypoxis* shows marked generic individuality on account of the form of the flower which Milne-Redhead (in Bot. Mag. t 9412, 1935) has very aptly described as having a "blind look": a phrase that sums up the way in which the inner tepals are inflexed in their lower part so that the mouth of the perianth is almost entirely closed."

Nel studied all the African species of *Hypoxis* and classified them into what he called natural groups, six, of the total eleven, of which almost exclusively comprised tropical species. Diagnostic characters used in dividing these groups were the form of the anther apex, the relationship of stigma to style, inflorescence type and leaf venation.

The main criticism of Nel's work is that he did not redescribe any of the species which had already been established, but merely cited more specimens, and thus his concept of these species was not always clear. The characters he used in species differentiation are discussed in detail under "diagnostic characters."

A number of new species of *Hypoxis* have been described since Nel's work, but no other major revision of the genus has been undertaken. At the present time, within the family Hypoxidaceae, revisionary work is being done on *Rhodohypoxis* (Hilliard & Burtt; University of Natal, Pietermaritzburg and Edinburgh University, Scotland respectively) and on *Empodium* and *Spiloxene* (Thompson, University of Stellenbosch, Cape).

Baker (1878) Hypoxis - Euhypoxis - Ianthe Molineria Curculigo Pauridia (later added to the Haemodoraceae).	Bentham & Hooker (1883) Curculigo - Molineria - Empodium Pauridia Campynema (Pax established this as the only representative of the subfamily Campynematoideae of Amaryllidaceae). Hypoxis
Pax (1889) Curculigo - Molineria - Empodium Hypoxis - Ianthe - Euhypoxis	Nel (1914) Hypoxis (Baker's subgenus Euphypoxis) Ianthe (Baker's subgenus Ianthe) Curculigo Molineria Forbesia (Eck. Verz. 4, 1827 Rhodohypoxis (new genus)

Table 2 : A summary of the genera established under the family Hypoxidaceae from 1878-1914.

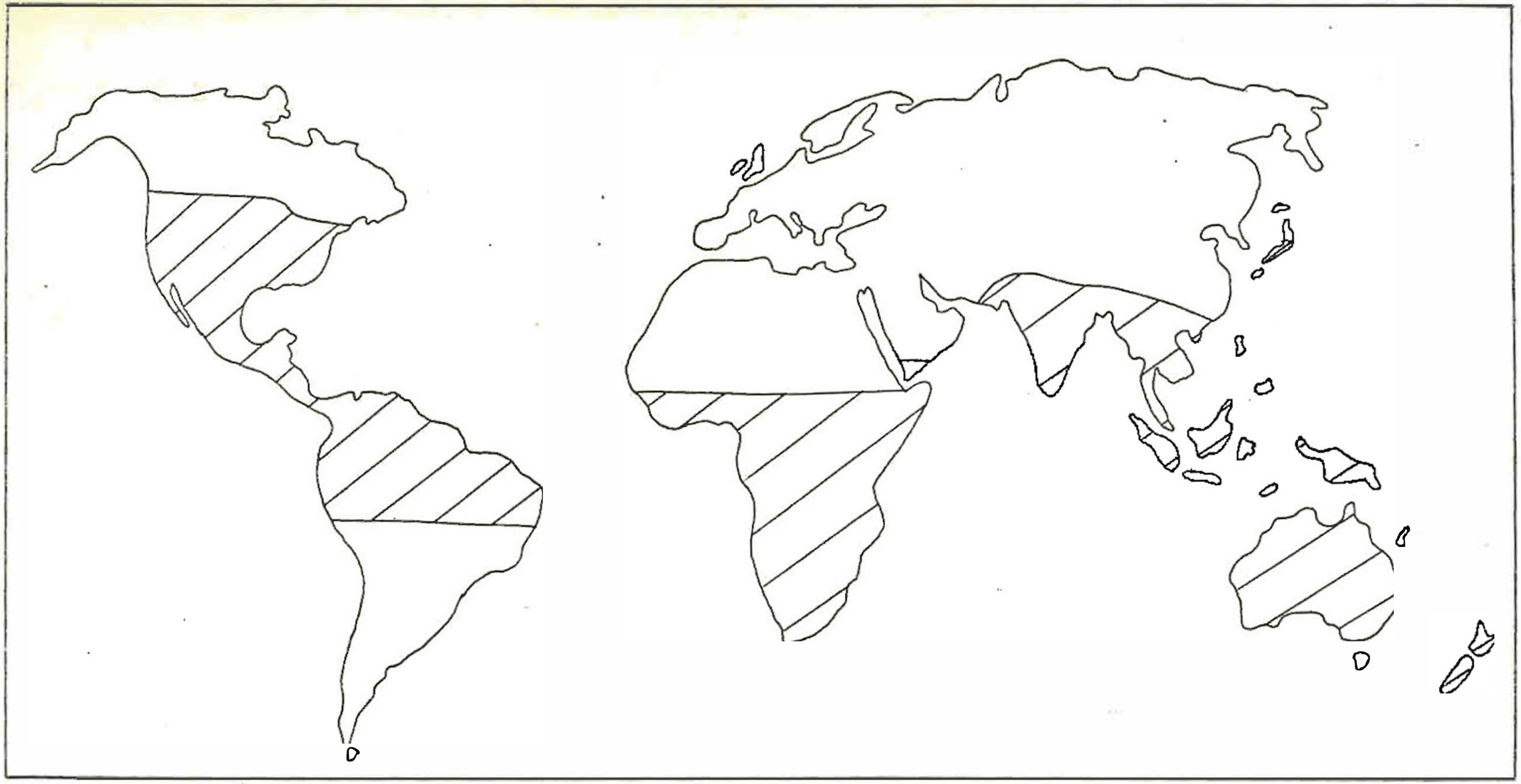


Fig. 1. General known world distribution of Hypoxis Linn. (excluding Ianthe Nel) (sources: Baker (1878), Engler (1964), Geerinck (1969, 1971), Index Kewensis, (1896-1970).

1.2 Geographical Distribution

The genus Hypoxis occurs throughout most of the warm temperate and tropical zones of the world (Fig. 1). It is difficult to determine the precise distributional limits, but the genus is not known to be present in Europe, northern and central Asia, north Africa, Canada and extra-tropical South America.

The largest number of species (53) is found in South Africa, with the greatest concentration in the Cape Province. Figures extracted from Index Kewensis (1895-1970) show that within the rest of Africa there are 46 species in Tropical Africa (including Zaire, East Africa, Angola, Malawi and Rhodesia), 3 in Ethiopia, 1 in Guinea, and 5 in the Cameroons. Australasia has 5 species, Asia 2, and there are 16 in the Americas (including Mexico). According to Baker (1878), "No known species extends its range from one continent to another."

Distribution and Habitat in southern Africa

Hypoxis species are found throughout southern Africa, except in the arid karroid regions of southern South West Africa and the north western Cape. The majority of species that occur in Swaziland, Lesotho, the Transvaal, the Orange Free State, Natal and the northern Cape are perennial, grassveld species and would be classed as typical geophytes following Raunkiaer's (1937) classification of plant life forms. The rootstock, which is responsible for the plant being able to withstand harsh winters, droughts and annual veld burning, is a mucilagenous and resiniferous corm capable of continued growth throughout the duration of life of the plant. One of the genera first to produce aerial parts in spring, Hypoxis plants flower and are pollinated before other constituents of the vegetation, particularly the grasses, reach a competetive height.

Some taxa show little altitudinal preference and the high veld, the mountains and the coast may support the same species. But there are exceptions: H. zululandensis S.E. Wood is known only at the coast; H. interjecta Nel and H. neliana Schinz are not represented at low altitudes.

H. membranacea Bak. and H. parvula Bak., which are among the more fragile, less robust species in the genus, although sometimes occurring in open veld areas, prefer moister, ravine habitats and forest margins. Their corms are very small, (approximately 1 cm in diameter) and the leaves are membranous.

The Hypoxis species found south of Kougaberge, that is in the southern Cape, are distinct from those that occur in the remainder of southern Africa. They tend, on the whole, to be smaller, and are obviously adapted to winter rainfall conditions. Ianthe, a glabrous genus of Hypoxidaceae (separated from Hypoxis by Nel, 1914) is confined to this area.

1.3 Cytology

Very little work has been done on the cytology of Hypoxis. Wilsenach, Warren & Papenfus (1967) compiled chromosome numbers for seven named species and one that was not identified. They also listed chromosome numbers for H. rooperi S. Moore that had been obtained by a previous group of workers (Fernandes & Neves, 1961). The results are summarized in Table 3, which also includes a chromosome number for H. pusilla Hook. (Darlington & Wylie, 1961).

Species	Chromosome Number: Diploid	Chromosome Number: Haploid
H. stellepilis Ker	16	
H. zeyheri Bak.	32	
H. multiceps Buching.	36	
H. longifolia Bak.	72	
H. rooperi S. Moore	(76-)96(-114)	(38-)$\pm$43(-58)
H. acuminata Bak.		18(-20)
H. filiformis Bak.		7
H. sp.		7
H. pusilla Hook.		11

Table 3. Chromosome numbers compiled for Hypoxis species so far investigated.

A basic chromosome number for Hypoxis has not been determined. The suggestion has been made that it is likely to be below 9, as at least one species has 16 somatic chromosomes.

For some at least of the species in which plants are large, chromosome numbers are higher than those recorded for species in which plants are small (for example for H. rooperi n = 38-$\pm$ 43-58, while for H. filiformis n = 7), but no clearly defined polyploid series is evident within the genus at the present stage of knowledge.

Apomixis has not been confirmed for any species so far studied, but Wilsenach et al. (1967), regarded this phenomenon as likely because of the degree of polymorphism, the variation in chromosome numbers, the abnormalities in meiosis of pollen mother cells in the high chromosome number species, the variation in chromosome numbers of pollen grains of the same species, the degeneration of megaspores, and the common occurrence of twin embryo-sacs, that they encountered.

A great deal more research is needed in this field. Because of complexities indicated by the preliminary work already undertaken, this is likely to prove a project in itself. A cytogenetic study was not attempted as part of this thesis. Clarification of the genetic history of *Hypoxis* may enable better understanding of patterns of hybridization and of variation within the genus than is possible at present. In conjunction with comparable studies within related genera, *Ianthe* Salisb., *Curculigo* Gaertn., *Forbesia* Eckl., *Molineria* Colla, *Rhodohypoxis* Nel, *Spiloxene* Salisb. and *Empodium* Salisb., it may also perhaps contribute to the understanding of generic origins within Hypoxidaceae.

CHAPTER 2

THE NATAL SPECIES

2.1 Materials and Methods

2.1.1. Herbarium studies

The foundation of this thesis was laid by the examination of herbarium material in conjunction with reference to relevant literature. From study of dried specimens from a range of localities and habitats, entities were delimited and the gross range of their morphological variation, distribution and ecological preferences determined. Problems requiring further study either in the field or the laboratory were exposed.

Abbreviations?

Specimens from the following herbaria were made available for study: Albany Museum, Grahamstown; Bolus Herbarium, University of Cape Town; Botanical Research Institute, Pretoria and Stellenbosch; British Museum (Natural History), London; Compton Herbarium, Kirstenbosch; Natal Herbarium, Durban; Natal Parks Board, Cathedral Peak; Royal Botanic Gardens, Kew; and the University of the Witwatersrand. All specimens studied are cited (see Chap. 2.5 - Enumeration of Species, for citations, and Appendix for an index to collectors, collectors' numbers and taxa to which the specimens belong).

The method of specimen citation used in this thesis is a modification of the Degree Reference System proposed by Edwards & Jessop (1967), and modified by Edwards and Leistner (1971). The herbarium abbreviations used in the citations are those of Holmgren & Keuken (1974), except for the Natal Parks Board, Cathedral Peak which is designated NPC. Where a collector's number is lacking, either the herbarium number, or the date of collection is quoted, for example (SAM 92654), or (SAM, Oct. 1964), respectively.

2.1.2. Field Studies

Field work was confined to Natal. Population studies enabled more accurate observation of plant habitats, habit and duration of growth, range of morphological variation and duration of flowering. It also often resulted in the extension and refinement of locality records. Of particular value was the opportunity it provided to study hair types and densities, both within plants during seasonal growth, and within and among whole populations. Inflorescence form and the developmental stages of this; ovary form, fruit development and dehiscence and seed maturation were also able to be studied. Character variation with ageing, especially changes in vesture of leaves and inflorescences, could be followed effectively only in living material. Corm size in relation to overall plant size and the nature of the contractile roots were also best studied in the field.

Where possible at least one plant was transplanted and grown under cultivation. This provided a constant source of living material for comparison and for dissection. Specimens collected in the field, especially leaves and inflorescences, were also preserved for anatomical study. Additional herbarium material was prepared where necessary in order to supplement existing collections.

2.1.3. Laboratory Studies

Anatomical investigations of hair types and seed coat structure were made either from hand sections or by embedding in wax and microtoming. A detailed anatomical study, however, was not attempted as part of this thesis. Surface structures of the seed coat were examined on the Transmitting Electron Microscope and the Scanning Electron Microscope. In preparation for scanning, dry seeds from mature capsules were mounted on stubs with double sided adhesive tape, precoated with carbon, and then coated with 250 angstroms of gold palladium in an Hitachi HUS3B coating unit. They were examined in an Hitachi SSM-2 Scanning Electron Microscope and photographed by an Asahi Pentax camera.

NOTE: In all figures the scale-line represents 1 cm unless otherwise stated.

2.2 Diagnostic Characters

Classification within the genus *Hypoxis* depends mainly upon the vegetative characters because of the high level of uniformity in floral structure. The classificatory value of any one of the characters discussed below may differ from species to species, thus identification depends not on single features but on correlations of characters.

In discussing characters used in species diagnosis, I have included comments on features employed by Baker (1878 & 1896) and Nel (1914) in their treatments of the genus.

2.2.1 Rootstock

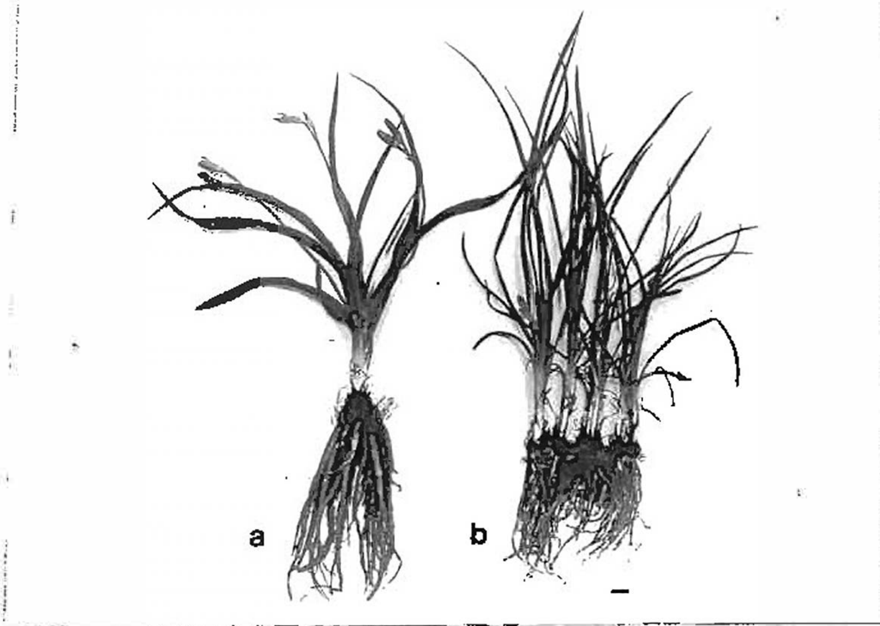
Baker (1896) used corm size to differentiate H. filiformis and H. kraussiana but this is unsatisfactory, especially as overlap in size range occurs.

All taxa possess a fleshy mucilagenous corm that is bright yellow or white internally. Corm sizes range from 0,5-11,0 cm in diameter and shapes vary from oblong to turbinate or globose.

Knowledge of the patterns of growth of corms is very limited. In this study seeds could not be germinated (there seems to be some dormancy system in operation), thus the study of seedlings and the development of young corms was not possible. Until experiment provides a method that will promote seed germination within a reasonable period, study of corm growth is not practical.

Preliminary observations show there to be at least three types of corm growth within the Natal species studied. The first is represented by the H. rooperi (Fig. 2a) in which a single corm persists throughout the life of the plant. Growth is from one apical meristem and usually only one aerial shoot per season is produced. The other types of corm development involve what is probably sympodial branching with the development of lateral buds. One example is H. acuminata where growth is initiated from one apical meristem (Fig. 2b). The corm either remains single or many lateral buds develop. These on growth result in the formation of a "plate" of rootstock material from which many aerial shoots arise (Fig. 3).

H. angustifolia var. buchananii exhibits the growth form in which lateral buds develop into slender rhizome-like portions that later thicken with the deposition of food reserves. The parent corm thus appears to become twisted or knotted (Fig. 4).



H. acuminata: a - plant with unbranched corm and single aerial shoot, b - with "plate-like" corm from which several aerial shoots are developed.

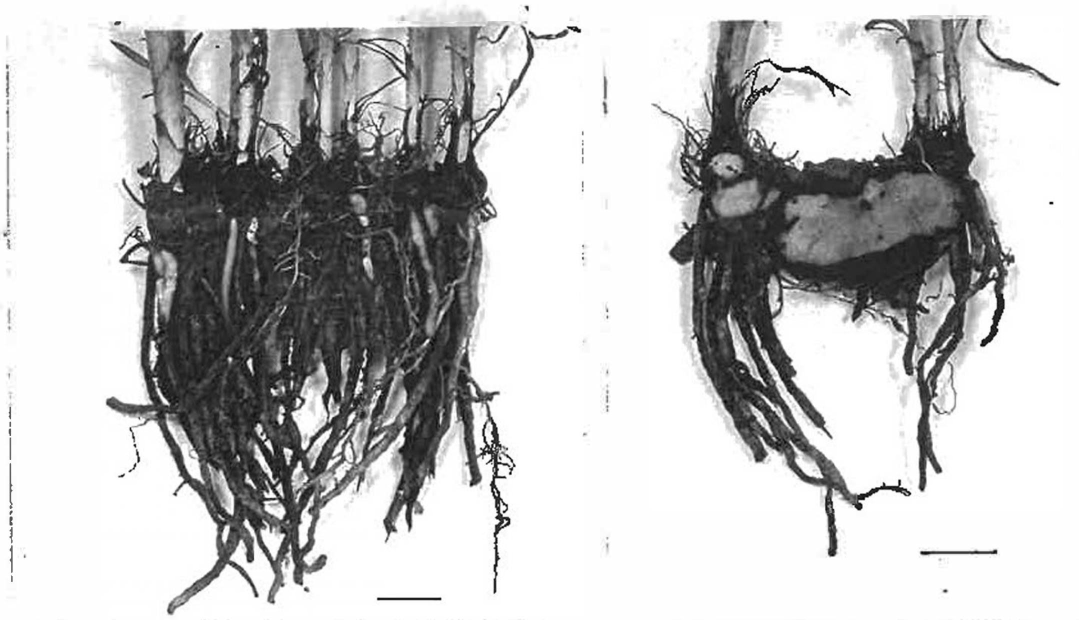


Fig. 3. H. acuminata: left - enlargement of corm of plant b above; right - section of corm of plant b above.

H. angustifolia: plant showing twisted single corm.

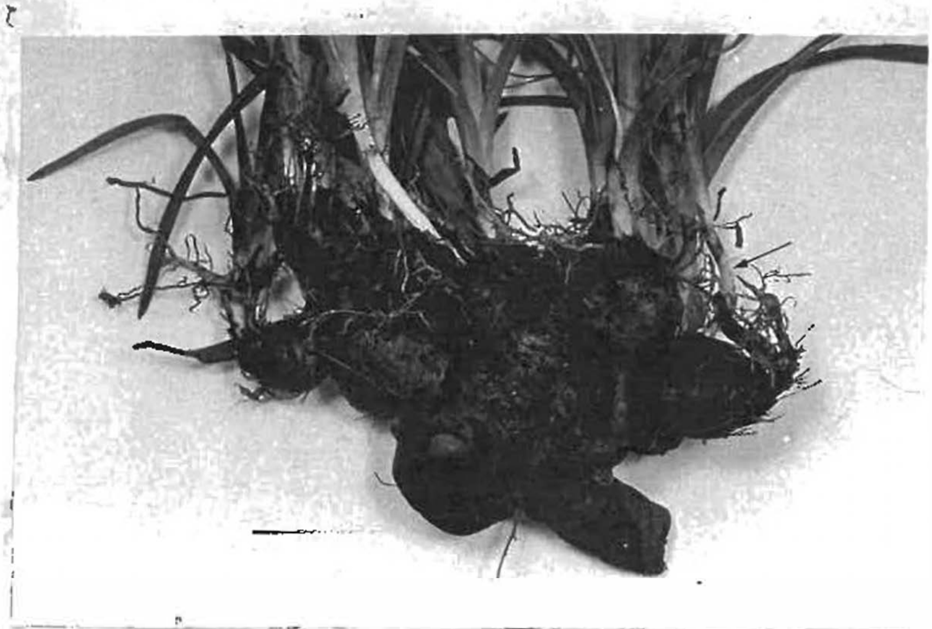


Fig. 4. H. angustifolia: twisted and knotted corm that has probably arisen as a result of sympodial branching.

Note: arrow indicates rhizome-like portion which probably later thickens with deposition of food reserves.

In addition to the above two species, corms of H. multiceps and H. costata were also found to exhibit sympodial growth.

Corm shape and the presence, or not, of sympodial branching often add confirmatory value to an identification.

2.2.2 Leaf

Plants of Hypoxis are acaulescent with the leaves arising directly from the corm, often in three ranks. There is a considerable range in the erectness and rigidity of the leaf, but this organ does provide features of value in diagnosis, especially vesture, venation and shape, in this order of importance.

shape: Leaves may be oblong, lanceolate, linear, acuminate, sickle-shaped or a combination of these forms. The degree of variation in leaf shape differs from species to species. H. filiformis has linear, filiform, subterete leaves which exhibit little variation, while leaves of H. costata vary from oblong to lanceolate and exhibit the most extensive range of variation of any Natal species. Use of leaf shape in identification has its limitations as it is often difficult for the worker unfamiliar with the genus to distinguish between, for example, linear-lanceolate and linear-acuminate leaves. It is, however, a useful criterion in distinguishing extremes. Leaf shape was used by both Baker (1878, 1896) and Nel (1914) in their keys.

Leaf length cannot be used in classification because it is the most variable parameter in the genus. In one year's season length may vary from 10 cm to 100 cm (Figs. 5 & 6), thus making it impossible to give reliably, an average leaf length for any taxon. Nel used this character in separating species within the groups, but it is not satisfactory.

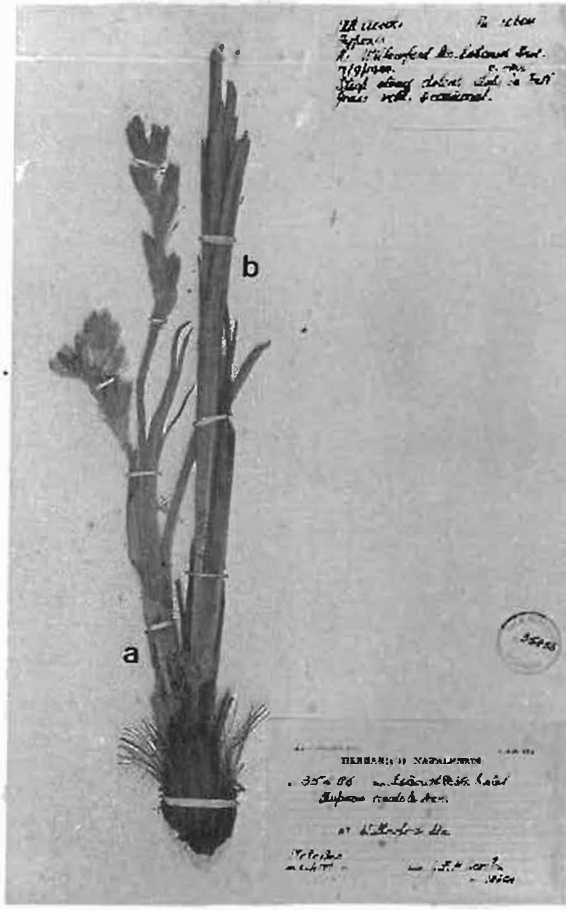
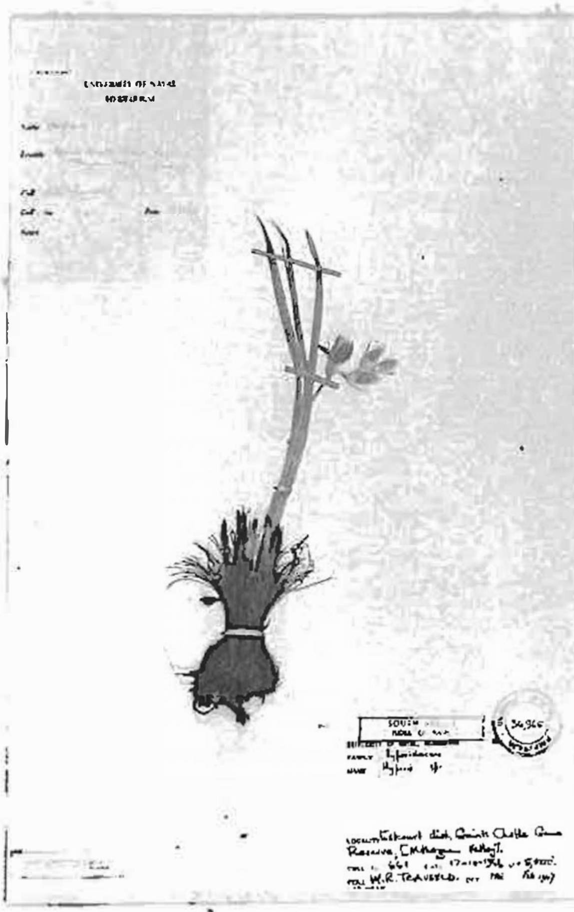


Fig. 5. H. rigidula: plant
a - present year's leaves,
b - last years old leaves
still attached



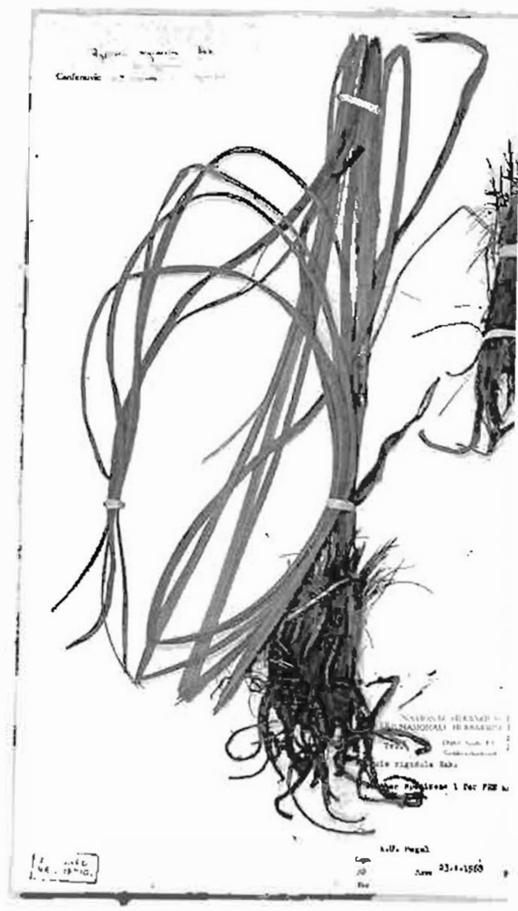


Fig. 6. H. rigidula: two plants showing extremes in leaf length; left: plant with spring growth, leaves short; right: plant with summer growth, leaves much elongated.

Leaf width also tends to exhibit a range of variation within a species, but it again is useful to differentiate extremes, for example the leaf of H. filiformis is not wider than 3,0 mm wide while that of H. galpinii is 1,5-4,5 cm wide. Both Baker and Nel used this character but it is apparent that they often had available only one, or at the most a few, specimens of the taxon for study, and thus could not record accurately the range of variation. This led to difficulties in using their keys.

venation: Nel used leaf venation as one of his major diagnostic characters for differentiating his groups within the genus. A translation from his German text reads as follows:

> The leaf laminae are throughout strongly ribbed, a characteristic as I will say at a later stage, which lends itself well to a systematic classification of the genus. It is established that the number of nerves in the different species is variable. The number of nerves provides not only a good characteristic for distinguishing the different species but it is also very valuable in building groups. Not only does the number of nerves vary but one finds that different nerves themselves are unevenly thickened. One observes that there are numerous species in which on every leaf half one, and more seldom, two ribs are more pronounced in comparison to the others; while by the way of contrast in other species the nerves remain equally thickened.

Diagnostically venation is a good character. However Nel tended to be too adamant as to the number of nerves per leaf per species, and did not take into account range in number according to range in leaf width. The presence of prominent nerves, and the regularity of the nerves are undoubtedly good characters for identification of species in this genus.

vesture: This is probably the most important character in diagnosing taxa within the genus.

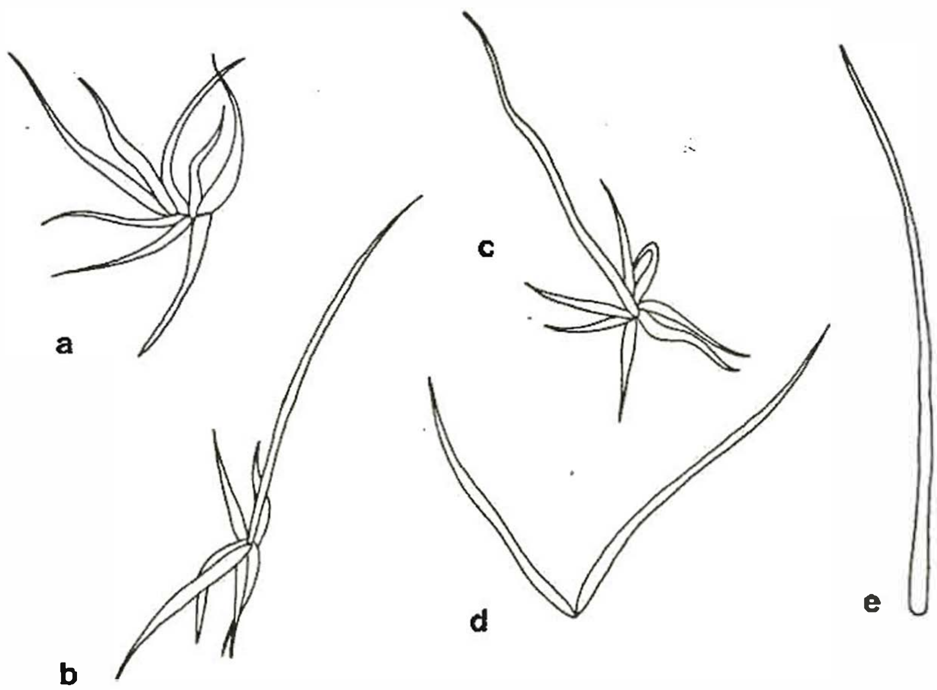


Fig. 7. Hair types represented in the Natal species of <u>Hypoxis</u> - a-c, stellate; d - bifurcate; e - simple.

Plants possess simple, bifurcate or stellate hairs (Fig. 7) that clothe the leaves. Hair type is constant for a species, but often more than one type is represented within a taxon (either simple and bifurcate, or bifurcate and stellate, intermingled). A number of species exhibit similar hair types and thus identification is not possible on type alone. However in conjunction with hair positioning, angle, and colour, good criteria are established for identifying the Natal taxa. Baker used degree of hair covering as a criterion in his key, while Nel used this character as well as hair angle.

Hairs may clothe the entire leaf surface, they may be scattered over the leaf surface without a concentration on margins and keel, or the abaxial surface may be more densely clothed than the adaxial. Hairs may also occur only on margins and keel with the laminal surfaces glabrous. Hair positioning is constant within a species but density may vary. An extreme example of this is H. costata where, although hairs are always found on the keel and margins, the lamina may range from subglabrous to densely hairy (possibly a result of environment). Plants of H. oblonga were also noted to differ in hair density according to aspect. In many Natal species old leaves tended to have fewer hairs in comparison with the younger leaves.

Hair angle is from patent to appressed and is constant within a taxon. Hairs on the leaves of plants of H. argentea var. argentea, a Cape variety, produce a sericeous effect, not present in any Natal species.

Hair colours present within the genus are white, yellow, golden and light and red-brown. This feature is useful in conjunction with other aspects of vesture.

2.2.3 Peduncle

All taxa have one or more axillary peduncles which are usually stellately hairy and terminate in an inflorescence. They are either ancipitous or terete, and in several species they become grooved and subglabrous towards the base. The peduncle is of little importance in classification.

2.2.4 Pedicel

Pedicels are also usually stellately hairy and range in length from 0,1 to 6,5 cm. A range in length is always represented within a taxon. Pedicel length is useful in distinguishing species with subsessile flowers from those with long-pedicelled flowers. It is important to measure the pedicel from the bract and not to include the continuation of the main axis. Baker did not use characters of the peduncle nor of the pedicel in his keys, but Nel used pedicel length in a number of instances.

2.2.5 Inflorescence

Baker (1896) recognized two main forms within Hypoxis, corymbose and racemose. Nel (1914) also recognized these types but substituted as an almost equivalent term, umbels for corymbs, and included spikes. However both authors experienced difficulty in grouping the inflorescences of all the species under these types and introduced the suffix "sub-" as an aid. But with such intermediate possibilities, it became confusing to attempt to recognize and delimit "sub-umbellate", "almost corymbose", "sub-racemose" and "spicate".

Lawrence (1969), based on the earlier work of Rickett (1944), put forward a schematic diagram suggesting the hypothetical evolution

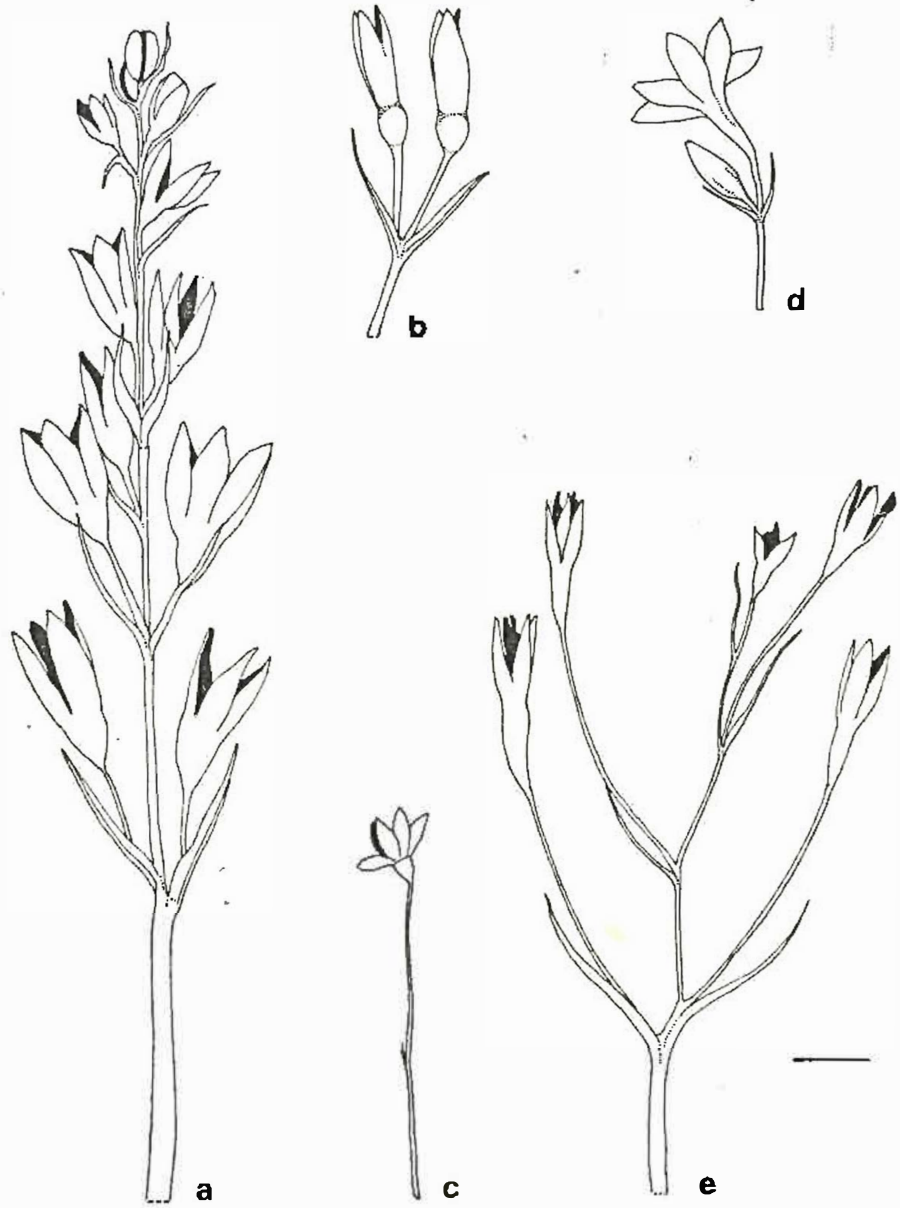


Fig. 9. The range of inflorescence types within the Natal species of Hypoxis. a - raceme, for example H. latifolia; e - corymb, for example H. gerrardii; b, c, d - reduced types not readily placed as racemose or corymbose, for example H. costata, H. parvula and H. filiformis respectively.

of inflorescence types. The following series of diagrams, from this scheme, encompasses the range represented within Hypoxis (Fig. 8).

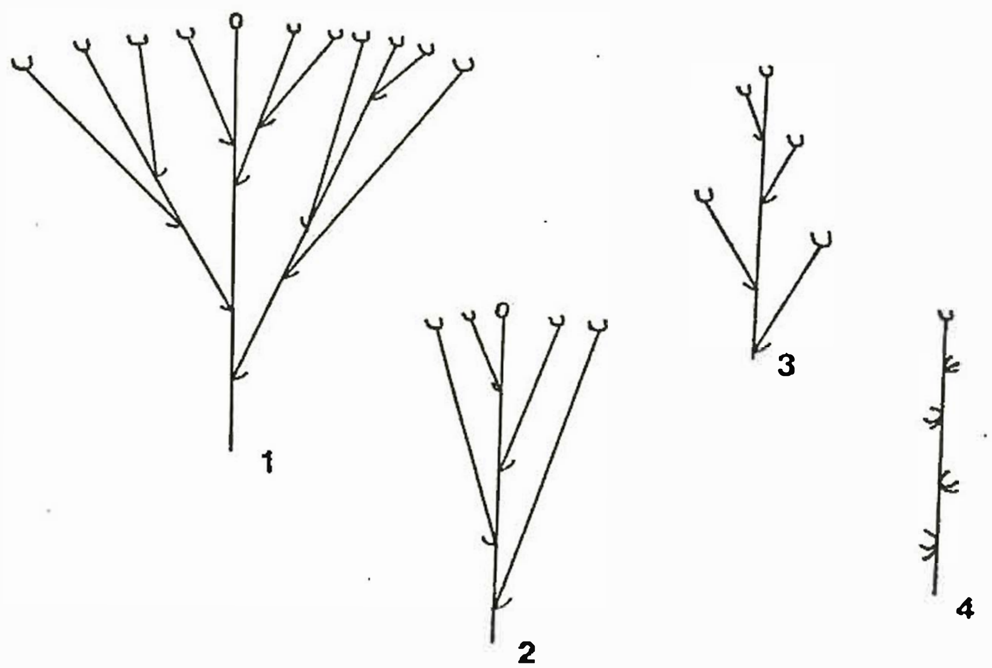


Fig. 8. Inflorescence types (Lawrence, 1969). 1 - compound corymb (not present in Hypoxis); 2 - simple corymb; 3 - raceme; 4 - spike.

However as can be seen from Fig. 9, the inflorescences of Hypoxis do not always fit conveniently into these types. The two extremes are well defined, corymbose (for example H. gerrardii, Fig. 9e) and racemose (for example H. latifolia, Fig. 9a). These extremes together with a reduced inflorescence (H. parvula which is always only 1-flowered, Fig. 9c), may be used in species diagnosis. However, many examples of the Natal species fall between the extremes of corymb and raceme. In such intermediates the inflorescence type cannot be decided from consideration of the mature flowering head alone. Even if developmental stages are studied it is not always possible to differentiate corymbose from racemose examples. Thus inflorescence form is far from reliable in diagnosis, except in special cases.

2.2.6 Perianth segments

The six, free perianth segments of all taxa are oblong to oblong-lanceolate. A considerable range in size is represented within a taxon, and overlap among different species occurs. This character has not been used in the key or in the descriptions.

Baker placed considerable emphasis on perianth length in his key (1896). Nel also used this parameter occasionally but did not place emphasis on it, nor did he use shape. A translation from his text in German reads as follows:

> The form of the perianth segments offers no characteristics for classification because it changes very frequently and is not even always constant in the same plant.

The segments are either yellow or white. Only H. parvula (which also has plants with yellow segments), and H. membranacea have white perianth segments.

2.2.7 Stamens

There are always six free stamens connate to the base of the perianth segments. The filaments are filiform or subulate, equal or unequal (usually in two groups of three with the longer filaments

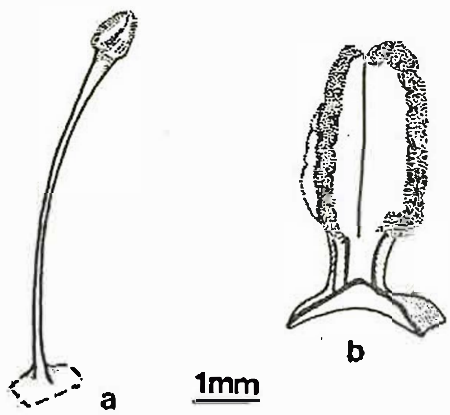


Fig. 10. Stigmatic types represented within Hypoxis:
a - H. membranacea and H. parvula,
b - all other taxa

attached to the outer segments). Anthers are lanceolate, sagittate and versatile with their apex entire or bifurcate.

The most important features are the lengths of the filaments and the state of the anther apex (i.e. bifurcate or entire). These are constant within a taxon but I have not used them in the key firstly because I have concentrated more on vegetative features, and secondly because similar species often have the same type of stamen.

Nel attaches great importance to the anther apex, and in fact separates two groups on this feature alone:

> At the point the anthers are either clefted or unclefted. A characteristic which I have used for the classification of the species.
> (translation from the German text)

Baker (1896) made no reference to this character.

2.2.8 Stigma and Style

There are two distinct types of stigma and style within the Natal species:

a) that of H. membranacea and H. parvula: the style is long and filiform with a minute stigma that appears globose. This stigma is most probably a very reduced form of that described in b) (Fig. 10a);

b) that of all other taxa: the style is cylindrical, subulate, or the stigma is subsessile. The stigma is a concrete structure consisting of three fused lobes. It is pyramidal in shape and has three concave faces. (Fig. 10b).

Variation in stigma size between the taxa is negligible. In some specimens the stigma lobes separate, but this is not a constant phenomenon and is most probably attributable to age.

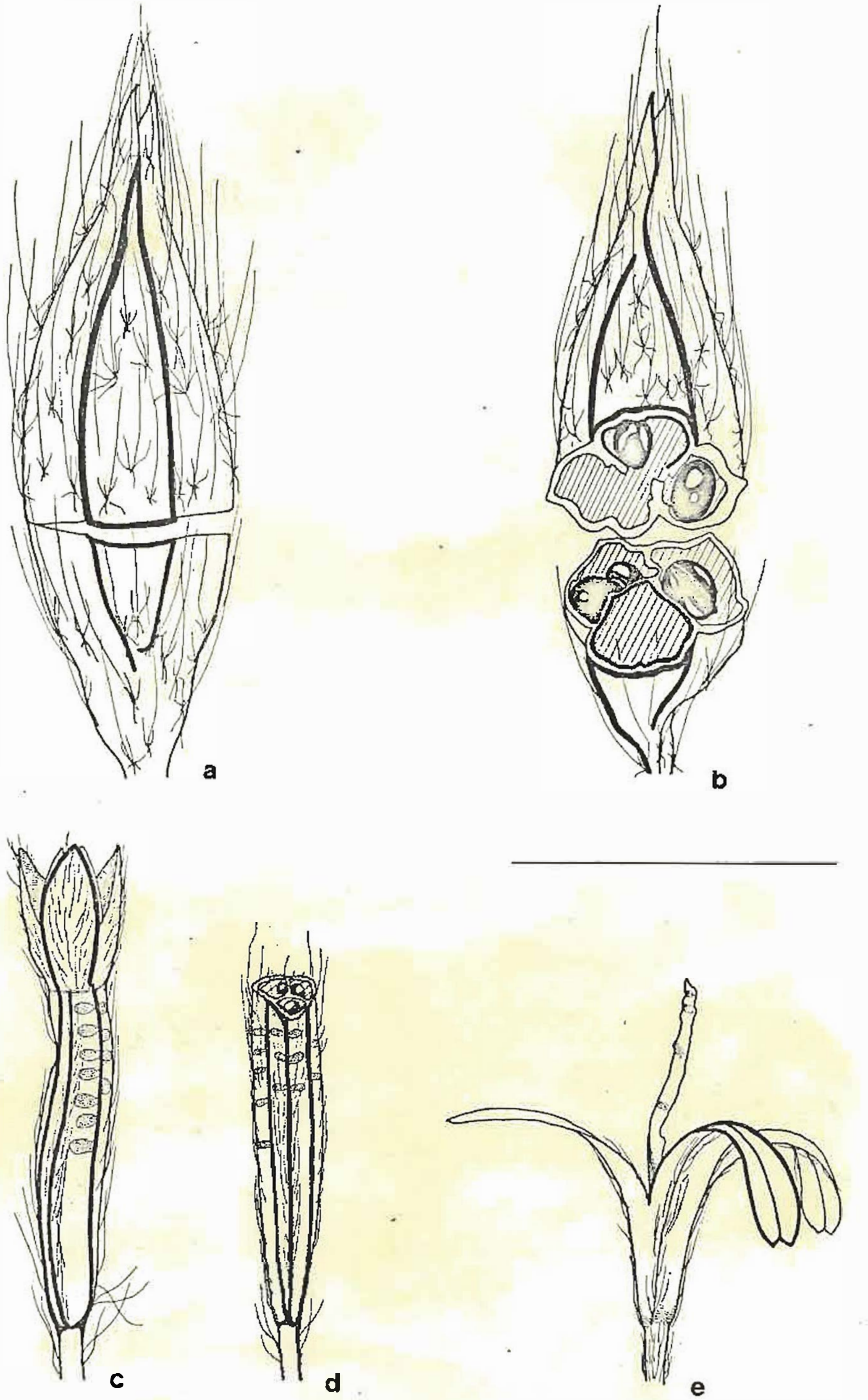


Fig. 11. Dehiscence mechanisms of capsules: a & b - H. latifolia (capsule opens by circumscissile dehiscence, with no lateral splitting of valves); c, d & e - H. angustifolia (circumscissile dehiscence followed by the splitting of three longitudinal valves).

I have only used these characters to separate out H. membranacea and H. parvula. Nel however attached great importance to the relationship of stigma to style and separated some of his groups on this character:

> The groups Angustifoliae, Orbiculatae, Infaustae, Recurvatae and Subspicatae are characterized by a style which is either longer than the stigma or approximately the same length. A sessile stigma or a stigma which is much longer than the style is characteristic of the groups Argenteae, Nyassicae, Oligotrichae, Rigidulae and Obtusae.
> (translation from the German text)

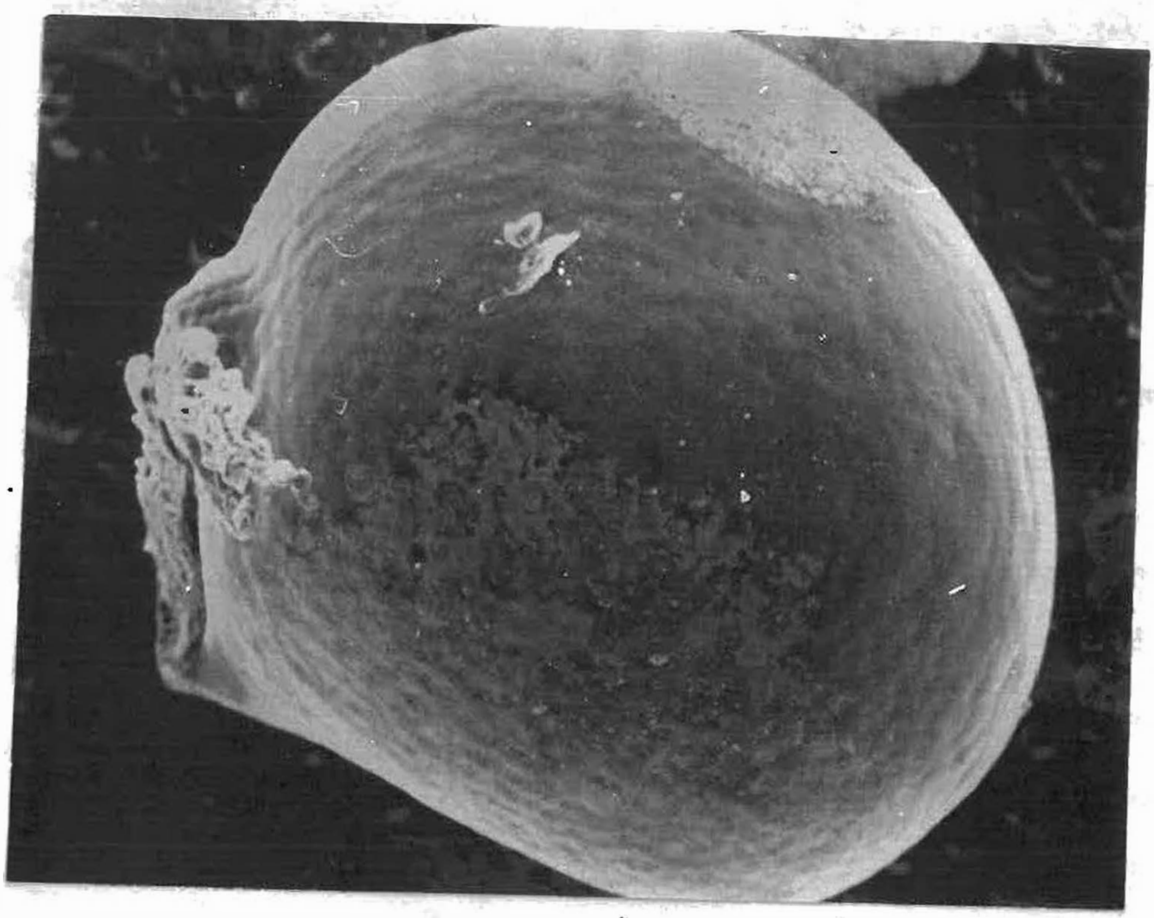
Nel also distinguished H. membranacea on this character, but Baker did not use it in his key.

2.2.9 Fruit

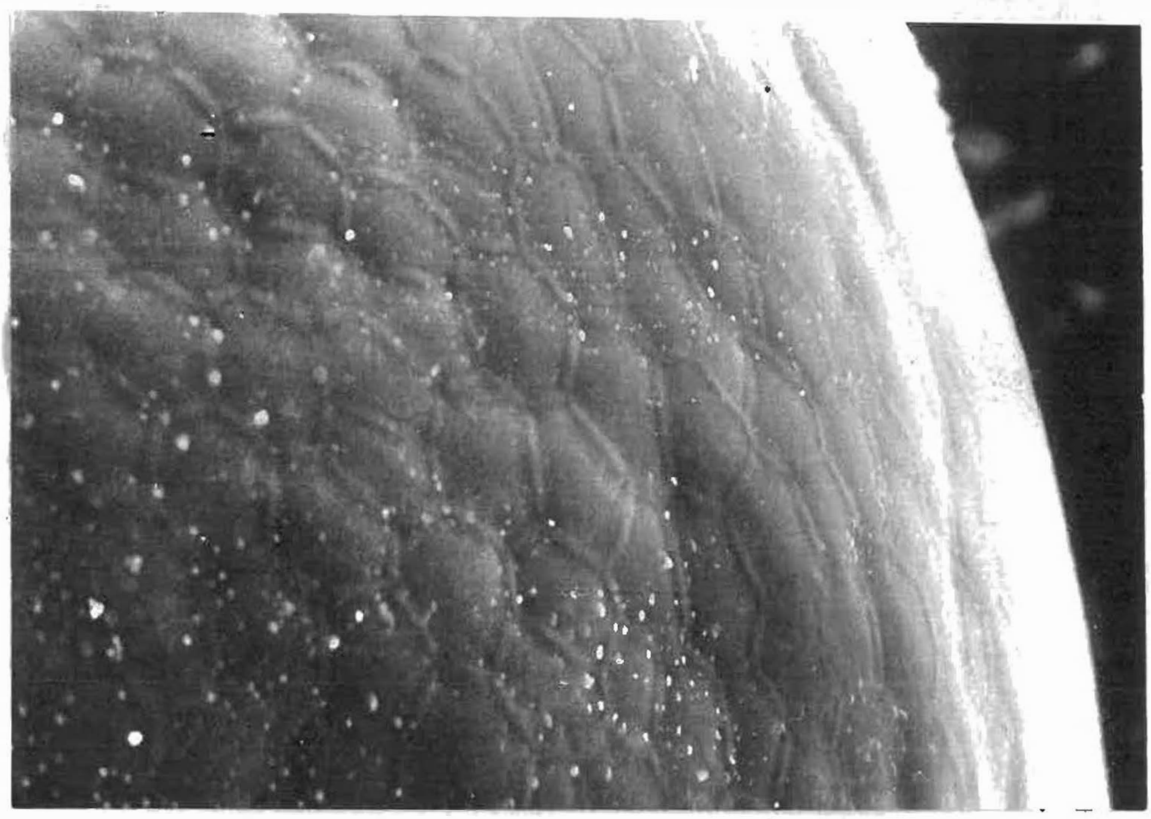
The fruit of Hypoxis has, from the earliest descriptions (Baker, 1878) been the chief character in distinguishing the genus within the family Hypoxidaceae. The fruit is a capsule which opens by circumscissile dehiscence below the apex (Fig. 11). In two species, H. angustifolia and H. gerrardii, the dehiscence proceeds further This involves splitting of the three valves longitudinally. The three portions of the capsule bend backwards and expose the seeds and placenta. (Fig. 11). Capsules on plants of H. latifolia have also shown this feature but only after the seeds were shed, and the inflorescence had become dry and shrivelled. It therefore appears probable that all species have the potential for these valves to split, but that it is not often realized.

2.2.10 Seed

Mature seeds are black with a similar obconic shape and pronounced projecting funicle and micropyle that lie in close proximity to one another. There are two groups, smooth-coated and papillate



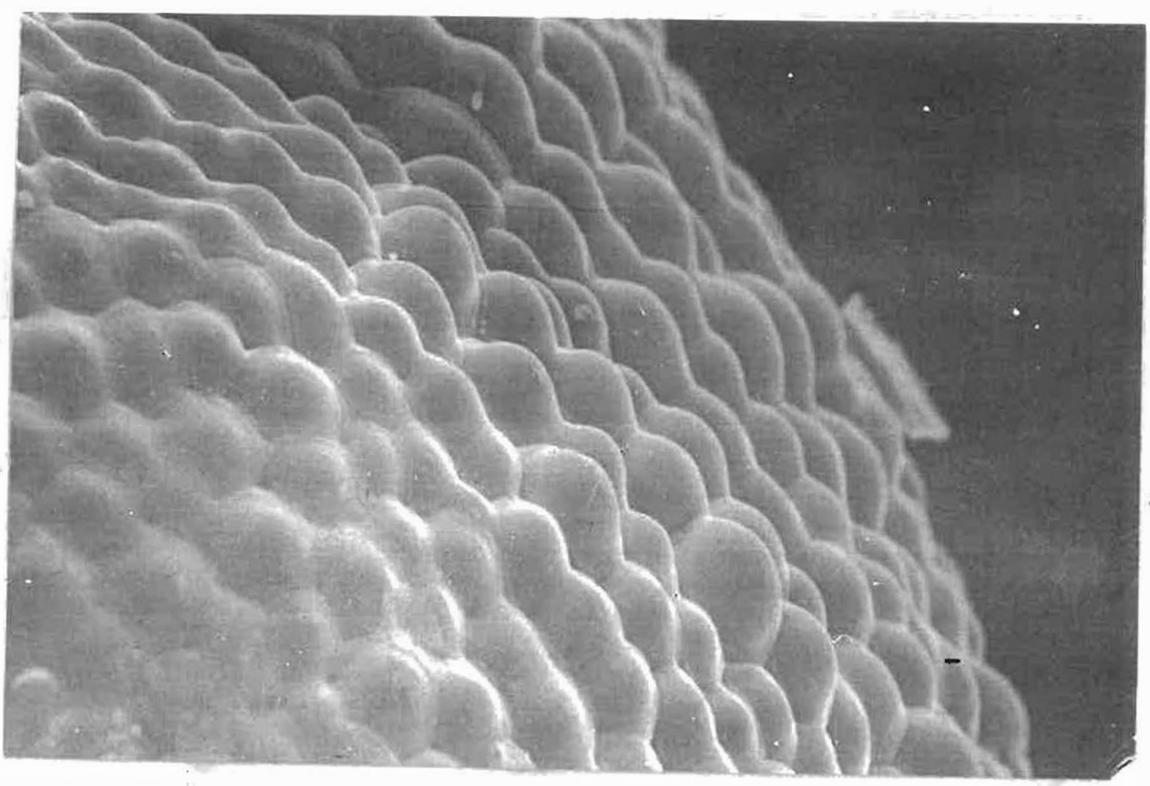
a



b

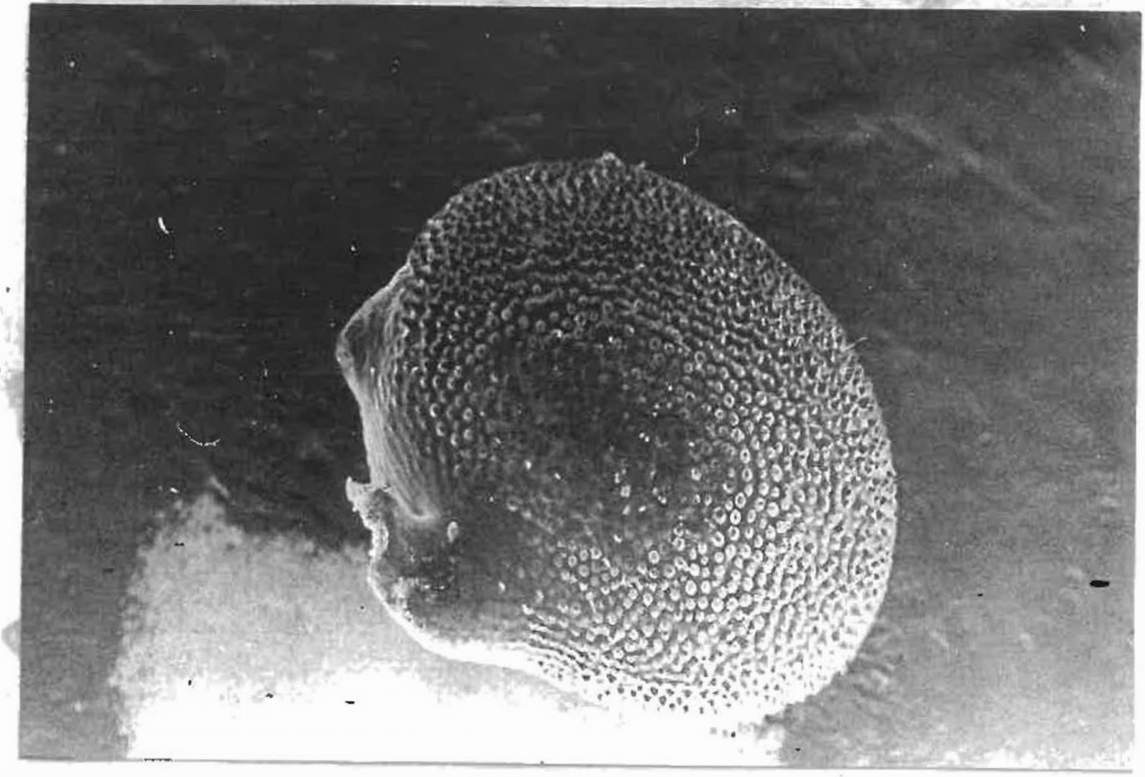
Fig. 12. H. costata: a - seed (plate width = 2,3 mm);
b - external features of seed coat (plate width = 0,58 mm).

a

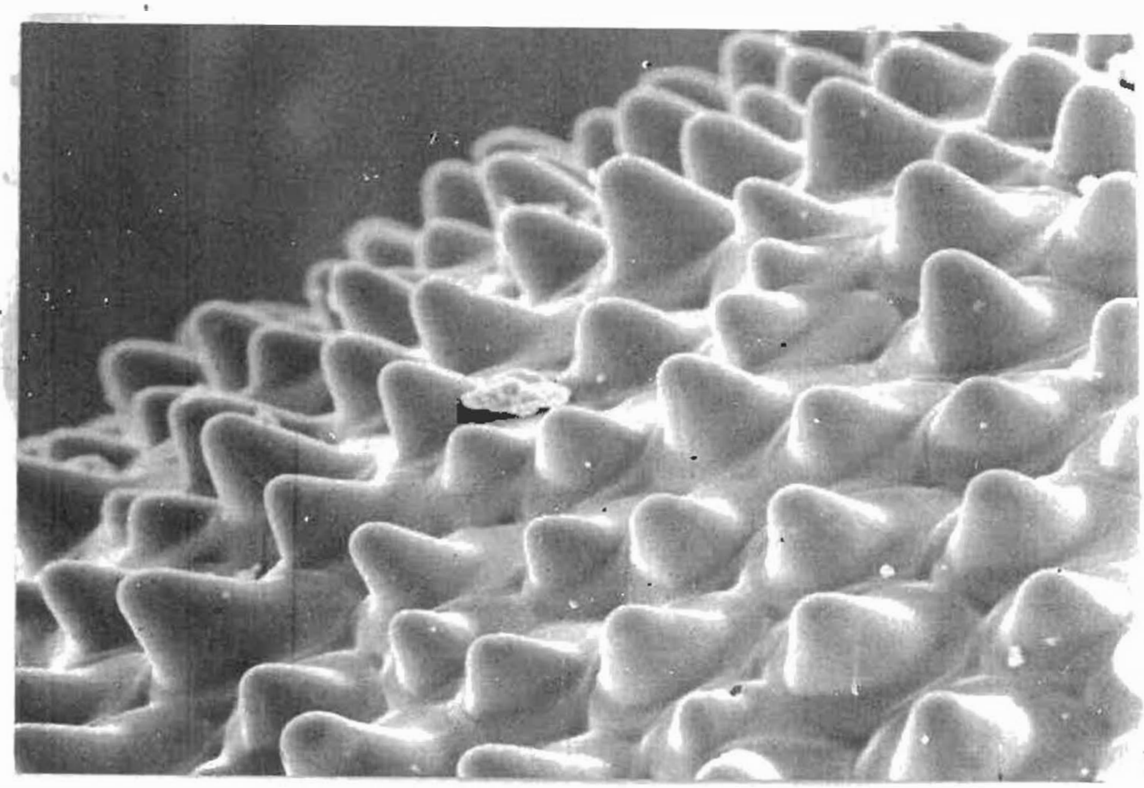


b

Fig. 13. H. latifolia: a - seed (plate width = 5,7 mm);
b - external features of seed coat (plate width = 0,57 mm).

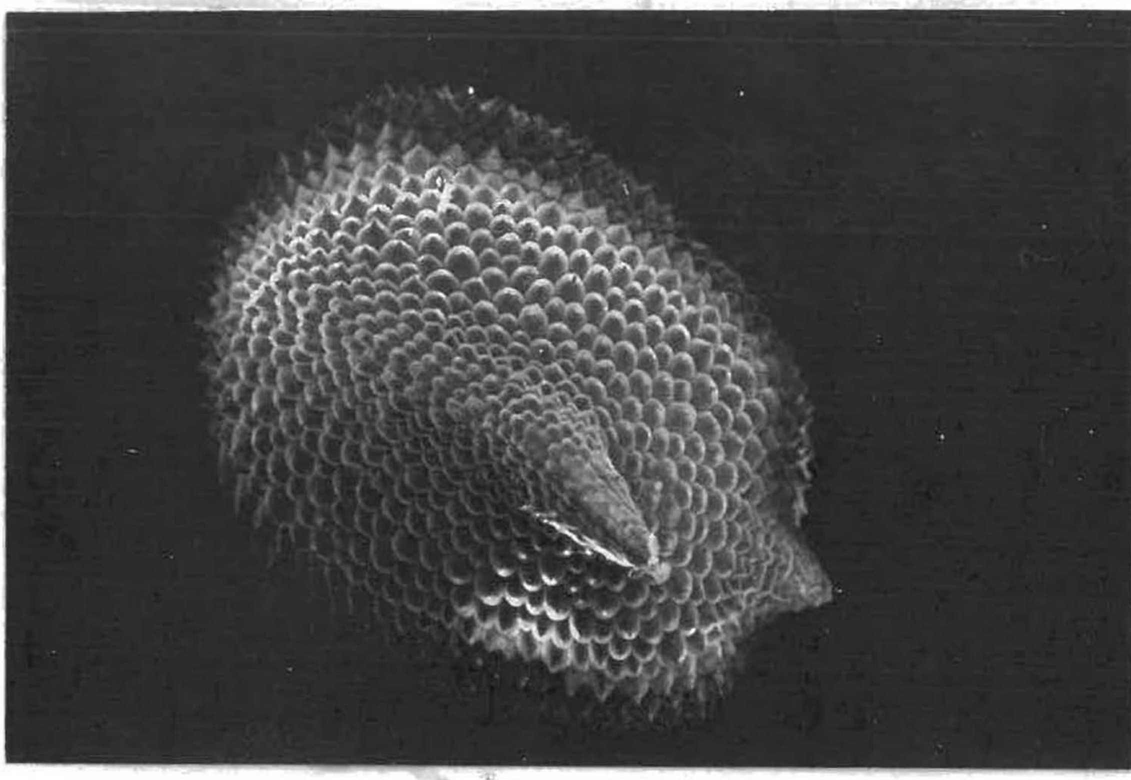


a

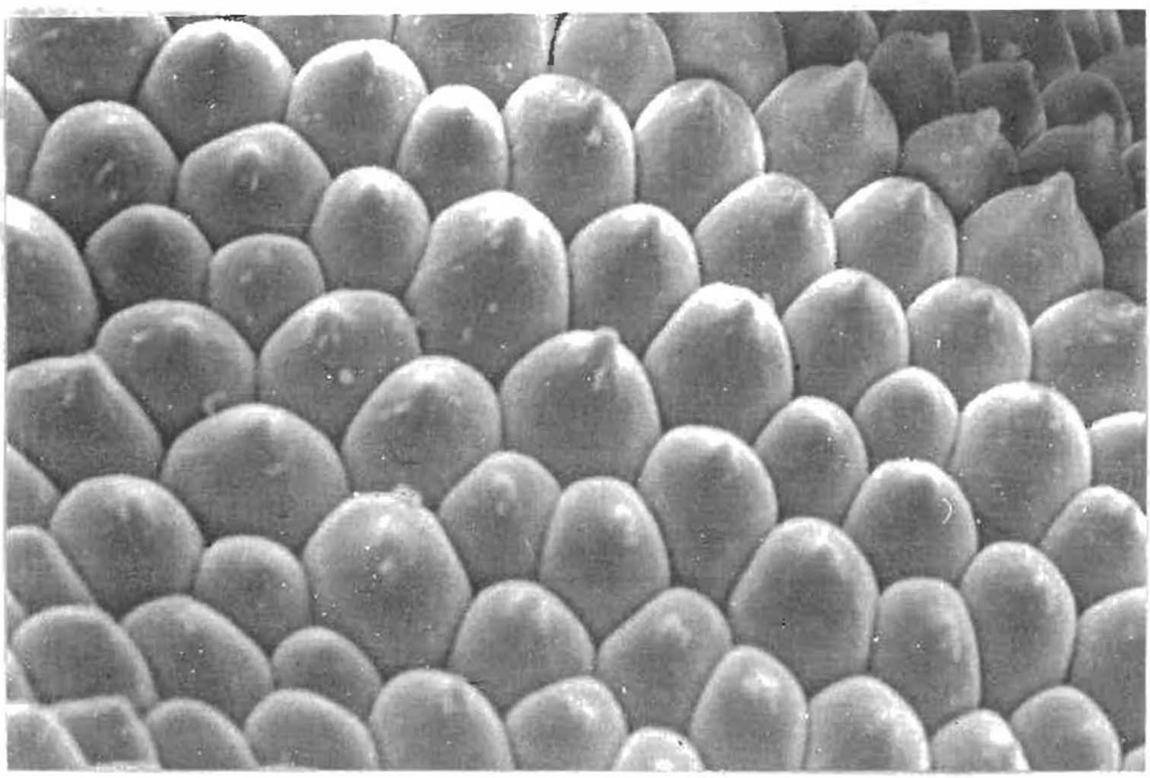


b

Fig. 14. H. obtusa: a - seed (plate width = 5,7 mm);
b - external features of seed coat (plate width = 0,57 mm).



a



b

Fig. 15. H. angustifolia var. buchananii: a - seed (plate width = 2,3 mm); b - external features of seed coat (plate width = 0,57 mm).

(Figs. 12-15 show the range that occurs within the Natal species).

The seed coat was hard and impermeable (even when cracked, seeds would not germinate). This led to difficulty in cutting sections which were needed in order to determine whether the papillae developed with maturation of the seed coat, or whether they were present at an early stage of development.

Results showed there to be no clear-cut difference in seed surface structures between the species. Thus this feature is not satisfactory for diagnostic distinction between the two groups, nor in the identification of individual taxa.

2.3 Description of the Genus

This description is relevant to the Natal species only. With a full revision of the genus in southern Africa, amendments may be necessary.

Hypoxis L. Syst. Nat. 10;7 (1759); Gen. Pl. no. 417 (ex parte) (1764); Roem. et Schultes, Syst. Veg. 7, 46:759 (1830); Herbert, Amaryll. 65 (1837); Endl. Gen. no. 1264 (1840); Salisb. Gen. Pl. Fragm. 44 (1866); Baker in J. Linn. Soc. 17:98 (1878) (excluding subgenus Ianthe); Bentham & Hooker, Gen. Pl. 3, 2:712 (1883); Pax in Naturl. Pflanzen 2, 5:121 (1887); Baker in Fl. Cap. 6:178 (1896) (excluding subgenus Ianthe, H. milloides and H. baurii); Nel in Engl. Jahrb. 51:239 (in clavi) (1914); Phill. Gen.: t. 1230 (1951).

Herbs perennial with a fleshy, mucilaginous corm, acaulescent. Leaves 2-many, filiform, lanceolate, linear or oblong, hairy or glabrous, often conspicuously nerved, the first leaf is a membranous sheath surrounding a neck formed from the bases of the inner leaves, and usually situated below ground level; remnants of old leaves form bristles crowning the corm. Peduncles ancipitous or terete, hairy, especially immediately below the flowering portion. Inflorescence scapose, axillary, 1-many flowered. Flowers pedicelled or subsessile, bisexual, regular, epigynous. Bracts subtending pedicels, rarely absent, linear or linear-subulate, hairy along keel. Ovary inferior, clavate-oblong, hairy, trilocular. Perianth segments six, free, ovate-oblong, in two ranks, the outer yellow or white and glabrous adaxially, green or green and yellow and hairy all over abaxially; the inner as above except that there is only a central vertical line of hairs abaxially. Stamens six; filaments attached to the base of the perianth segments, subulate or filiform, equal or unequal, if unequal usually the outer longer than the inner; anthers 2-celled, versatile, lanceolate, sagittate, apex entire or bifurcate. Style cylindrical, subulate, filiform or stigma subsessile. Stigmas three, free or concrete with three concave faces; pyramidal and equal to or longer than the style, or spherical and minute. Fruit a capsule opening by circumscissile dehiscence below the apex, sometimes accompanied by the splitting of three valves of the capsule. Seeds many, black, round to elliptic-oblong, with funicle and cone-like micropyle forming two protuberances on the same side of the seed, outer coat smooth or papillate.

2.4 Key to the Natal Species

1. Leaves glabrous 2

   Leaves hairy 3

2. Leaves 1,0-1,5 cm broad; inflorescence 2-flowered ....
   .... 3. H. interjecta

   Leaves 2,5-11,0 cm broad, often overlapping, at least basally, to form a funnel; inflorescence 6-21 flowered . 1. H. latifolia

3. Stigma spherical, minute, ± ~~5,0~~ 0,5 mm long, much shorter than the filiform style that is usually ± 3,0 mm long 4

   Stigma concrete, pyramidal with 3 concave faces, equal to or longer than the cylindrical or subulate style 5

4. Inflorescence 1-flowered, perianth segments yellow or white adaxially, bracts absent or only one that is 1,0-4,0 mm long
   .... 21. H. parvula

   Inflorescence 1-3 flowered (on a plant there will always be one peduncle that is more than 1-flowered), perianth segments white adaxially, bracts 2, 0,3-0,6 cm long ..... 20. H. membranacea

5. Leaf hairs brown 6

   Leaf hairs yellow, golden or white 7

6. Hairs light brown, scattered over both surfaces of the leaf
   .... 19a. H. sobolifera var. sobolifera

   Hairs red-brown, densely covering both surfaces of the leaf
   .... 19b. H. sobolifera var. pannosa

7. Leaf hairs golden giving a sericeous effect to the leaf ... 8

   Leaf hairs white or yellow 9

8. Hairs appressed, densely covering abaxial surface of the leaf
.... 16a. H. argentea var. argentea
Hairs appressed, situated predominantly on margins and keel, scattered over the lamina of the leaf ....
.... 16b. H. argentea var. sericea

9. Leaves membranous 10
Leaves not membranous 12

10. Leaves sickle-shaped, hairs stellate or bifurcate or both types intermingled, patent, situated predominantly on margins and keel .... 18. H. lata
Leaves lanceolate, linear-acuminate or oblong-lanceolate, hairs simple and bifurcate intermingled, not patent, scattered over the leaf surface 11

11. Leaves lanceolate or linear-acuminate, 0,2-0,9 cm at widest point, semi-erect .. 17a. H. angustifolia var. angustifolia
Leaves lanceolate to oblong-acuminate, 0,6-1,7 cm at widest point, flaccid .... 17b. H. angustifolia var. buchananii

12. Leaves sickle-shaped 13
Leaves not sickle-shaped 15

13. Leaf hairs stellate and bifurcate, dense on margins and keel, usually appressed, lamina glabrous to pilose 14
Leaf hairs stellate and bifurcate, often U-shaped, mainly on keel and margins, but not dense, patent, lamina glabrous to pilose .... 18. H. lata

14. Laminal hairs lying in channels between the ribs ....
.... 6a. H. rigidula var. rigidula

Lamina glabrous or occasionally with scattered hairs at the base .... 9. H. obtusa

15. Leaves rigid, erect, linear, linear-lanceolate, linear-acuminate, (rarely oblong-lanceolate), filiform or subterete 16
Leaves not rigid, or, if rigid, oblong to oblong-lanceolate or sickle-shaped 19

16. Leaves linear, 0,1-0,3 cm at widest point, hairs yellowish, predominantly bifurcate, appearing U-shaped, situated mostly along margins and keel .... 13. H. neliana
Leaves not as above, hairs white 17

17. Leaves with a prominent vein on either side of the keel, hairs, if present, not appressed 18
Leaves not as above 22

18. Leaves 0,2-1,5 cm at widest point, laminal hairs bifurcate, scattered to dense on both surfaces (abaxial surface usually more densely covered than adaxial surface) ...... 8. H. oblonga
Leaves 1,5-4,5 cm at widest point, laminal hairs lacking, if present stellate, scattered on prominent ribs .. 2. H. galpinii

19. Leaves 0,1-0,3 cm at widest point, ribs 6-12 regular, hairs predominantly bifurcate, scattered over the whole leaf surface not concentrated on margins and keel; inflorescence 1-4 flowered, first formed flower with longest pedicel, youngest flower usually subsessile 20
Leaves 0,2-1,3 cm at widest point, ribs 6-20, irregular, hairs stellate (predominant) and bifurcate intermingled, dense on margins and keel, and lying in channels between the ribs, or both surfaces of the lamina woolly or white appressed hairy;

inflorescence 2-11 flowered, flowers usually subsessile 21

20. Leaves lightly pilose all over, hairs fine, white, simple and bifurcate intermingled, not patent; peduncles silky villous below inflorescence becoming subglabrous towards the base .... 12. H. filiformis

Leaves sparsely to densely covered with white, stellate and bifurcate (predominant) hairs intermingled, usually patent; peduncles hairy all over, hairs patent .... 14. H. kraussiana

21. Laminal hairs appressed, lying in the channels between the ribs .... 6a. H. rigidula var. rigidula

Lamina woolly or densely white appressed hairy on both surfaces, hairs not confined to channels between the ribs .... 6b. H. rigidula var. pilosissima

22. Leaves rigid or semi-rigid or markedly sickle-shaped 23

Leaves not rigid, not sickle-shaped 26

23. Leaves lanceolate to oblong-lanceolate, never twisted with age, hairs yellowish (especially on inflorescence); inflorescence 1-5 flowered 24

Leaves linear-lanceolate or lanceolate, occasionally long and twisted with age, hairs white or opaque, inflorescence 2-15 flowered 25

24. Leaves with thickened submarginal vein, lamina glabrous to densely hairy, hairs if present, predominantly bifurcate .... 5. H. costata

Leaves without thickened submarginal vein, lamina densely hairy, hairs short, stellate, rarely with bifurcate intermingled .... 4. H. multiceps

25. Leaves sometimes in 3-ranks, linear-lanceolate, slightly sickle-shaped, becoming twisted and curving backwards with age, lamina glabrous or occasionally with scattered hairs at the base, keel and margins covered with white, opaque, appressed hairs .... 9. H. obtusa

Leaves clearly 3-ranked, lanceolate, sickle-shaped, not becoming twisted with age, hairy all over (abaxial surface more densely covered than adaxial) .... 10. H. rooperi

26. Leaves 0,1-0,4 cm at widest point, hairs dense on keel and margins, lamina glabrous or with hairs mainly at the base between the ribs; or leaf lightly pilose all over, hairs not U-shaped 27

Leaves 0,4-1,2 cm at widest point, hairs woolly villous all over; or sparse on adaxial surface, dense on abaxial surface, hairs to keel and margins often U-shaped 28

27. Leaves linear, 0,3-0,4 cm at widest point, with 10-20 uniform ribs, hairs stellate, dense on keel and margins, lamina glabrous or hairs mainly at the base between the ribs .... 11. H. zululandensis

Leaves linear 0,1-0,3 cm at widest point, with 6-8 prominent ribs, hairs simple and bifurcate, lightly pilose over leaf surface .... 12. H. filiformis

28. Leaves linear-lanceolate, with usually 2 (seldom 4) prominent ribs, hairs fine, whitish-golden, woolly villous all over; hairs on margins and keel not U-shaped ...... 15. H. gerrardii

Leaves linear-lanceolate or linear-acuminate, ribs 6-12, hairs patent, stellate or bifurcate, sparse on adaxial surface, dense on abaxial surface, hairs to keel and margins often U-shaped .... 7. H. acuminata

2.5 Enumeration of species

1. Hypoxis latifolia Hook. in Bot. Mag. t. 4817 (1873); Baker in J. Linn. Soc. 17:115 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:232 (1893), et in Fl. Cap. 6:185 (1896); Medley Wood, Fl. Natal:132 (1907); Bews, Fl. Natal & Zululand: 65 (1921). Type: South Africa, Natal, Adlam s.n. (K, holo.!)

   H. colchicifolia Baker in J. Bot. (Lond.):3 (1889), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6:186 (1896). Type: South Africa, s.n. Bull (K, holo.)

   H. oligotricha Baker in J. Bot. (Lond.):3 (1889), in Dur. & Schinz, Consp. Fl. Afr. 5:232 (1893), et in Fl. Cap. 6:187 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:321 (1914); Bews, Fl. Natal & Zululand:65 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Clairmont, Medley Wood 1170 (NH, holo.!)

Corm 4,0-7,0 cm in diam., globose-turbinate. Leaves 5-12, 11,0-60,0 cm long, 2,5-11,0 cm at the widest point, 3-ranked, often overlapping, at least basally, to form a funnel, erect, coriaceous, oblong-lanceolate, strongly ribbed with 30-90 veins, glabrous occasionally with sparse stellate hairs on the margins, (except Burtt-Davy 13457 which has stellate hairs all over), leaves deciduous. Peduncles ancipitous, with few, fine, white stellate hairs below raceme. Inflorescence up to 14,0 cm long, excluding peduncle, 6-21 flowered. Pedicels of lower open flowers 1,0-2,0 cm long, of upper $\pm$ 0,1-1,0 cm long. Bracts subulate, 1,0-2,5(-3,1) cm long, glabrous to lightly setose. Ovary globose-turbinate, subglabrous with few, stellate hairs. Perianth segments yellow adaxially, in open flowers up to 2,0 cm long, 0,4-0,6 cm wide at the broadest point. Filaments subulate, equal. Anthers 4,0-7,0 mm long, lanceolate, sagittate, apex entire or slightly bifurcate. Style subulate, approximately 1,0 mm long. Stigma concrete, (of 3 loosely fused sections that

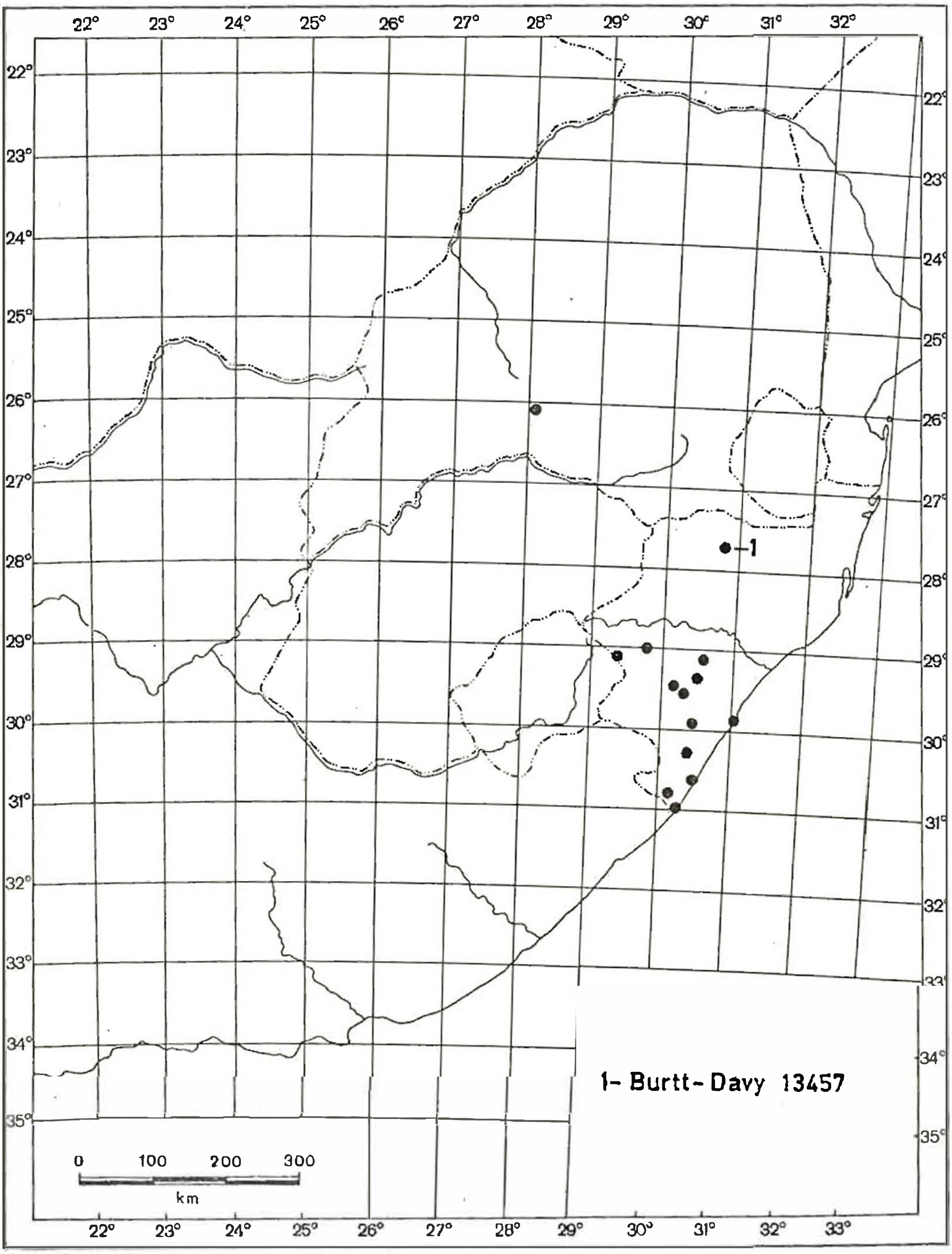


Fig. 16. Hypoxis latifolia Hook. - known distribution in Southern Africa up to 1975.

tend to separate with age), 3,0-5,0 mm long, 1,0-1,5 mm at widest point, pyramidal with 3 concave faces. Fruits a capsule, opening by circumscissile dehiscence below the apex.

Flowering Period: August-February.

Hooker in 1873 described *Hypoxis latifolia.* Baker in 1889 established *Hypoxis colchicifolia* and *Hypoxis oligotricha.* *H. colchicifolia* was described as having shorter leaves, fewer flowers, longer pedicels and a more hairy inflorescence than *H. oligotricha.* In his key in Flora Capensis (1896), Baker separated them on inflorescence type, that of *H. colchicifolia* being corymbose and that of *H. oligotricha* racemose. However, it has since been determined from the type that *H. colchicifolia* has a racemose inflorescence. Examination of the types of these two species has shown them to be conspecific with the type of *H. latifolia,* thus they must both become junior synonyms.

Plants of *H. latifolia* are concentrated in Natal south of the Tugela River, from the Estcourt district to the Mtamvuna River. It is not yet known if this river is the southernmost limit of this species or whether the apparent absence of specimens further south is due to inadequate collecting.

Only two specimens, Moss 13679 (Johannesburg) and Burtt-Davy 13457 (Vryheid) have been found outside southern Natal. Moss 13679 is glabrous and thus conforms with the species. Burtt-Davy 13457, possibly represents a variant since its leaves are covered with stellate hairs. Further collecting in northern Natal and the Transvaal is needed to determine if there is a range from the glabrous to

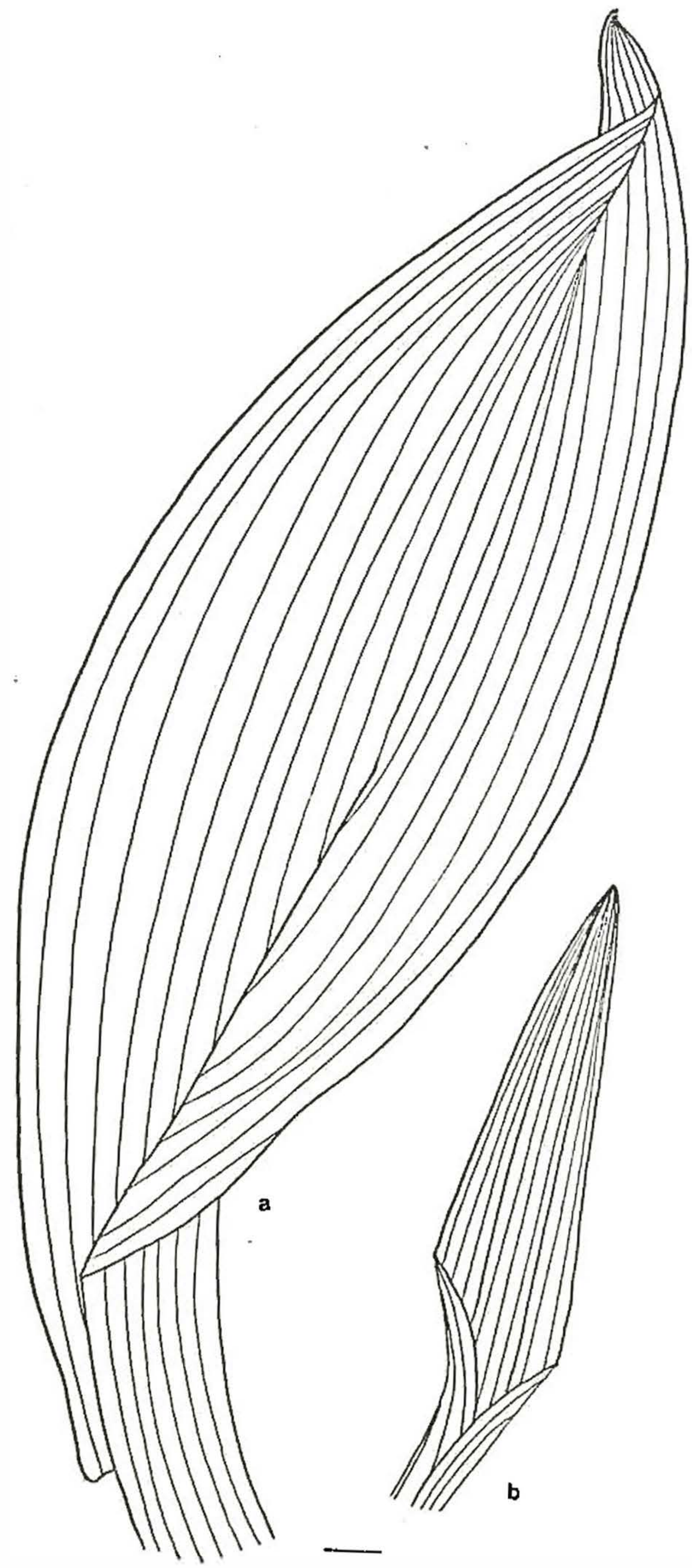


Fig. 17. H. latifolia: a - centre leaf, b - outer leaf

the hairy form, or whether the latter should be regarded as a distinct variety. The discontinuities in the known distribution (Fig. 16) cannot, at present, be adequately explained.

Hypoxis latifolia is a very robust species usually found growing in poor and sandy soils in undisturbed or disturbed grassveld. The corm is large in the mature plant, turbinate and bright yellow internally when freshly cut. Adventitious, contractile roots, which arise from the top of the corm, are comparatively thick (4-6 mm diam.).

Towards the middle of the flowering season the leaves developed are characteristically large and glabrous (Fig. 17a), with a tendency for the margins to become wavy with age. The plant can reach up to 60 cm in height and although the leaves appear bunched or whorled on an herbarium sheet, they are in fact 3-ranked. The outermost leaves are smaller than those in the centre (Fig. 17b). The inflorescence is racemose with never less than 6 flowers per raceme. It is sparsely covered with hairs (that is, over peduncle, ovary and perianth segments).

This species is easily identified in the field and is without any close ally in the genus. Morphologically *H. galpinii* is closest to *H. latifolia* but the plants have narrower leaves with hairy margins, and hairier inflorescences.

Citations:

TRANSVAAL	-	2628	(Johannesburg): Johannesburg (-AA), Moss 13679 (J).
		2730	(Vryheid): Vryheid (-DD), Burtt-Davy 13457 (PRE).
NATAL	-	2929	(Underberg): Tabamhlope (-AB), Miller 150, 202 (NH, 3 sheets); Estcourt (-BB), Barker 21449 (NBG).
		2930	(Pietermaritzburg): Near Howick (-AC), Medley Wood 5193 (NH); Greytown (-BA), Wylie s.n. (PRE, NH 27973); Gramond (-BC), Staples s.n. (NH 18533); Hawthorns Hill (-GB), Allsopp 520 (NU), 909 (NH, NU);

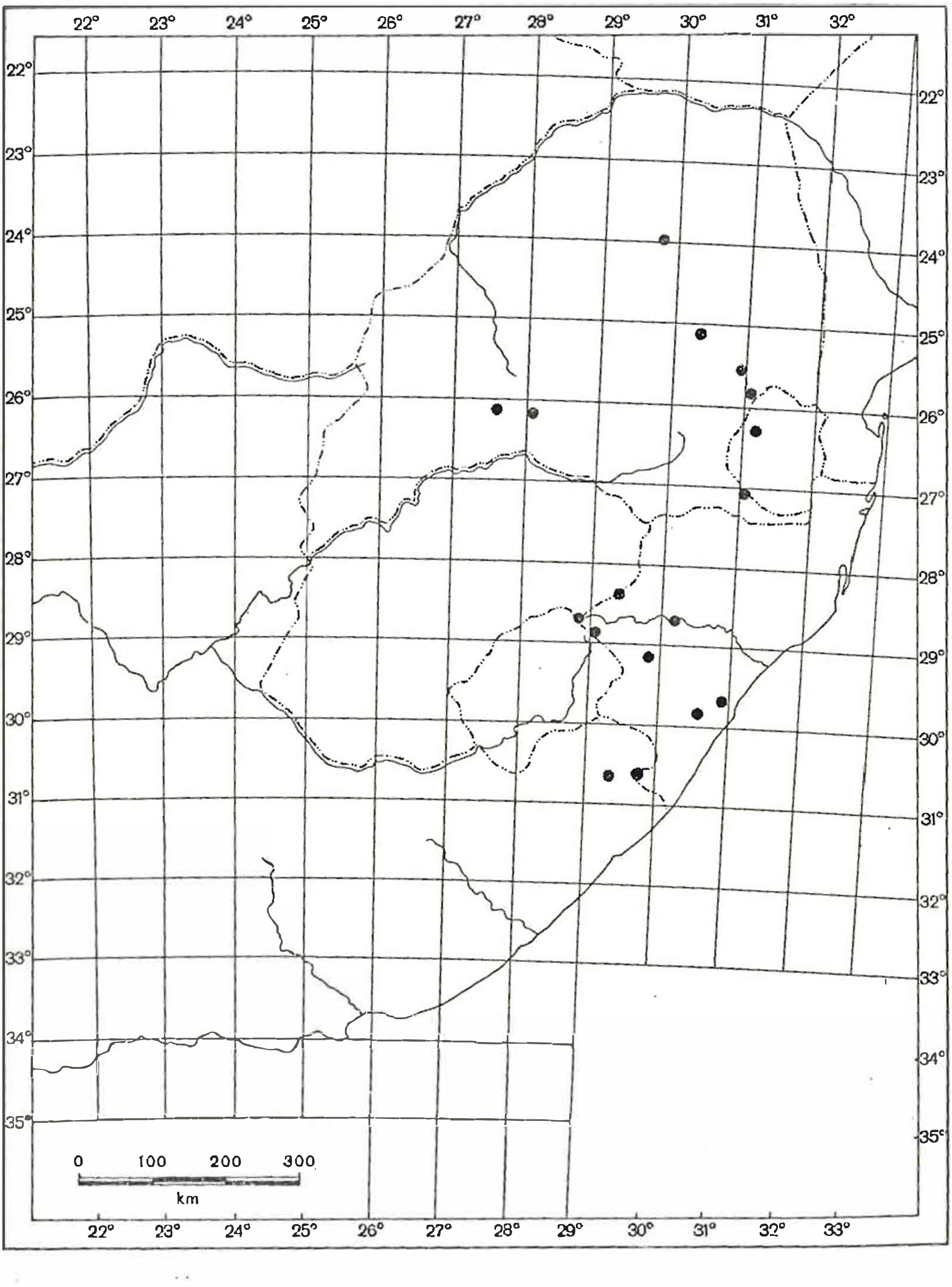


Fig. 18. Hypoxis galpinii Bak. - known distribution in Southern Africa up to 1975.

Hilton (-CB), Trace 59 (NU); Pietermaritzburg (-CB), Herbst s.n. (NBG 78, 441), Stirton s.n. (NU, 21.10.75), S.E. Wood 73, 85 (NU); 11 km. to Mid-illovo from turn off from Eston Road (-CD), S.E. Wood 111 (NU).

2931 (Stanger): Clairmont, near Durban (-CC), Medley Wood 1170 (NH, SAM).

3030 (Port Shepstone): Station Dumisa (-AD), Rudatis 1791 (PRE); St. Michaels-on-Sea (-CB), Nicholson 797 (PRE); Marina Beach (-CB), Strey 5949 (NH); on road to P. Edward from Izingolweni (-CC), S.E. Wood 161 (NU); Beach Terminus (-CD), Thode s.n. (STE 2542, 4662); 7 miles north of P. Edward (-CD), Strey 4521 (NH).

3130 (Port Edward): Port Edward (-AA), Ward 6654 (PRE).

2. Hypoxis galpinii Baker in Fl. Cap. 6:188 (1896); Nel in Engl. Jahrb. 51:320 (1914); Verdoorn in Wild Flowers of the Transvaal:69 (1962). Type: South Africa, Transvaal, Saddleback Range, near Barberton, Galpin 1098 (GRA, iso.!)

Corm 2,1-4,5 cm in diam., turbinate-globose, crowned with bristles. Leaves 4-8, up to 50,0 cm long, 1,5-4,5 cm at widest point, not noticeably 3-ranked, erect, linear-acuminate to oblong-lanceolate, ribs 20-50, not compact, 2 more prominent than the rest, hairs stellate, white, scattered on keel and margins, rarely on the prominent nerves, the abaxial surfaces of the first membranous leaves also covered with stellate (occasionally bifurcate) hairs. Peduncles ancipitous, hairs stellate, usually patent, most abundant below inflorescence grading to few at the base. Inflorescence 4-11-flowered. Pedicels of lower open flowers 0,1-1,5 cm long (flowers often appearing subsessile), pedicels of upper open flowers ± 0,1-0,7 cm long, densely villous. Bracts subulate, 1,0-3,5 cm long, up to 0,3 cm wide, setose.

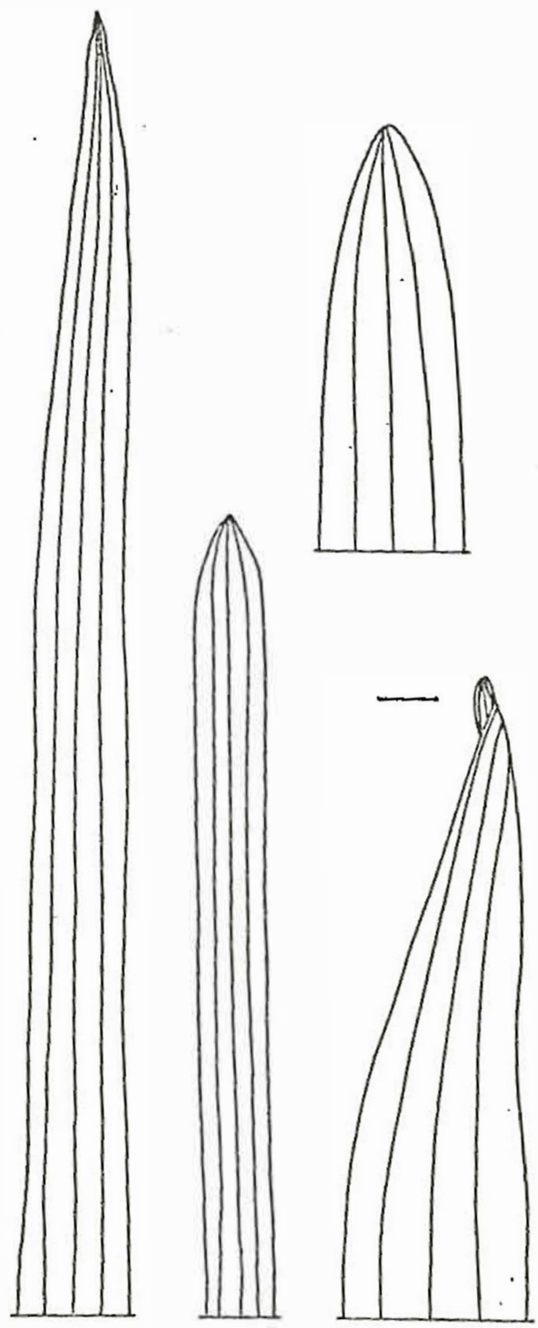


Fig. 19. H. galpinii: variation in leaf shape
(from apex to half way down lamina)

Perianth segments yellow adaxially, in open flower 0,9-1,8 cm long. Filaments subulate, equal, 2,0-3,0 mm long. Anthers lanceolate, sagittate, 5,5-7,0 mm long, apex entire or slightly bifurcate. Style subulate-cylindrical 1,0-2,0 mm long. Stigma concrete, pyramidal with 3 concave faces, 2,0-4,0 mm long. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-February.

H. galpinii has not previously been recorded for Natal. The distribution as at present known is from Haenertsburg (N. Transvaal), through Swaziland, to Mount Currie (Cape Province) (Fig. 18). Populations grow in grassveld and disturbed grassveld, commonly at high altitudes, but plants in more southern latitudes occur near the coast.

Plants are characterized by obtuse-apiced, linear leaves (Fig. 19), which turn a dark red-brown when dry. The leaves are neither conduplicate nor arranged in 3 ranks, in which features they are unlike many of the Natal species, for example H. rooperi, H. obtusa. The lower pedicels of the inflorescence are unusually short (0,1-1,5 cm long). H. latifolia is the closest morphological ally of H. galpinii (for details see under the former species).

Medley Wood 373 (NH) in my opinion is H. galpinii, but Baker (Fl. Cap., 1896) cited it as H. rooperi S. Moore. It does not have the sickle-shaped, conduplicate leaves covered with stellate hairs, that are characteristic of H. rooperi.

Citations:

TRANSVAAL	-	2329	(Pietersburg): Haenertsburg (-DD), Pott 4687 (PRE).
		2530	(Lydenburg): 8 m east of Lydenburg (-AB), Codd & de Winter 3282 (PRE); Nelspruit (-BD) Codd 9396 (PRE).
		2531	(Komatipoort): Umlomati valley, Barberton (-CC) Galpin 1098 (GRA, NH, PRE, SAM).
		2627	(Potchefstroom): Witwatersrand: Krugersdorp (-BB), Gilliland 26911 (PRE); Canada (-BB), Moss 17720 (J).
		2628	(Johannesburg): Houghton Road, Johannesburg (-AA), Moss 3332 (J); Melville Koppies Nature Reserve (-AA), Cain J37931 (J); Milner Park, Johannesburg (-AA), Moss 14026 (J); Roedean Kopje, Johannesburg (-AA), Deny J35104 (J).
		2731	(Louwsburg): between Pongola and Piet Retief (-AA), Barker 2585 (NBG).
SWAZILAND	-	2631	(Mbabane): near Mhlambanyati, Mbabane (-AC), Compton 30881 (PRE, NBG); Mbabane (-AC), Compton 22371 (NBG); Ukutula, Mbabane (-AC), Compton 26341 (NBG); Usuthu Mission, Mbabane (-AC), Compton 27095 (NBG).
NATAL	-	2828	(Bethlehem): National Park, Mont aux Sources (-DB), v.d. Zeyde s.n. (NBG, 9.11.1969).
		2829	(Harrismith): Van Reenen (-AD), Bews s.n. (NU 650); ridge between catch. 7 & 8, Cathedral Peak (-CC), S.E. Wood 153 (NU); Catchment 9, Cathedral Peak (-CC), S.E. Wood 159 (NU); "The Caverns" (-DB), Hodson 7 (NU).
		2830	(Dundee): Culvers, Weenen Div. (-CC), Rogers 27505 (J), 28267 (STE).
		2929	(Underberg): Yorkshire Wolds, (-BB), Thode 2538, 2544 (STE).
		2930	(Pietermaritzburg): Inanda (-DB), Medley Wood 373 (NH); 32 km to Umbumbulu on Eston Road (-DC), S.E. Wood 104 (NU); to south coast from turn off "3 km to Mid-Illovo" (-DC), S.E. Wood 117 (NU).
		3029	(Kokstad): Mount Currie (-CB), Goossens 289 (PRE); Weza Forest (-DA), L.E. Taylor 5292 (STE).

without precise locality:

Stewart 10191 (PRE), Swaziland.

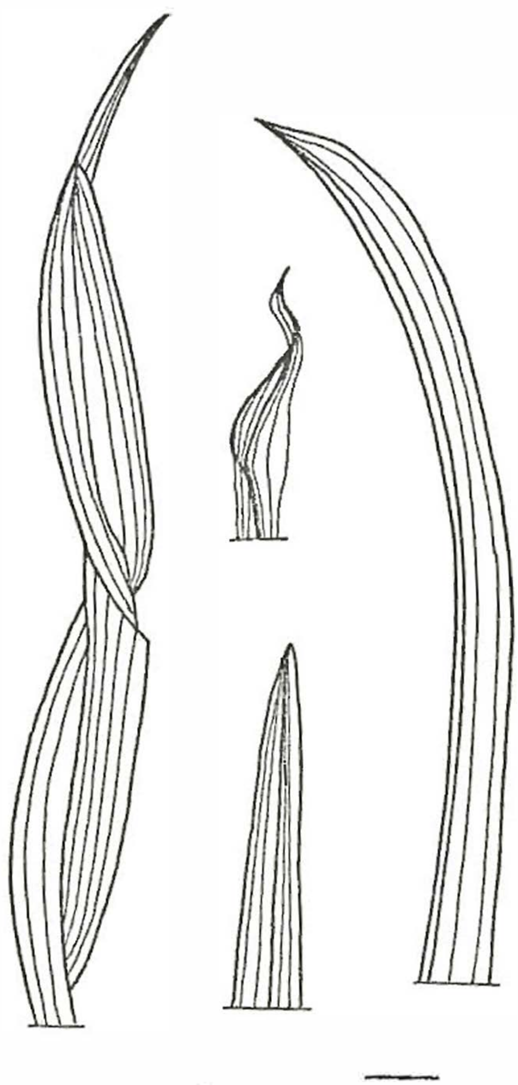


Fig. 20. H. interjecta: variation in leaf shape

3. Hypoxis interjecta Nel in Engl. Jahrb. 51:321 (1914). Type: South Africa, Transvaal, Lydenburg, Wilms 1454 (BSB, holo.)

Corm 2,0-5,0 cm in diam., oblong-globose, crowned with bristles. Leaves 7-9, 3,5-15,0 cm long, 1,0-1,5 cm broad at widest point, 3-ranked, oblong-lanceolate, erect to semi-erect, with 20-40 prominent ribs, glabrous. Peduncles ancipitous, densely hairy, hairs stellate with one arm longer than the remainder, usually yellow, opaque. Inflorescence 2-flowered. Pedicels 0,6-1,4 cm long at time of flowering, densely hairy. Bracts linear-subulate, setose, 0,6-1,1 cm long. Perianth segments yellow adaxially, in open flowers 1,0-1,5 cm long. Filaments subulate, equal, $\pm$ 3,0 mm long. Anthers 4,5-5,0 mm long, lanceolate, sagittate, apex entire or very slightly bifurcate. Style subulate or stigma subsessile. Stigma concrete, 1,5-2,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-December.

Hypoxis interjecta has small (usually less than 15 cm in length), glabrous leaves that vary in shape from oblong to lanceolate (Fig. 20). Peduncles are particularly hairy with stellate, spreading and usually yellow hairs. In all specimens seen the inflorescence was two-flowered. H. interjecta is a grassveld species, recorded from altitudes approximately between 1000-2000 metres.

The closest morphological ally of H. interjecta is H. multiceps. In this species the shape of the leaves is similar, but they are larger attaining approximately 20 cm in length and 5 cm in width. They are completely covered with short stellate hairs, in contrast to the

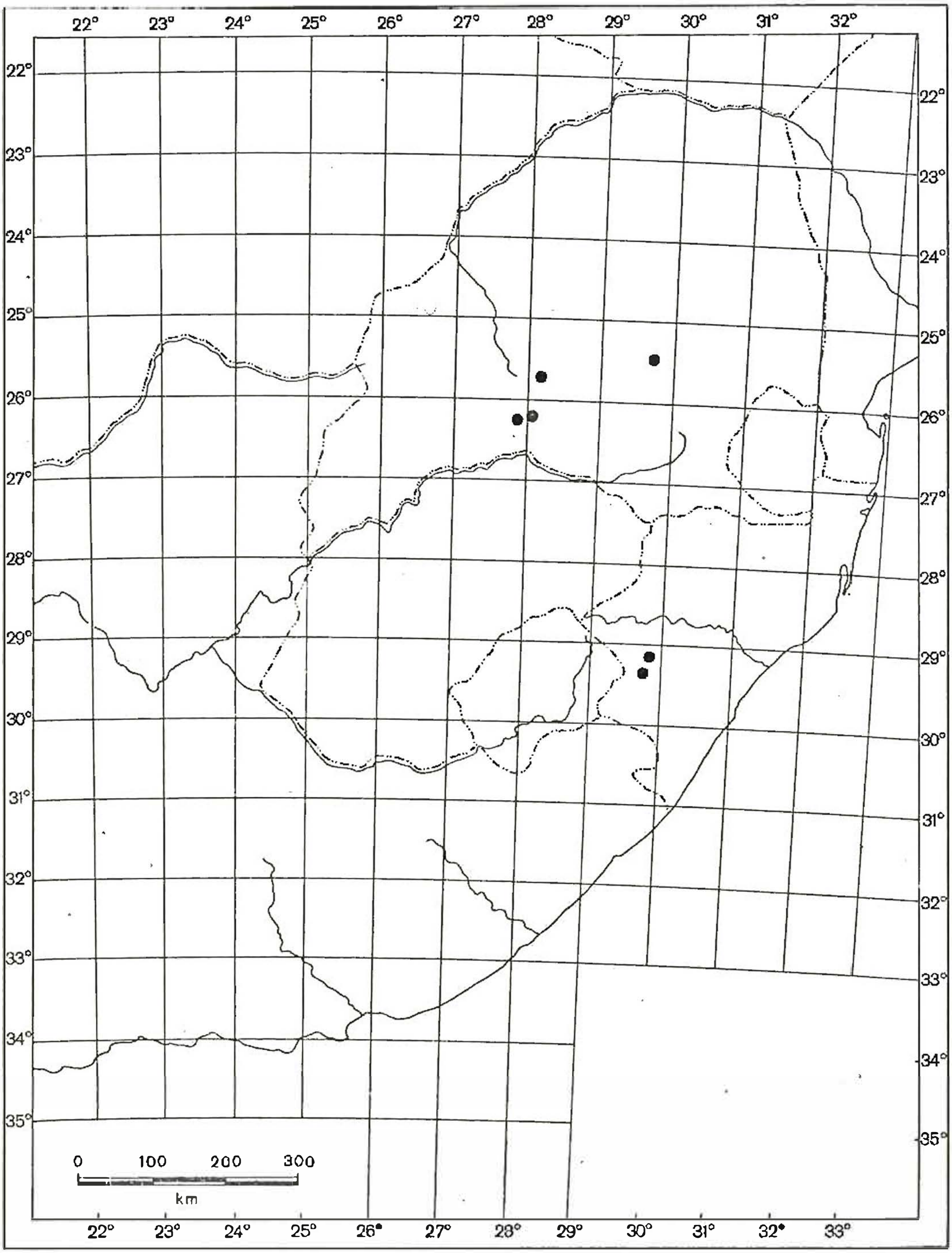


Fig. 21. Hypoxis interjecta Nel - known distribution in Southern Africa up to 1975.

glabrous leaves of H. interjecta. The inflorescences of the species are notably alike, although H. multiceps may occasionally carry up to four flowers per inflorescence. H. latifolia is the only other Natal species with glabrous leaves, but otherwise these taxa are distinct.

H. interjecta has not previously been recorded for Natal. Nel (1914) cited only the type specimen (Lydenburg, Transvaal). Other Transvaal specimens have not been associated with H. interjecta, but were grouped together as an undescribed taxon (manuscript name H. pretoriensis). Two specimens only are known from Natal, both from the Estcourt district. The discontinuity in the distribution (Fig. 21) shows the general need for collecting, especially in northern Natal and the northern Orange Free State.

Citations:

TRANSVAAL	-	2528	(Pretoria): Muckleneuk (-CA), Goossens 91 (PRE); Pretoria (-CA), Leendertz 11970 (PRE).
		2529	(Witbank): Staffberg (-BD), Young A125 (PRE).
		2627	(Potchefstroom): Witwatersrand: Frankenwald (-BB), van Rensburg 25556 (J).
		2628	(Johannesburg): Witwatersrand: Bryanston (-AA), Gilliland 26127 (J).
NATAL	-	2929	(Underberg): Yorkshire Wolds (-BB), Thode 2538 (STE); Kamberg Mountain (-BD), Wright 1549 (NU).

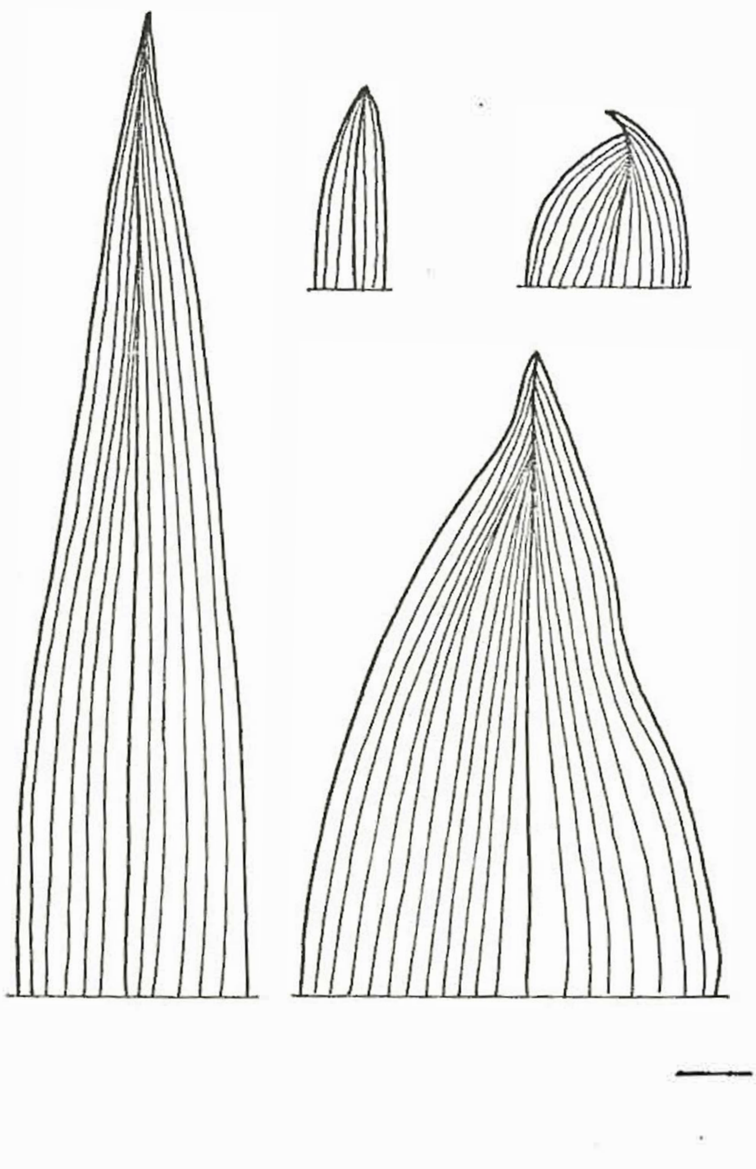


Fig. 22. H. multiceps: variation in leaf shape

4. Hypoxis multiceps Buchinger ex Krauss in Flora 28:311 (1845), et in Krauss Breiträge:163 (1846); Baker in J. Linn. Soc.: 117 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:233 (1893), et in Fl. Cap. 6:187 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:319 (1914); Bews, Fl. Natal & Zululand:65 (1921); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Krauss 248 (BM, holo.!)

Corm 1,5-4,1 cm in diam., globose-oblong, crowned with bristles. Leaves 4-8, oblong-lanceolate, 3,0-22,0 cm long, up to 5,5 cm broad at the widest point, 3-ranked, rigid, with 30-40 ribs, hairs on both surfaces of the lamina stellate (all arms ± equal in length, 0,4-2,0 mm long) or stellate and bifurcate intermingled (stellate always more numerous than bifurcate) keel and margins with stellate hairs only. Peduncles 1-3(-4), ancipitous, villous, hairs stellate (all arms ± equal in length). Inflorescence 1-4-flowered. Pedicels 1,5-2,6 cm long at time of flower opening, villous. Bracts linear-subulate, setaceous, 0,6-1,9 cm long. Perianth segments in open flowers 1,0-2,0 cm long, yellow adaxially, villous abaxially, hairs stellate (one arm 1,2-2,0 mm long, the remainder ± 0,4 mm). Filaments ± equal, subulate. Anthers 4,5-6,0 mm long, linear-lanceolate, sagittate, apex entire. Style ± 1,0 mm long or stigma subsessile. Stigma concrete, 2,0-3,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: July-November.

H. costata is the only ally of H. multiceps. No other species in Natal is likely to be confused with either taxon. Like H. costata, H. multiceps has short, oblong-lanceolate to long, narrow lanceolate leaves (Fig. 22) with the laminae varying from glabrous to

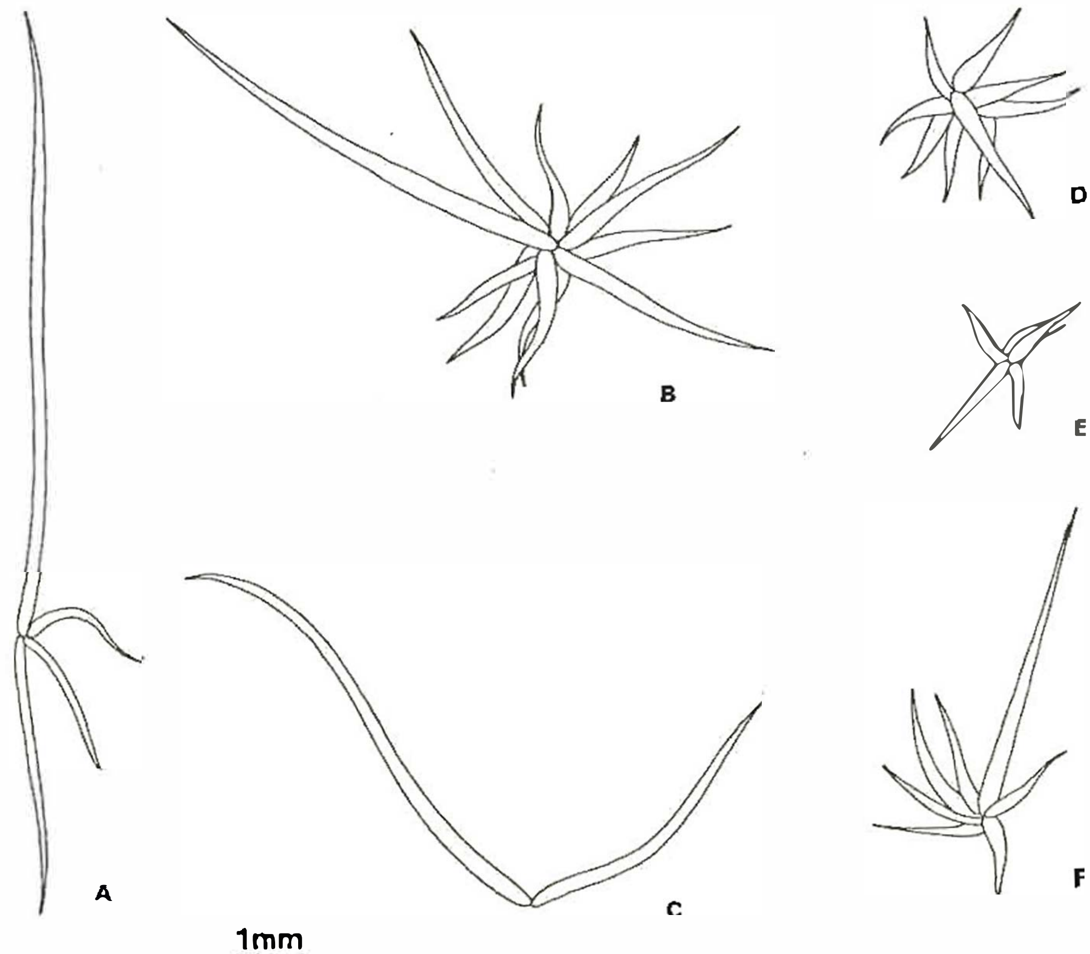


Fig. 23. H. multiceps and H. costata: hair types

A, B, C - H. multiceps

D, E, F - H. costata

densely hairy. The inflorescence is two or three flowered, supported by a particularly thick, ancipitous peduncle. There are, however, several features (see Table 3) that consistently differentiate these closely allied species.

	H. costata	H. multiceps
lamina	Submarginal veins thickened. Hairs predominantly bifurcate (arms up to 6,0 mm long, Fig. 23C), intermingled with stellate hairs (one or two of the arms long, up to 6,0 mm, Fig. 23A, B).	Submarginal veins not thickened. Hairs predominantly stellate (arms of equal length, not exceeding 2,0 mm, Fig. 23D, E), occasionally intermingled with bifurcate hairs (arms up to 2,0 mm long).
keel & margins	Hairs predominantly stellate occasionally intermingled with bifurcate ones (types as above)	Hairs stellate only (type as above)
inflorescence	Hairs stellate (one arm only longer, up to 6,0 mm)	Hairs stellate (one arm slightly longer, up to 2,0 mm, Fig. 23F).

Table 3: Summary of morphological features by which H. costata and H. multiceps may be distinguished.

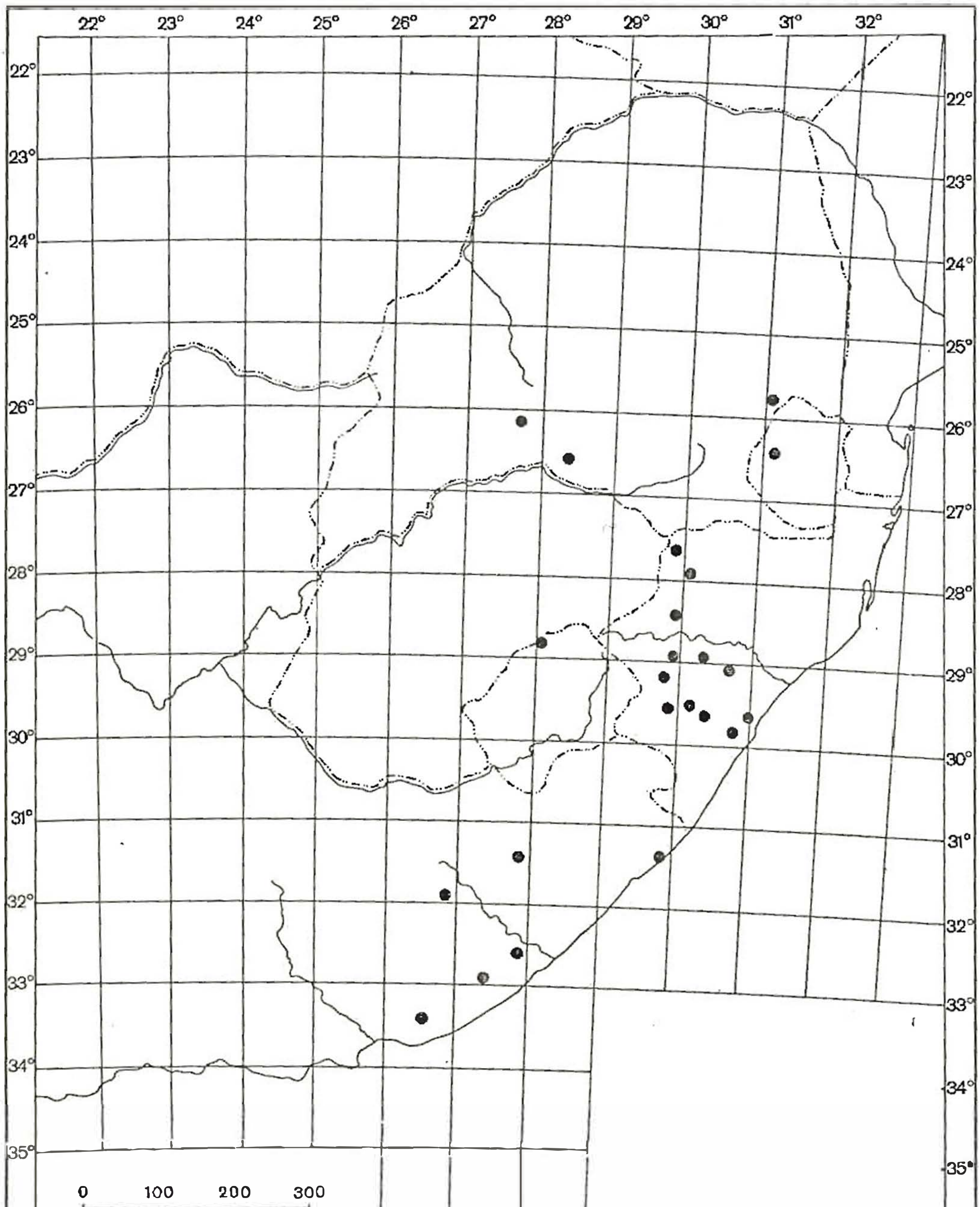


Fig. 24. Hypoxis multiceps Buch. - known distribution in Southern Africa up to 1975.

Plants of H. multiceps occur in the Eastern Cape, Natal, the Transvaal, Swaziland and Lesotho (Fig. 24), up to altitudes of 2000 m.

Citations

TRANSVAAL	-	2531	(Komatipoort): Saddleback Mtn. Barberton (-CC), Galpin 1058 (PRE).
		2627	(Potchefstroom): Witpoortjie Kloof, Witwatersrand (-BB), Moss 13585 (J).
		2628	(Johannesburg): Heidelberg (-DB), Leendertz 7746 (PRE).
SWAZILAND	-	2631	(Mbabane): Usuthu Mission, Mbabane (-AC), Compton 27121 (NBG).
NATAL	-	2729	(Volksrust): 20 km before Newcastle from Volksrust (-DB), Arnold 841 (NU).
		2730	(Vryheid): Dundee dist. Impati Mt. (-CC), Shirley 6 (NU).
		2829	(Harrismith): Elandslaagte (-BD), Randles 55 (NU); Willowford Stn. (-DD), Acocks 10605 (NH).
		2830	(Dundee): Krantzkloof (-CD), Haygarth s.n. (STE, Oct. 1921).
		2929	(Underberg): Yorkshire Wolds (-BB), Thode 2539 (STE); 10 km to Dargle from Impendhle (-DB), S.E. Wood 131 (NU).
		2930	(Pietermaritzburg): Lions River (-AC), Moll 1044 (NU, PRE); 20 km to Kranskop from Greytown (-BA), S.E. Wood 97 (NU); Pietermaritzburg (-CB), S.E. Wood 91 (NU), Goossens 138 (PRE); Inanda (-DB), Medley Wood 1011 (NH); Shongweni (-DD), Ross 1305 (NU); Fields Hill (-DD), Medley Wood s.n. (SAM 22296).
LESOTHO	-	2828	(Bethlehem): Leribe (-CC), Dieterlen 149 (PRE, SAM).
CAPE	-	3126	(Queenstown): Hangklip Mtn. Queenstown (-DD), Galpin 1603 (PRE).
		3127	(Lady Frere): Elliot (-BD), Malan s.n. (SAM 58324).
		3129	(Port St. Johns): Umzikaba river near Ndindini (-BD), Strey 10117 (NH).
		3227	(Stutterheim): King Williams Town (-CD), Sim 1127 (NU); Komgha (-DA), Flanagan 1173 (GRA, SAM).
		3326	(Grahamstown): Grahamstown (-BC), Rogers 27547 (STE), Schönland 69 (GRA).

without precise locality:

MacOwan 104 (GRA); Wylie (com: Medley Wood) 10606 (NH), Niginya, Natal.

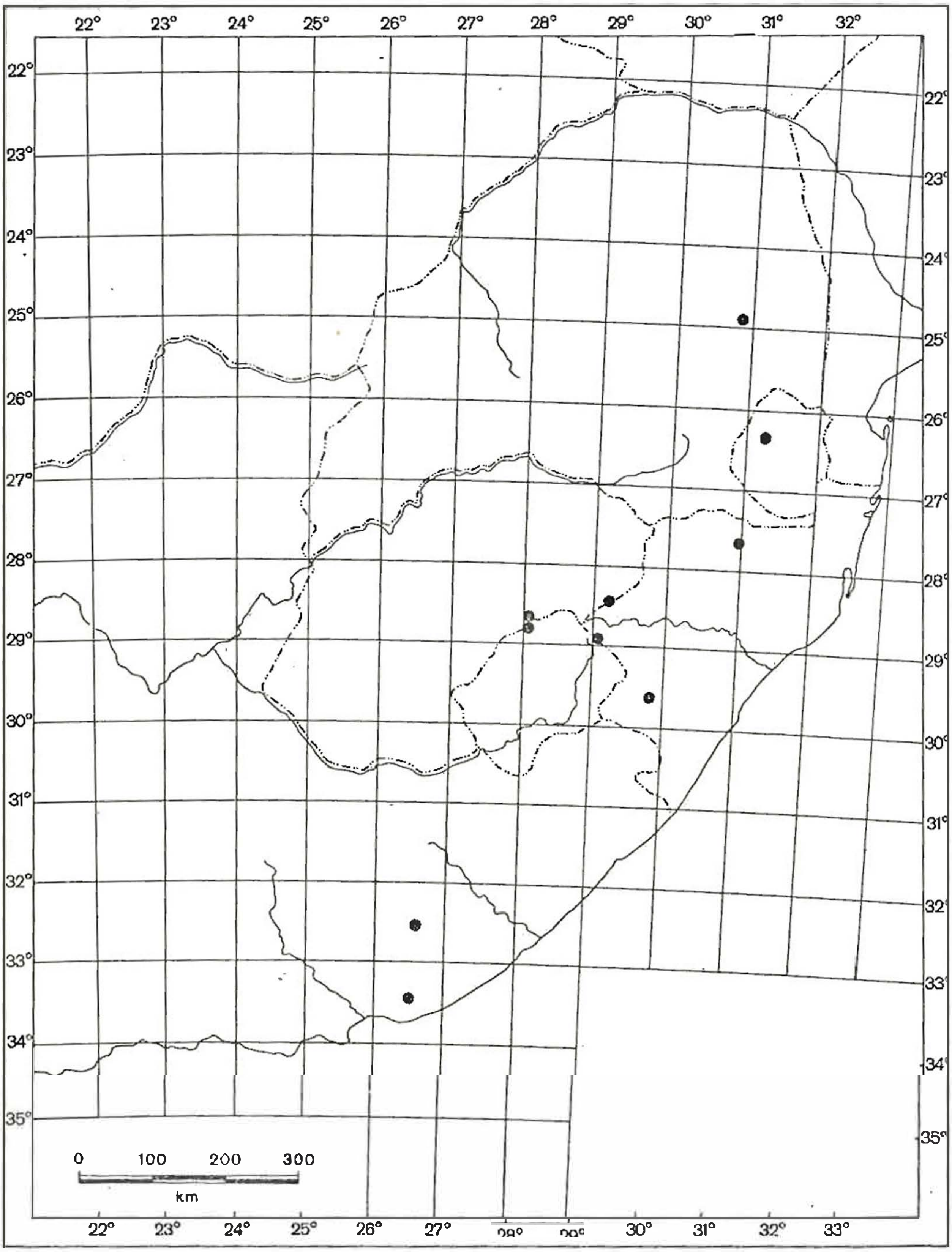


Fig. 25. Hypoxis costata Bak. - known distribution in Southern Africa up to 1975.

5. Hypoxis costata Baker in J. Linn. Soc.:119 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6: 188 (1896); Nel in Engl. Jahrb. 51:322 (1914); Bews, Fl. Natal & Zululand:65 (1921); Guillarmod, Fl. Lesotho: 149 (1971). Type: South Africa, Orange Free State, Nelson's Kop, Cooper 879 (K, holo.)

Corm 1,0-3,5 cm in diam., globose-oblong, crowned with bristles. Leaves 4-10, oblong-lanceolate, 5,0-18,0 cm long, 0,8-4,2 cm wide at the broadest point, 3-ranked, usually rigid with 20-70 ribs and the submarginal veins strongly thickened, hairs on margins and keel stellate with one arm longer than the remainder (up to 6,0 mm long), both sides of the lamina glabrous to densely hairy, hairs predominantly bifurcate with some stellate intermingled. Peduncles ancipitous, villous, hairs patent, stellate with one arm longer than the remainder. Inflorescence 1-5 flowered. Pedicels 0,3-1,0(-1,6) cm long at time of flowering, villous. Bracts subulate, setaceous 0,7-1,6 cm long. Perianth segments yellow adaxially, in open flowers 1,1-1,7 cm long. Filaments ± equal, subulate. Anthers (3,0-)4,5-6,0 mm long, sagittate, lanceolate, apex entire. Stigma concrete, 2,0-4,0 mm long, pyramidal with 3 concave faces, usually subsessile. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: October-January.

Hypoxis costata has a distribution sympatric with that of its closest ally H. multiceps (Fig. 25).

Like H. multiceps, plants of H. costata have strongly ribbed, oblong-lanceolate leaves, but in the latter species a thickened submarginal vein is present (Fig. 26). H. costata and H. multiceps are also distinguished according to hair type (for details see under the

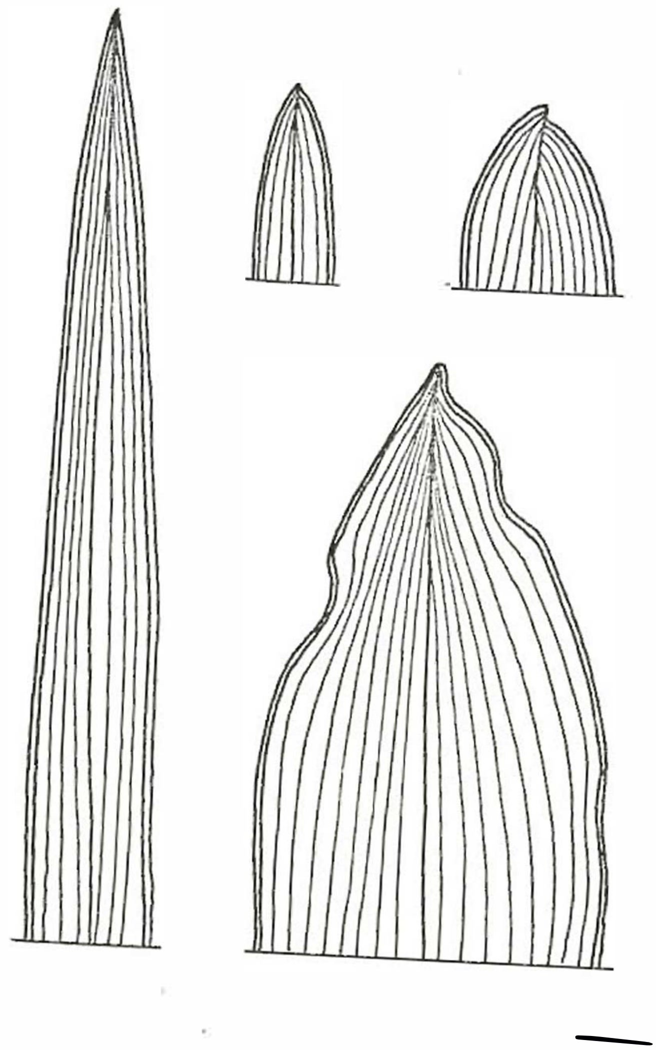


Fig. 26. *H. costata*: variation in leaf shape

latter species). Peduncles are ancipitous and the pedicels are generally shorter than those of H. multiceps.

Within the limits of H. costata plants are not entirely uniform: one entity possesses short, oblong leaves with few hairs on the lamina; the other has longer, lanceolate leaves with a densely hairy lamina. However, these are extremes and are linked by intermediates that cannot clearly be placed with either group. Further field work is required to study populations in the field so that the range of variation may be better understood in relation to habitat and environmental conditions. At the present time the extremes will not be formally recognized.

Citations:

TRANSVAAL	-	2430	(Pilgrims Rest): Mount Anderson, Pilgrims Rest (-DD), Smuts & Gillet 2465 (PRE).
O.F.S.	-	2828	(Bethlehem): Golden Gate National Park (-CC), Liebenberg 6956 (PRE).
		2829	(Harrismith): Rensburgskop, Swinburne (-AC), Jacobsz 328 (PRE).
SWAZILAND	-	2631	(Mbabane): Ukutula, Mbabane (-AC), Compton 24490, 24578, 25210 (NBG).
NATAL	-	2730	(Vryheid): Hlobane, Vryheid (-DB), Johnstone 528 (NU).
		2829	(Harrismith): Catchment 9, Cathedral Peak (-CC), S.E. Wood 155, 158 (NU), Killick 1573 (NPC).
		2929	(Underberg): Impendhle (-DB), Levett 101 (NH).
LESOTHO	-	2828	(Bethlehem): Leribe (-CC), Dieterlen 229b (NH, PRE, SAM).
CAPE	-	3226	(Fort Beaufort): Katberg (-DA), Galpin 8427 (PRE).
		3326	(Grahamstown): Grahamstown (-BC), MacOwan 104 (SAM).

without precise locality:

Compton 21311 (NBG), Basutoland; Thode 2543 (STE), Altemooi, Natal Province.

6. Hypoxis rigidula Baker in J. Linn. Soc. 17:116 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:233 (1893), et in Fl. Cap. 6:186 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:331 (1914); Bews, Fl. Natal & Zululand: 65 (1921); Sölch in Merxm. F.S.W.A. Fam. 151:2 (1969); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Cape, British Kaffraria, Cooper 3239 (K, syn.!)

Corm 2,0-5,0 cm in diam., oblong, crowned with bristles. Leaves 4-6(-9), 9,0- >100,0 cm long, 0,3-1,3 cm at widest point, linear-lanceolate, erect, rigid, not 3-ranked, ribs 6-20(-32), close together, irregular: both surfaces of the lamina woolly villous, or white appressed hairy (in the latter case the adaxial surface with stellate, usually the more numerous, and bifurcate hairs intermingled in the channels between the ribs); abaxial surface more densely hairy (keel and margins with stellate hairs only). Peduncles 1-5, ancipitous, densely hairy below inflorescence grading to sparsely pilose towards the base. Inflorescence (excluding peduncle) up to 13,5 cm long, (2-)3-11 flowered (the first produced in each season tending to be limited to 2 flowers only). Pedicels up to 1,0 cm long at time of flowering or flowers subsessile, densely hairy. Bracts linear-subulate, setaceous, 0,7-2,7 cm long. Perianth segments yellow adaxially, in open flowers (0,7-)1,0-2,1 cm long. Filaments equal, subulate. Anthers 4,5-7,5 mm long, lanceolate, deeply sagittate, apex entire. Style cylindrical, 1,0-1,5 mm long. Stigma concrete, 2,5-3,5 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-March.

Within the limits of H. rigidula Baker recognized two entities, typical H. rigidula and H. rigidula var. pilosissima. These two taxa

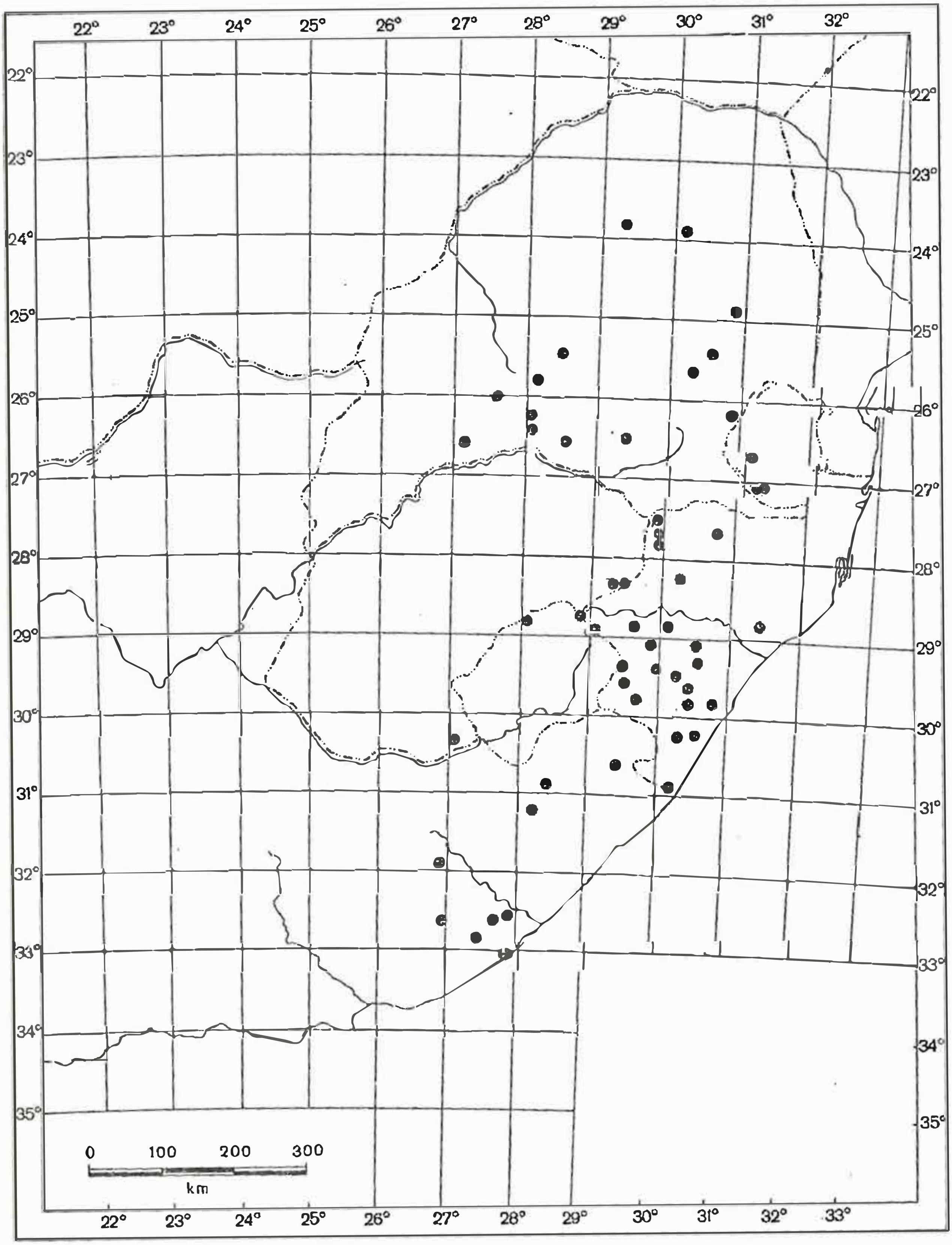


Fig. 27. Hypoxis rigidula Bak. var. rigidula - known distribution in Southern Africa up to 1975, excluding South West Africa from which one gathering, Dinter 5601, has been recorded

are retained for they differ according to the hair covering of the leaf. The leaves of var. rigidula are covered with stellate and bifurcate hairs which lie in channels between the ribs; leaves of var. pilosissima have a much denser covering of stellate hairs only, which are patent, not appressed, and thus produce a woolly effect.

Hypoxis rigidula var. rigidula
Baker in J. Linn. Soc. 17:116 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:233 (1893), et in Fl. Cap. 6:186 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:331 (1914); Bews, Fl. Natal & Zululand:65 (1921); Sölch in Mermx. F.S.W.A. Fam. 151:2 (1969); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Cape, British Kaffraria, Cooper 3239 (K, syn.!)

H. elliptica Nel in Engl. Jahrb. 51:332 (1914); Bews, Fl. Natal & Zululand:65 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, between Pietermaritzburg and Greytown; Wilms 2317 (K, syn.!)

Leaves both surfaces of the lamina white, appressed hairy; adaxial surface with stellate (usually the more numerous) and bifurcate hairs intermingled in the channels between the ribs; abaxial surface more densely hairy (keel and margins with stellate hairs only).

Plants of var. rigidula are widely distributed in all four provinces of South Africa, Lesotho, Swaziland and South West Africa. The southern-most record at the present time is from East London (Fig. 27).

Examination of the syntype of H. elliptica Nel, showed it to to be conspecific with H. rigidula var. rigidula, and therefore it must now become a junior synonym.

Citations:

TRANSVAAL -	2329	(Pietersburg): naby Daviesville, Distr. Pietersburg (-CD), Markotter s.n. (STE 16304).
	2330	(Tzaneen): Agatha (-CC), McCallum 323 (PRE).
	2430	(Pilgrims Rest): Vaalhoek, Lydenburg (-DD), Rogers 23539 (J).
	2527	(Rustenburg): Magaliesberg (-DC), Zeyher 1670 (STE).
	2528	(Pretoria): Waterkloof river bank, Pretoria (-CA), Barker 220 (NBG); Green Kloof, nr. Pretoria (-CA), Lewis 6184 (STE); Menlo Park, Pretoria (-CA), Robertson s.n. (PRE 33558); Colleges Station, Pretoria (-CA), Obermeyer 37 (NH); Van Riebeck Natuurreservaat (-BC), Kok 210 (PRE).
	2530	(Lydenburg): Lowveld Botanic Garden (-BD), Buitendag 890 (NBG).
	2627	(Potchefstroom): Klipdrift (-CA), Theron 1191 (NH); Losberg (-CA), Theron 675 (NH).
	2628	(Johannesburg): ± 10 mls s. of Johannesburg (-AA), McMurtry C3 (NBG); Johannesburg (-AA), Pegel Jhb. 1 (NH); Melville Koppies (-AA), Macnae 1339 (J); Houghton Kopje (-AA), Cohen s.n. (J, 18.9.1936); hills s. of Johannesburg (-AA), Arnold 835 (NU); 5 km past Balfour on road to Volksrust (-DA), Arnold 837 (NU).
	2629	(Bethal): 1 m.e. of Leslie (-AD), Story 689 (PRE); Bethal (-AD), Burtt-Davy 3823 (PRE).
	2630	(Messina): between Oshoek and Lochiel (-BB), K.D. Gordon-Gray 9950 (NU).
O.F.S. -	2829	(Harrismith): Rensburgskop, Swinburne (-AD), Jacobsz 329 (PRE); Van Reenen (-AD), Bews 193 (NU).
	3027	(Lady Grey): Zastron (-AC), Stephanson s.n. (STE 16223).
SWAZILAND -	2631	(Messina): Mankaiana (-CA), Compton 32393 (NBG).
	2731	2 m. e. of Goedgegun on Hlatikulu rd. (-AA), Ross 1458 (NU).
NATAL -	2729	(Volksrust): 2 km past Charlestown on road to Newcastle (-BD), Arnold 838 (NU); 3 miles s. of Newcastle (-DD), Crook 5 (NH); One Tree Hill, Newcastle (-DD), Shirley s.n. (NU 32355).
	2730	(Vryheid): Tendeka (-DB), Mattison 8 (NU); Vryheid (-DD), Strey 9100 (NH).
	2828	(Bethlehem): Mont aux Sources (-DD), Bolus s.n. (NBG 65814).
	2829	(Harrismith): De Hoek, Catchment 9 (-CC), Downing 31 (NU); Catchment 1, Cathedral Peak (-CC), S.E. Wood 152 (NU); Top Catchment 9, Cathedral Peak (-CC), S.E. Wood 161A (NU); Greenford, Frere (-DC), Acocks 10641 (NH); Brakfontein nr. Frere (-DC),

Acocks 10833 (NH).

2830 (Dundee): top of Mpati Mt. (-AA), Shirley 76 (NU); Culvers, Weenen (-CC), Rogers 27786 (STE).

2831 (Nkandla): Eshowe (-DC), Lawn 1297, 1788 (NH).

2929 (Underberg): Giants Castle Game Reserve (-AD), Trauseld 661, 866, 867, (NU); Kamberg "Game Pass" (-AD), C.G. Gordon-Gray 117 (NU); near Gourton (-BB), Medley Wood 2627, 3456 (NH); hills above Mooi River (-BB), Medley Wood 3870 (NH); Mooi River Meteor Ridge (-BB), Mogg 3240 (PRE); nr. Willowford Stn., Estcourt (-BB), Acocks 10604 (NH); 85 km to Nottingham Rd. from Himeville (-DA), S.E. Wood 128 (NU); 75 km to Nottingham Rd. (-DA), S.E. Wood 128A (NU); 33 km to Underberg from Pietermaritzburg (-DC), S.E. Wood 124 (NU).

2930 (Pietermaritzburg): Howick (-AC), Moll 1255 (NH), 1040 (NU); 8 m. from Greytown (-BA), Wylie s.n. (NH 28016); Greytown (-BA), Wylie s.n. (NH 21681); 1 km to New Hanover Station from Pietermaritzburg (-BA), S.E. Wood 92 (NU); 18 km to Greytown, nr. Seven Oaks (-BA), S.E. Wood 94 (NU); 20 km to Kranskop (-BA), S.E.Wood 95 (NU); 2 km from Estcourt (-BB), Stirton 1045 (NU); Pietermaritzburg (-CB), Allsopp 920 (NH, NU); Chase Valley, Pietermaritzburg (-CB), S.E. Wood 140 (NU); Howick old main road, Pietermaritzburg (-CB), S.E. Wood 143 (NU); Arnold's Hill, Richmond (-CD), Wylie s.n. (NH 23357); 3 km to Thornville on road to Richmond (-CD), Stirton 1219 (NU); 11 km to Mid-Illovo (-CD), S.E.Wood 106, 107 (NU); 8 km to Mid-Illovo along railway line (-CD), S.E. Wood 114 (NU); Fields Hill near Pinetown (-DD), Medley Wood 754 (SAM).

3030 (Port Shepstone): 8 km from Highflats towards Umzinto (-AB), S.E. Wood 175 (NU); Umgaye Flat (Alexandra County) (-BA), Rudatis 472 (STE); on road to P. Edward from Izingolweni (-CC), S.E. Wood 164A (NU).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), Dieterlen 223, 6971 (SAM).

CAPE - 3028 (Matatiele): Mt. Fletcher (-CD), Weidermann & Oberdieck 1147 (PRE).

3029 (Kokstad): Kokstad (-CB), Mildred 2 (NBG), Tyson 1211 (SAM), Piek 89 (NH).

3126 (Queenstown): Hangklip Mt., Queenstown (-DD), Galpin 1604 (GRA, PRE).

3128 (Umtata): nr. Ugie (-AA), Flanagan 2842 (SAM).

3226 (Fort Beaufort): Hogsback, Amatola Mts. (-DB), Peacock s.n. (SAM 65759).

3227 (Stutterheim): Mount Coke (-CD), Sim 1125 (NU); Stutterheim (-DA), Theron 2115 (NH); Komgha (-DB), Flanagan 1171, (SAM).

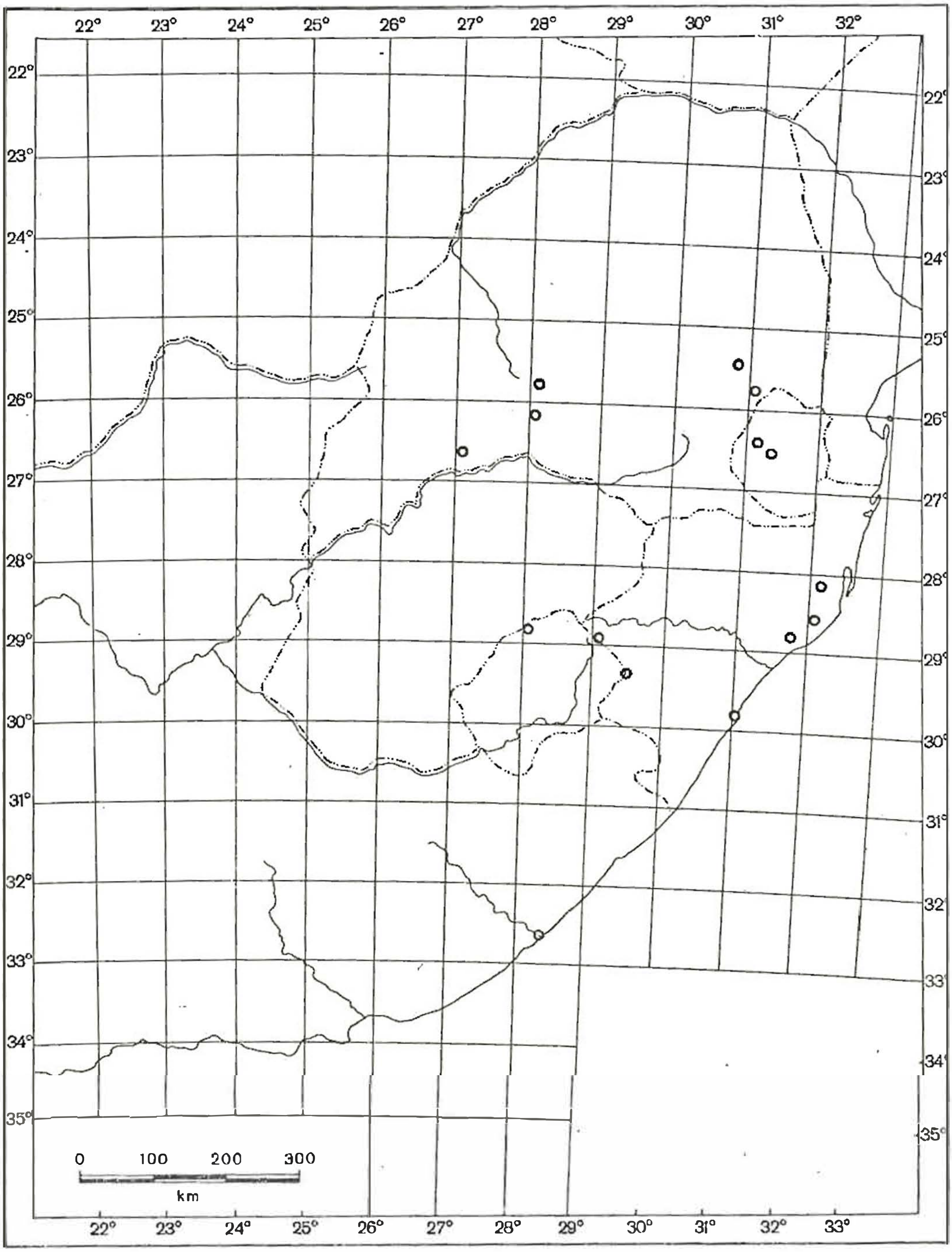


Fig. 28. Hypoxis rigidula Bak. var. pilosissima Bak. - known distribution in Southern Africa up to 1975.

3327 (Peddie): East London (-BB), Barker 7952 (NBG).

without precise locality:

Gerstner s.n. (NH 28986), Zululand; MacOwan 1649 (GRA), Boschberg; Acocks 16275 (PRE), 4 m. s. of Groeneberg Pass, Adelaide; Lesotho: Dieterlen 1370 (NBG, PRE), near Joa's village, Likhoele, Mafeteng Distr.

Hypoxis rigidula var. *pilosissima* Baker in J. Linn. Soc. 17: 116 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:233 (1893), et in Fl. Cap. 6:186 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:331 (1914); Bews, Fl. Natal & Zululand:65 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Tugela, Gerrard 1826 (K, syn.!)

Leaves both surfaces of the lamina woolly villous, hairs not appressed.

The known distributional limits of var. *pilosissima* are similar to those of var. *rigidula*, but there are not as many collections and the southern-most limit, at present, is the Kei River Mouth (Fig. 28).

Of special interest is Moss 12080 (J), Houghton Rise, Johannesburg. The plant is particularly robust with leaves of 2,0 cm in width and a 13-flowered inflorescence. It would be interesting to determine whether polyploids are represented in the locality where this plant was collected.

Plants of both varieties of *H. rigidula* are tall, rigid and erect. The leaves are not 3-ranked and remain close together, which characters, later in the season when growth is complete, impart an impression of "whip-like" form. The first inflorescence is usually 2-flowered, a phenomenon which can cause confusion in distinguishing plants of this species from those of *H. acuminata* (for details see under this latter species). Subsequent inflorescences, however, are generally more than 2-flowered. Plants occur mainly in grassland, but are occasionally recorded from damper areas such as vlei margins.

Citations:

TRANSVAAL	-	2528	(Pretoria): Pretoria (-CA), Burtt-Davy 682 (NH); Groen Kloof, near Pretoria (-CA), Lewis 6184 (NBG).
		2530	(Lydenburg): Lowveld Botanic Garden (-BD), Buitendag 158 (NBG); Waterval Boven (-CA), Rogers 237 (GRA).
		2531	(Komatipoort): Barberton (-CC), Galpin 1099 (PRE).
		2627	(Potchefstroom): Dassiesrand, Potchefstroom (-CA), Westhuizen 820 (PRE).
		2826	(Johannesburg): Kensington Ridge (-AA), Heydoorn 45 (STE); North Riding, Johannesburg (-AA), Wilsenach s.n. (J 35565); Houghton Rise, (-AA), Moss 12080 (J).
SWAZILAND	-	2631	(Mbabane): Ukutula, Mbabane (-AC), Compton 24492, 26342 (NBG); Forbes Reef, Mbabane (-AC), Compton 26988 (NBC); Komati Bridge, Mbabane (-AC), Compton 26924 (NBG); near Bremersdorp, Manzini (-AD), Compton 28102 (NBG).
NATAL	-	2829	(Harrismith): Cathedral Peak Area (-CC), Schelpe 466 (NU).
		2831	(Nkandla): not far from Umhlatuze bridge Eshowe-Empangeni (-DD), Gerstner 3855 (NH, PRE).
		2832	(Mtubatuba): Hluhluwe Game Reserve (-AA), Ward 1583 (NH, NU); Mposa (-CA), Halse 43 (NH).
		2929	(Underberg): Giants Castle Game Reserve (-AD), Trauseld 865 (NU).
		2931	(Stanger): Tugela (-AB), Gerrard & McKen 1826 (NH); Westville North (-CC), Coleman 193 (NH).
LESOTHO	-	2828	(Bethlehem): Leribe (-CC), Dieterlen 230 (NH).
CAPE	-	3228	(Butterworth): Kei River Mouth (-CB), Flanagan 1170 (SAM).
without precise locality:			Harrison 245 (NH), Palm Ridge Farm, Hlabisa; Medley Wood 2463 (NH), Little Tugela (Lower Tugela?) district.

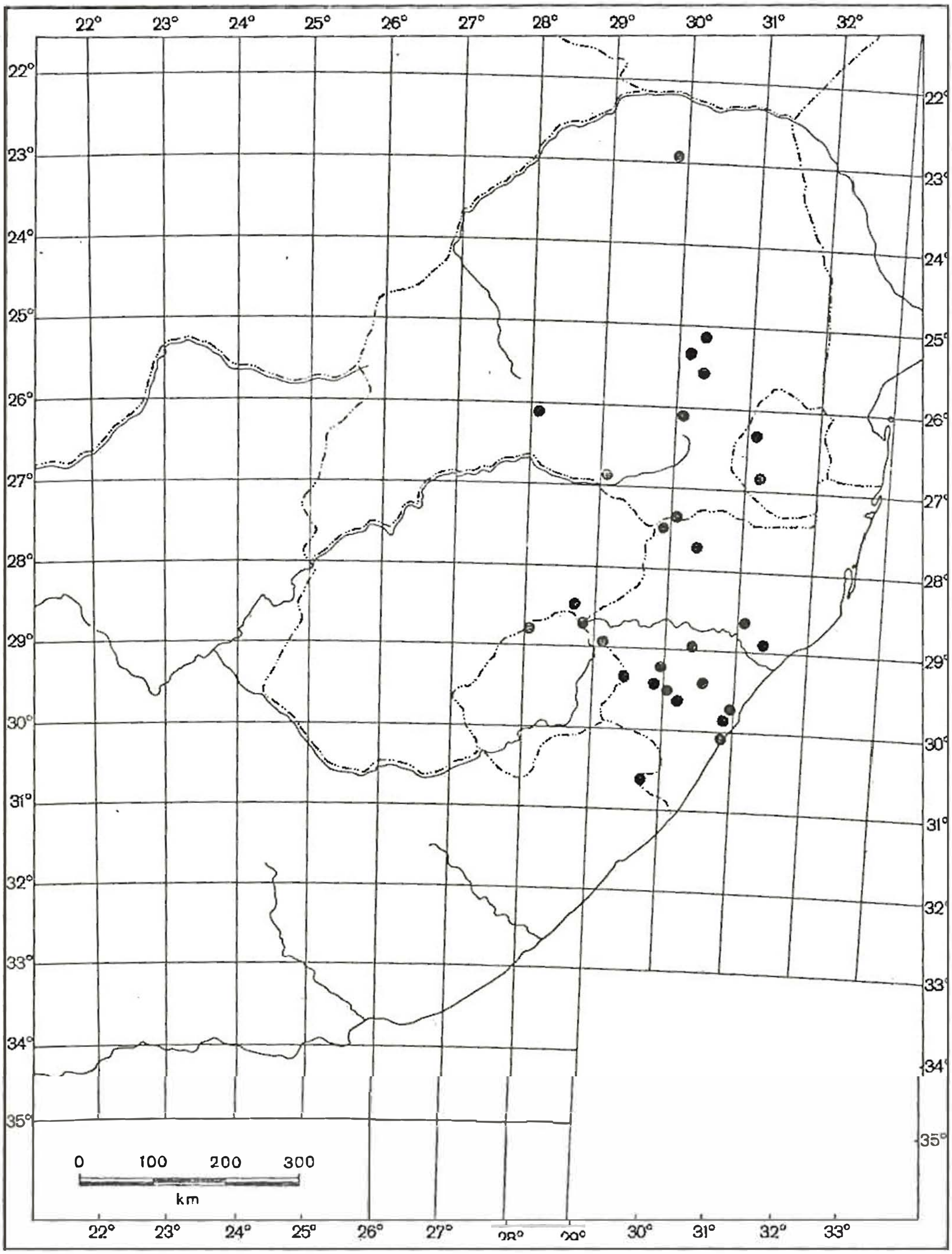


Fig. 29. Hypoxis acuminata Bak. - known distribution in Southern Africa up to 1975.

7. Hypoxis acuminata Baker in J. Bot. (Lond.):3 (1889), in Dur. & Schinz, Consp. Fl. Afr. 5:230 (1893), et in Fl. Cap. 6: 186 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:318 (1914); Guillarmod, Fl. Lesotho:148 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Inanda, Medley Wood 1347 (NH, holo.!)

Corm 1,7-2,5 cm in diam., globose-oblong, crowned with bristles. Leaves (4-)5-9, up to 30,0 cm long, 0,3-1,2 cm at widest point, not noticeably 3-ranked, linear-lanceolate or linear-acuminate, semi-erect, V-shaped in cross section, ribs 6-12, hairs stellate and bifurcate intermingled, opaque, patent, sparse on adaxial surface, dense on abaxial with hairs to keel and margins often U-shaped. Peduncles ancipitous, slightly grooved, covered with patent hairs. Inflorescence 2-4(-6) flowered. Pedicels 0,2-1,4 cm long at time of flower opening, all approximately equal or that of first formed flower longer. Bracts subulate, setaceous, 0,6-1,6 cm long. Perianth segments yellow adaxially, in open flowers 0,9-1,7 cm long. Filaments subulate. Anthers 4,0-6,0(-7,0) mm long, those associated with outer perianth segments occasionally 0,5-1,0 mm longer than the inner ones, lanceolate, sagittate, apex entire or slightly bifurcate. Style 1,0-2,0 mm long, or stigma subsessile. Stigma concrete, 2,0-3,5 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-May.

Hypoxis acuminata is predominantly a grassveld species with a wide altitudinal range. Its distribution is sympatric with that of H. rigidula (its closest morphological ally), and the present southernmost limit is Weza, Natal (Fig. 29).

Both H. rigidula and H. acuminata have erect, narrow leaves but the latter species has a smaller, less rigid, fewer-veined leaf that is V-shaped in cross section (the lamina of H. rigidula is flat). Also leaves of H. rigidula remain "bunched" together while those of H. acuminata spread out.

The type and position of hairs on the leaf also differ in the two taxa. H. acuminata has non-localised, predominantly bifurcate, patent hairs, whereas H. rigidula has appressed, predominantly stellate hairs which lie in channels between the ribs of the lamina.

Inflorescences differ only in flower number: H. acuminata usually has two, but may have up to four flowers, whereas inflorescences of H. rigidula are 3-11 flowered, except for the first which is usually 2 flowered.

Citations:

TRANSVAAL	-	2229	(Waterpoort): Punda Maria (Milia), Zoutpansberg (-DD), Lang s.n. (NH 27190).
		2530	(Lydenburg): Lydenburg (-AB), Codd 8049 (PRE); near Dullstroom (-AC), Killick & Strey 2548 (PRE); 10 m. N.E. of Machadodorp on road to Lydenburg (-CB), Codd & de Winter 3361 (PRE).
		2628	(Johannesburg): Rand Klip, Witwatersrand (-AA), Moss 17713 (J); Milner Park, Johannesburg (-AA), Moss 13889 (J); Houghton Estate, Johannesburg (-AA), Moss 5211 (J).
		2629	(Bethal): Standerton (-CD), Weiss s.n. (STE 16907), Phillips s.n. (J 32949).
		2630	(Carolina): Carolina (-AA), Rogers 11561 (GRA).
		2730	(Vryheid): Wakkerstroom (-AC), Beeton 27 (NBG).
O.F.S.	-	2828	(Bethlehem): Witzieshoek (-DA), Thode 2547 (STE); National Park, Mont aux Sources (-DD), v.d. Zeyde s.n. (NBG, 9.11.69), Cliver 403 (NH).
SWAZILAND	-	2631	(Mbabane): Mbabane Dist. (-AC), Compton 24551, 25179, 26071, 27182, 28279, 28289 (NBG), 31728, 26128, (NBG; PRE); Hlatikulu (-CC), Stewart 180 (NBG).
NATAL	-	2729	(Volksrust): 2 km after Charlestown on road to Newcastle (-AC), Arnold 839 (NU).
		2730	(Vryheid): Naauwhoek Distr., Utrecht (-CB), Devenish 1174 (PRE).

2829 (Harrismith): Cathedral Peak (-CC), S.E. Wood 149, 154 (NU), Killick 1574 (NPC), 1113 (NPC, (PRE).
2830 (Dundee): Muden (-CD), Wylie s.n. (NH 27977).
2831 (Nkandla): N'kandhla (-CA), Gerstner 3588 (NH); Eshowe (-CD), Gerstner 2382 (NH).
2929 (Underberg): Giants Castle (-AD), Symons 70 (NBG); Mooi River, Meteor Ridge (-BB), Mogg 3189 (PRE); Balgowan (-BD), Mogg 5572 (PRE); 18 km to Dargle from Impendhle (-DB), S.E. Wood 132 (NU).
2930 (Pietermaritzburg): Dargle Road (-AC), Mogg 5720 (PRE); Greytown (-BA), Wylie s.n. (NH 21682); 1 km to New Hanover Station (-BC), S.E. Wood 92A (NU); 40 km to Bulwer from Pietermaritzburg (-CA), S.E. Wood 121 (NU); Inanda (-DB), Medley Wood 1347 (NH); Escombe (-DD), Rensburg 25 (NU).
3029 (Kokstad): Weza Forest (-DA), L.E. Taylor 5262 (STE).
3030 (Port Shepstone): Newhaven, Amanzimtoti (-BB), Allsopp 682 (NH).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), Dieterlen 290 (PRE, SAM), 709 (SAM).

without precise locality:
Stokoe 1598 (STE); Thode 2546 (STE), Altemooi, Natal Province.

8. Hypoxis oblonga Nel in Engl. Jahrb. 51:332 (1914); Bews, Fl. Natal & Zululand:65 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Weenen Distr., Medley Wood 4372 (NH, iso.!)

Corm 2,0-3,0 cm in diam., oblong, crowned with bristles. Leaves 4-7, 12,0-80,0 cm long, 0,2-1,5 cm at widest point, linear acuminate-lanceolate, erect, not 3-ranked, 8-20 irregular ribs with 2 more prominent, hairs on margins and keel stellate (predominant) and bifurcate intermingled, up to 8,0 mm long, whitish, dense; hairs on lamina bifurcate only, scattered to dense (abaxial surface denser

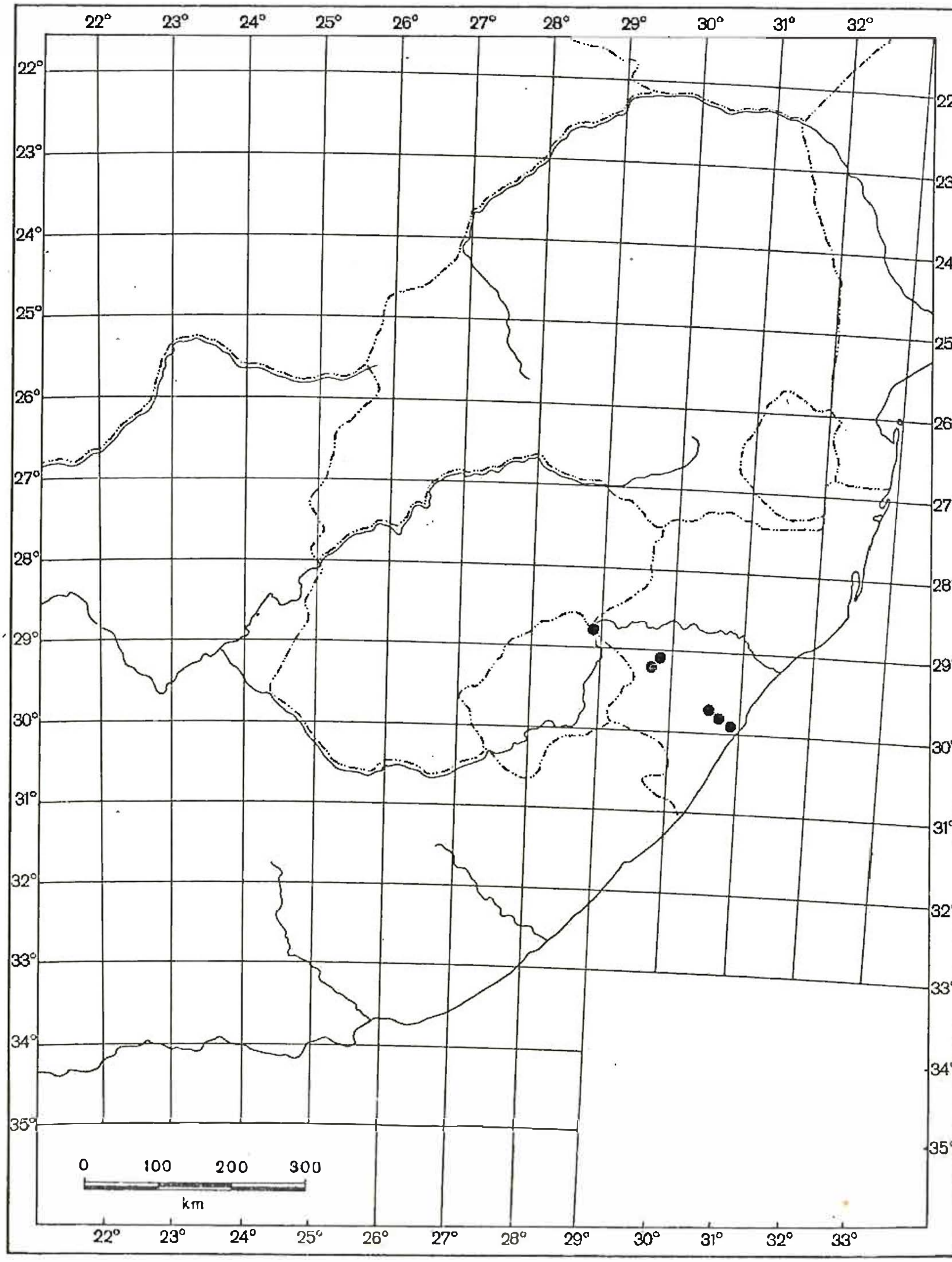


Fig. 30. Hypoxis oblonga Nel - known distribution in Southern Africa up to 1975.

than adaxial). Peduncles ancipitous, patently hairy, becoming subglabrous towards the base. Inflorescence 2-6 flowered. Pedicels 2,0-5,0 mm long or flowers subsessile. Bracts subulate, setose, 1,1-2,2 cm long. Perianth segments yellow adaxially, in open flowers 1,0-1,7 cm long. Filaments subulate, equal. Anthers 4,0-7,0 mm long, lanceolate, sagittate, apex entire. Style cylindrical, 1,0-2,0 mm long. Stigma concrete, 2,0-3,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: June-December.

Hypoxis oblonga is known only from Natal (Fig. 30). The erect, essentially narrow leaves are variable in width (0,2-1,5 cm) and hairiness within the limits of a population. The leaf blades are provided with a prominent rib on either side of the keel. The leaves are not 3-ranked. Plants growing at Inchanga exhibited aspect differences: those from the south facing slope had narrower, less densely hairy leaves; those from the north facing slope were wider, harder and more densely hairy.

H. oblonga has two morphological allies, H. galpinii and H. rigidula var. rigidula. Their differences are summarised in Table 4. In all other respects they are similar.

Citations:

NATAL - 2828 (Bethlehem): Mont aux Sources (-DD), Pellatt 2 (NU).
2929 (Underberg): "South Downs", Weenen Distr. (Estcourt) (-BB), Medley Wood 4372 (NH); Yorkshire Wolds (-BB), Thode 2534 (ex parte) (STE).
2930 (Pietermaritzburg): Inchanga Cutting (-DA), K.D. Gordon-Gray 10011 (NU), S.E. Wood 210

(NU): Botha's Hill (-DC), Medley Wood 2435
(NH): Westville (-DD), Cairns s.n. (NU, 8.8.55).

Leaf	H. oblonga	H. galpinii	H. rigidula
width	0,2-1,5 cm	1,5-4,5 cm	0,3-1,3 cm
ribs	prominent rib on either side of keel	prominent rib on either side of keel	ribs irregular
lamina	usually conduplicate	not conduplicate	not conduplicate
laminal hairs	bifurcate, scattered to dense on both surfaces	absent, or rarely stellate hairs, scattered on prominent ribs	stellate (predominent) and bifurcate intermingled, lying in channels between the ribs

Table 4. Comparison of leaf characters of H. oblonga, H. galpinii and H. rigidula var. rigidula.

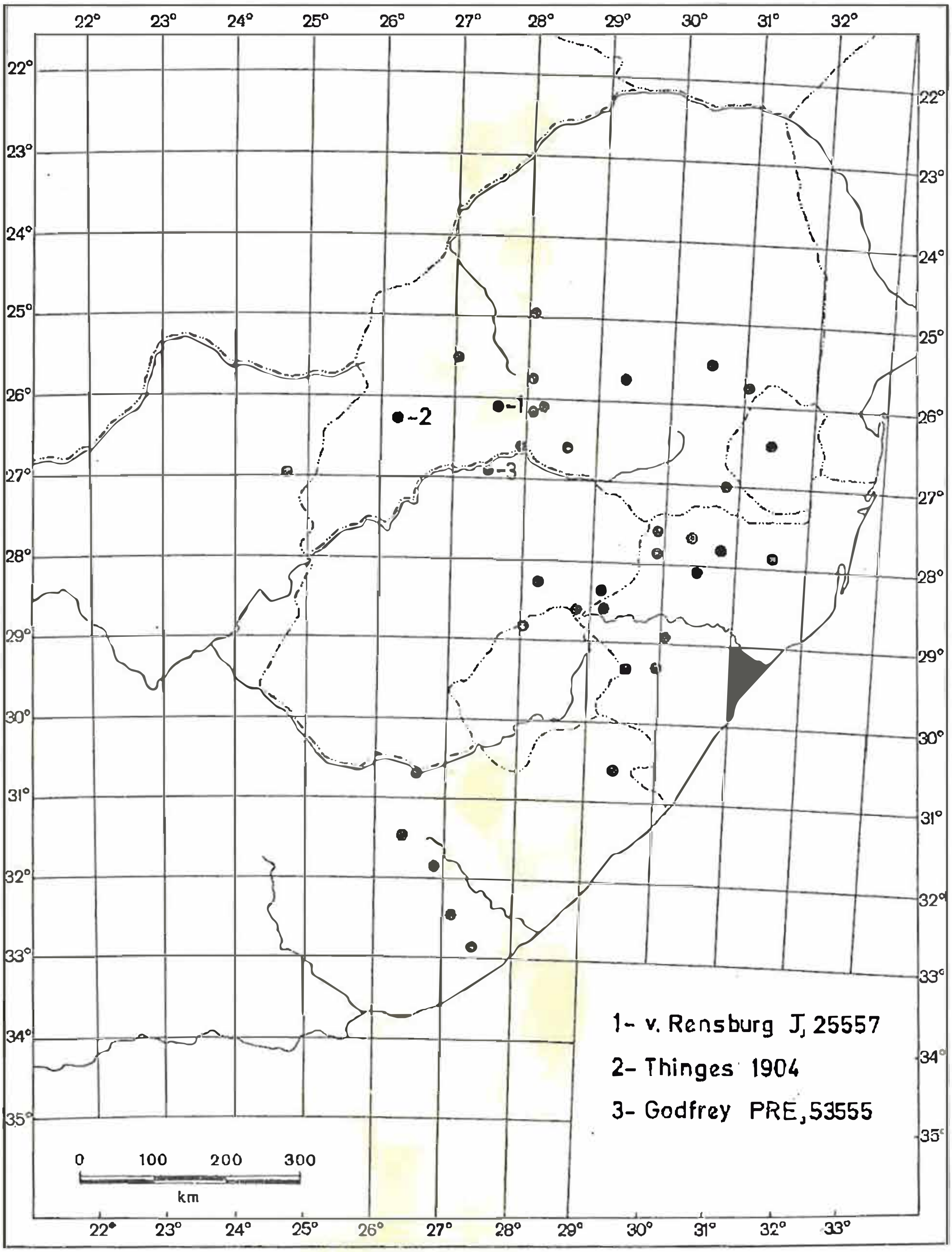


Fig. 31. Hypoxis obtusa Burch. - known distribution in Southern Africa up to 1975, excluding South West Africa and Botswana

9. Hypoxis obtusa Burchell in Bot. Reg.t.159 (1816); Roem. et Schultes, Syst. Veg. 7:765 (1818); Baker in Trans. Linn. Soc. 29:156 (1875), in J. Linn. Soc.:114 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:233 (1893), et in Fl. Cap. 6:184 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:334 (1914); Bews, Fl. Natal & Zululand: 65 (1921); Söich in Merxm. F.S.W.A. Fam. 151:2 (1969); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Bechuanaland, Pellat Plains near Takun, Burchell s.n. (K, holo.!)

Hypoxis nitida Verdoorn in Flow. Pl. Afr. 27:Plate 1058; (1949); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Transvaal, Pretoria, Robertson 2 (PRE, holo.!)

Corm 4,0-7,0 cm in diam., oblong-globose, crowned with a dense ring of bristles. Leaves 6-16, 7,0-56,0 cm long, 0,3-2,0 cm at widest point, linear-lanceolate, erect but becoming twisted and curving backwards with age, ribs 20-80, prominent, usually regular in size, hairs white, opaque, stellate, usually appressed on margins and keel, lamina usually glabrous, occasionally with stellate hairs at the base, with or without bifurcate hairs intermingled. Peduncles (1-)3-5, ancipitous, densely hairy below inflorescence grading to sub-glabrous or glabrous at the grooved base. Inflorescence 2-12 flowered. Pedicels lowest 2-4 at time of flower opening, 0,5-1,7 cm long, densely hairy. Bracts subulate, setose, 0,8-3,5 cm long, the first formed flowers with the longest bracts. Perianth segments yellow adaxially, in open flowers 1,2-2,3 cm long. Filaments subulate, equal. Anthers 6,0-8,0 mm long, lanceolate, deeply sagittate, apex entire. Style cylindrical 1,0-2,5 mm long. Stigma concrete, 2,0-4,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circum-scissile dehiscence below the apex.

Flowering Period: August-February.

Fig. 32. H. obtusa: a - young leaves,
b - last season's leaves

Fig. 33. H. obtusa with old leaves only

Hypoxis obtusa is southern African in distribution (Fig. 31), being recorded from South West Africa, Swaziland, Lesotho and all four provinces of South Africa. Populations commonly occur at high altitudes of up to approximately 2000 m, but at more southern latitudes they are present at lower elevations often not far from the coast.

Leaves of this species are lanceolate and strongly ribbed, with the younger, central leaves characteristically narrower than the older, outer ones. The keel and margins are clothed with stellate hairs, but the lamina is usually glabrous (occasionally stellate or bifurcate hairs, or both types intermingled, occur over the lamina for a distance of about 4,0 cm from the base). During the growing season the leaves elongate to up to 60 cm, become recurved and twisted and are not as markedly conduplicate as are the younger leaves. Fig. 32 shows the difference between young and old leaves, while Fig. 33 shows a plant with old leaves only.

Specimens v. Rensburg s.n. (J 25557) and Godfrey s.n. (PRE 53555)(Fig. 31-1 & 3) are thought to be variants of H. obtusa because the leaves are covered throughout in stellate hairs. Further collecting in the central area of the Transvaal, from where these plants were collected, is needed to determine if a range from the glabrous to the hairy form is present, or whether the hairy plants should be recognized as a distinct variety.

Verdoorn in 1949 established H. nitida (type: Robertson 2, Pretoria (PRE). In the type description this species was said to have "leaves 12 to 15 at time of flowering, shining, glabrous, or occasionally with a patch of appressed pubescence, the margins and midrib conspicuously fringed with whitish pubescence, sub-equally 30-75 nerved, at first erect then recurving, trifarious ... at the time of flowering, 18 to 23 cm long and 1 to 2 cm broad, the outer shorter and broader and the innermost narrower". In the discussion comparison was made with H. obtusa. "In respect of the white fringes to the leaf it /H. nitida/ resembles H. obtusa, but in that species the leaves are much narrower, with fewer nerves, and they are not arranged trifariously".

According to the characters used by Verdoorn, I have not been able to distinguish H. nitida from H. obtusa. The critical characters do not hold, firstly because the leaves of both species are not always obviously trifarious, and secondly because leaf width varies between extremes of 0,3 and 2,0 cm, with a wider leaf possessing more nerves than a narrower one.

Comparison of the types has shown these to be conspecific, and H. nitida must now become a junior synonym of H. obtusa.

The only close ally of H. obtusa is H. rooperi S. Moore, but in the latter species the leaves are more markedly 3-ranked, wider, hairy all over with the ribbing not as compact, and not becoming twisted in age.

Thinges 1904 (Fig. 31-2) falls into this complex but has hairy leaves like those of H. rooperi. A concentration of hairs on the keel and margins is, at the same time, suggestive of similar aggregations of hairs on the leaves of H. obtusa. Thinges 1904 cannot be confused with either Godfrey s.n. (PRE 53555) or v. Rensburg s.n. (J 25557), as its leaf hairs are not appressed, and are stellate and bifurcate. Field study in the central Transvaal is necessary if the relationships among these variants are to be understood.

Citations:

TRANSVAAL -	2428	(Nylstroom): Flats near Warmbaths (-CC), Hofström & Acocks 251 (PRE).
	2527	(Rustenburg): Rustenburg (-AC), Leendertz 10203 (PRE), Moss 2655 (J).
	2528	(Pretoria): Pretoria (-CA), Pegel s.n. (NH, 23.1.68, 4 sheets), Robertson 2 (PRE); Muckleneuk, Pretoria (-CA), Bouwer 6055 (PRE); Doornpoort, Pretoria (-CA), Mogg 272 (PRE); Axalikloof, Pretoria (-CA), Mogg s.n. (PRE 9358); Doornkloof, Irene (-CC), Gillett s.n. (STE 30403).
	2529	(Witbank): Buffelsvlei, Middleburg, Transvaal (-CB), Rudatis 39 (STE); Middleburg (-CB), Jenkins 10202 (PRE).
	2530	(Lydenburg): 18 mls from Nelspruit, Johannesburg road (-BC), Buitendag 619 (NBG).
	2531	(Komatipoort): Barberton (-CC), Galpin 412 (GRA, PRE).
	2627	(Potchefstroom): Witwatersrand, Frankenwald (-BA), v. Rensburg s.n. (J 25556, 25557), Maguire s.n. (J 25555); Parys (-CD), Godfrey s.n. (PRE 33555); Vereeniging (-DB), Gunn s.n. (PRE 33557).
	2628	(Johannesburg): Johannesburg (-AA), Moss 2556 (J), Pegel s.n. (NH 23.1.68); The Wilds, Johannesburg (-AA) Lambert s.n. (J 24471); Melville Koppies (-AA), Macnae 1496 (J); Zoo Koppies, Johannesburg (-AA), Moss 16184 (J); Kempton Park (-AA), Prosser s.n. (J 29380); 5 km past Balfour on road to Volksrust (-DA), Arnold 836 (NU).
	2630	(Carolina): Piet Retief (-DD), Compton 22360 (NBG).
O.F.S. -	2626	(Klerksdorp): Lichtenburg (-AA), Thinges 1904 (PRE).
	2828	(Bethlehem): Bethlehem (-AD), Potgieter 34 (PRE); Golden Gate National Park (-DB), Liebenberg 7329 (PRE).
	2829	(Harrismith): Harrismith (-AC), v.d. Zeyde s.n. (NBG, 4.2.70, 12.10.70).
SWAZILAND -	2631	(Mbabane): Manzini (-AD), I'ons 63/19 (NBG).
NATAL -	2729	(Volksrust): 20 km before Newcastle from Volksrust (-DB), Arnold 842 (NU); Newcastle (-DD), Booysen 1707 (NBG).
	2730	(Vryheid): Kafir Drift (-CB), Thode A249 (NH); Vryheid (-DD), Strey 9101 (NH, PRE).
	2731	(Louwsburg): Nongoma (-DC), Markotter s.n. (STE 8851).
	2829	(Harrismith): Olivershoek Pass, Bergville (-DA), Laughton s.n. (J 34644).
	2830	(Dundee): 30 km from Dundee to Vryheid (-AB), Stirton 1317 (NU); Weenen (-CC), Rogers 28311 (STE).

2929 (Underberg): Giants Castle (-AD), Symons 72 (PRE), Trauseld 868 (NU); Mooi River, Meteor Ridge (-BB), Mogg 3281 (PRE, 2 sheets).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), Dieterlen 223 (NH), 230 (PRE, SAM), 310 (SAM).

CAPE - 2624 (Vryburg): Vryburg (-DC), Sharpe s.n. (PRE 7234), no name (STE 12805).

3026 (Aliwal North): Aliwal North (-BA), Bolus 181 (PRE, STE).

3029 (Kokstad): Kokstad (-CB), Mildred 1 (NBG).

3126 (Queenstown): nr. Molteno (-AD), Flanagan 1642 (SAM); Hangklip Mtn., Queenstown (-DD), Galpin 1605 (PRE); Queenstown (-DD), Baur 904 (SAM).

3227 (Stutterheim): Cathcart (-AC), Kemp s.n. (NBG 65826); Welcome Wood (King Williams Town) (-CD), Sim 1126 (NU).

without precise locality:

MacOwan 1649 (SAM), Boschberg, Somerset East; Moss s.n. (J, 22.10.27); Rennie 610 (NU), Polela distr., Glengariff; Weeks 25 (J) Eckstein Park; Winter 617 (NBG).

(Note: The South West African specimens have not been cited since it has not yet been possible to examine them.)

10. Hypoxis rooperi S. Moore in Gard. Comp. 1:65 cum icone (1852), in J. Linn. Soc. 17:118 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:234 (1893), et in Fl. Cap. 6:188 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:337 (1914); Bews, Fl. Natal & Zululand:65 (1921); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, without locality, Cooper 154 (BM, syn.!)

Corm 2,6-6,5 cm in diam., globose-oblong, crowned with bristles. Leaves many, 6,0-95,0 cm long, 1,0-5,2 cm at widest point, 3-ranked, lanceolate, erect usually sickle-shaped, ribs 20-50, slightly irregular in size, keel, margins and usually abaxial surface densely covered with stellate and bifurcate, white hairs, adaxial surface less densely covered with similar hairs. Peduncles ancipitous, densely hairy below inflorescence, grading to subglabrous at the grooved base.

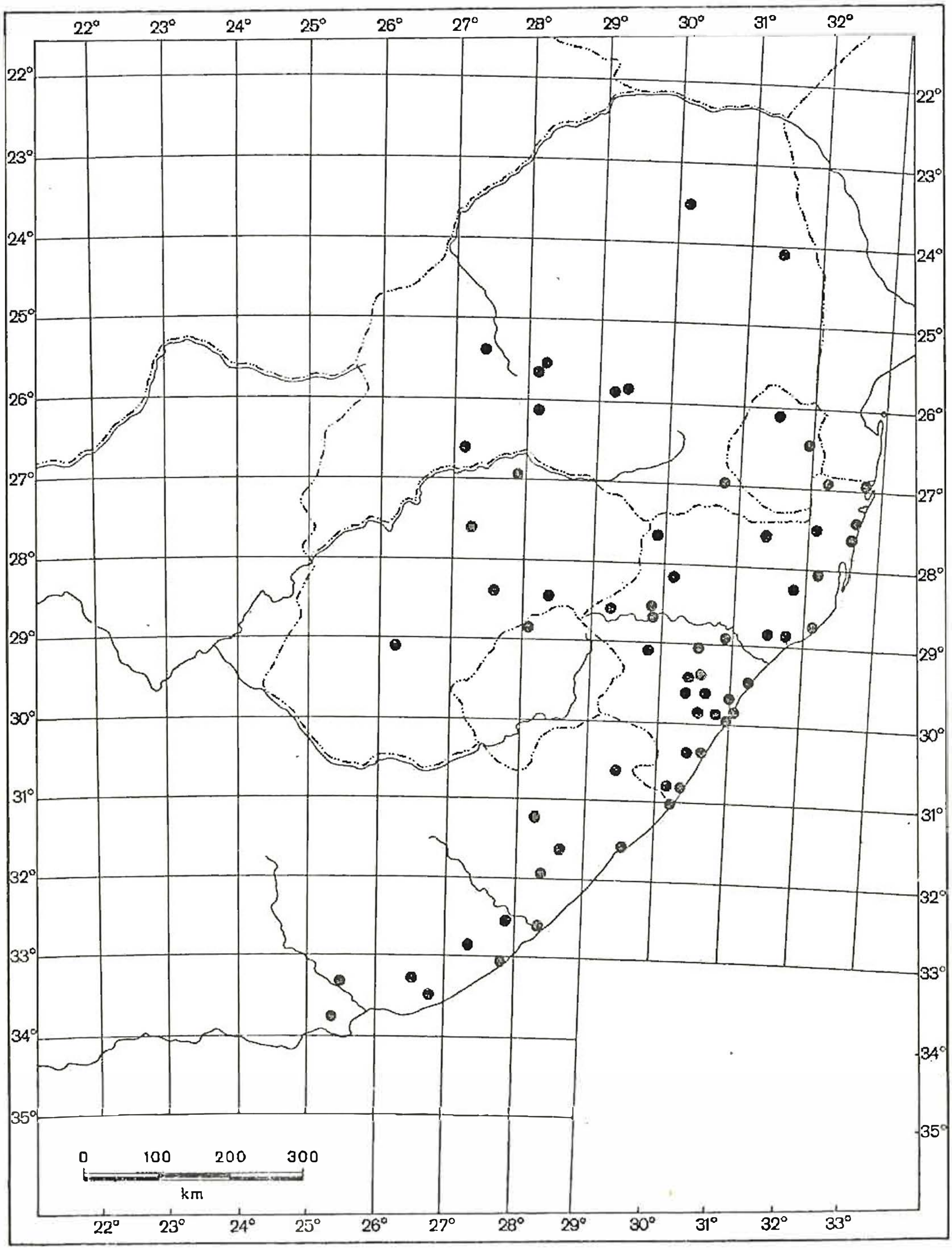


Fig. 34. Hypoxis rooperi S. Moore - known distribution in Southern Africa up to 1975.

Inflorescence 2-15 flowered, up to 12,0 cm long (excluding peduncle). Lower pedicels (0,5-)1,0-3,0 cm long at time of flower opening. Bracts subulate, setose, 0,7-3,3 cm long. Perianth segments yellow adaxially, in open flowers (0,8-)1,0-2,3 cm long. Filaments subulate, equal. Anthers (5,0-)7,0-7,5(-8,0) mm long, lanceolate, sagittate, apex usually entire, seldom slightly bifurcate. Style cylindrical, 1,0-3,0 mm long. Stigma concrete, 2,0-3,5 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: (July-) August-January (-May).

Hypoxis rooperi is perhaps the best known Natal species. Plants are characterized by the many, obviously 3-ranked, sickle-shaped leaves that are densely hairy abaxially.

Plants occupy a wide range of habitats from sandy hills on the margins of dune forests to damp areas around streams: they are commonest, however, in grassveld, where, in disturbed areas, quite extensive almost pure stands often occur.

H. rooperi is eastern, southern African in distribution (Fig. 34), being recorded from all four provinces of South Africa, Lesotho and Swaziland, up to altitudes of approximately 1800 m. There is considerable variation in leaf size and hairiness over this range, but no distinct infra-specific entities are recognizable.

There is no difficulty in the identification of this species in the field. H. obtusa is its closest ally, but in this taxon the leaves are not as distinctly 3-ranked as in H. rooperi, while the narrower laminae are glabrous, except for opaque, stellate hairs confined to the margins and keel.

Citations:

TRANSVAAL	-	2431	(Acornhoek): Kruger National Park (-AB), Codd 5673 (PRE).
		2527	(Rustenburg): Rustenburg (-AD), Hards 19 (PRE).
		2528	(Pretoria): Pretoria (-CA), Leeman s.n. (PRE 33554, Smith 1724 (PRE).
		2529	(Witbank): Zondagsfontein, Witbank (-CC), Thode A2856 (NH).
		2627	(Potchefstroom): Mooi River (-CA), Nelson 11768 (PRE); Klipdrift (-CA), Theron 1190 (NH).
		2628	(Johannesburg): Modderfontein (-AA), Haagner s.n. (GRA, Oct. 1904); Hills south of Johannesburg (-AA), Arnold 834 (NU).
		2630	(Carolina) Piet Retief (-DD), Pienaar 74 (NU).
O.F.S.	-	2727	(Kroonstad): Kroonstad Convent (-CA), 6 (PRE).
		2827	(Senekal): Senekal (-BD), Goossens 779 (PRE).
		2828	(Bethlehem): Bethlehem (-AD), v. Ginkel 257 (PRE).
		2926	(Bloemfontein): Bloemfontein (-AA), Bouwer 2229 (PRE).
SWAZILAND	-	2631	(Mbabane): Timbutini River Bank (-AB), Compton 31790 (NBG); near Bremersdorp (-AB), Compton 28104 (NBG); Komati Bridge (-AC), Compton 28843 (NBG); Umtintegwa (-BD), Compton 27337 (NBG).
NATAL	-	2632	(Bela Vista): Ndumu Game Reserve (-CC), Pooley 662 (NU); NPB camp, Kosi Bay (-DD), Moll & Strey 3807 (NH).
		2729	(Volksrust): 20 km before Newcastle from Volksrust (-DB), Arnold 840 (NU).
		2731	(Louwsburg): Louwsburg (-CB), v. Rooyen 5 (NU).
		2732	(Ubombo): Lake Sibaya (-BC), Hart 29 (NU); Lala Nek (-CA), Stephen, v. Graan & Schwabe 1151 (PRE); Sordwana Bay Park (-DA), S.E. Wood 86 (NU).
		2829	(Harrismith): 8 mls to Bergville on Rustenburg Rd. (-CA), Edwards 2407 (NU); Hart's Hill, Colenso (-DB), Strey 9962 (NH, NU); Ladysmith (-DB), Geekie 41 (NU); Colenso (-DD), Dixon 6 (NU).
		2830	(Dundee): Dundee (-AA), Shirley 241 (NU); Krantzkloof (-DD), Haygarth 18 (STE), Rogers 24612 (STE).
		2831	(Stanger): Hluhluwe Game Reserve (-BB), Ward 1586 (NH, NU, PRE); Eshowe (-CD), Lawn 446 (NH), 1161 (NH), Gerstner 2590 (NH); Ngoye Forest Reserve (-DD), Huntley 247 (NH, NU).
		2832	(Mtubatuba): Hluhluwe (-AA), Wells 2113 (NH); Hluhluwe Game Reserve (-AA), Bourquin 458 (NU); Richards Bay (-CC), Lawn 335 (NH).

2929 (Underberg): 8 km from Estcourt (-BB), S.E. Wood 145 (NU).
2930 (Pietermaritzburg): Albert Falls (-AD), Comins 304 (NU); ± 10 km from Wartberg (-AD), S.E. Wood 75 (NU); Greytown (-BA), Wylie s.n. (NH 22420); Kingscliff (-BC), S.E. Wood 77B (NU); Impolweni (-BC), Rump s.n. (NH 20300); Kings Hill Railway siding (-BC), S.E. Wood 76 (NU); Pietermaritzburg (-CB), Lachman 7 (NU), Mauve 29 (NU), Fisher 81 (NU), Fairall 110 (SAM), Barker 4367 (NBG), Leisgang 46 (NU), Douwes Dekker 11 (NU), Pienaar 16 (NU), Stirton 105 (NU), S.E. Wood 72, 82 (NU); 11 km to Mid-Illovo from turn off on Eston Rd. (-CD), S.E. Wood 106 (NU); Nagel Dam (-DA), Todd 33 (NU); Cato Ridge (-DA), Ross 2157 (NH); Camperdown (-DA), Wells 1578 (NU); Inanda (-DB), Strey 5163 (NH), Medley Wood 47 (SAM); Bothas Hill (-DC), Hutchinson, Forbes & McClean 31 (NH); 8 km to Kingburugh on Eston Rd. (-DC), S.E. Wood 118 (NU); 36 km to Umbumbulu on Eston Rd. (-DC), S.E. Wood 100 (NU); 32 km to Umbumbulu (-DC), S.E. Wood 102 (NU); Isipingo North (-DD), Ward 398, 459 (NU); Cowies Hill (-DD), Lawson 1220 (NH); Umlazi, Adams Mission station (-DD), Wilker 116 (NU).
2931 (Stanger): Umhlanga River (-CA), Ross & Moll 2281 (NH, PRE); Tongaat (-CA), Farquaharson 3 (NU); 5 mls west of Verulam (-CA), Moll 2068 (NU); Brighton Beach (-CC), Coleman 159 (NH); Greenwood Park (-CC), Wylie s.n. (NH 23107); Durban Flat (-CC), Medley Wood s.n. (NH 6922); Durban (-CC), Forbes s.n. (STE 12803).
3029 (Kokstad): Clydesdale (-BB), Tyson 2745 (PRE); Kokstad (-CB), Tyson 1125, 1210 (SAM), 1478 (GRA).
3030 (Port Shepstone): Hlutankungu (-AD), S.E. Wood 79 (NU); Umdoni Park (-BC), Guy & Jarman 84 (NU); on rd. from Izingolweni to Port Edward (-CG), S.E. Wood 165B (NU); Beach Terminus (-CD), Thode s.n. (STE 2540); Ramsgate (-CD), S.E. Wood 174 (NU); Greenhart turn off from Port Edward to Port Shepstone (-CD), S.E. Wood 173 (NU); Marina Beach (-CD), Strey 5942 (NH, NU); St. Michaels-on-Sea (-CD), Nicholson 238 (NH); Shelley Beach (-CD), Strey 9256 (NH).
3130 (Port Edward): Entrance into Port Edward from Izingolweni (-AA), S.E. Wood 167, 168 (NU); outside Port Edward (-AA), S.E. Wood 170 (NU). Port Edward (-AA), S.E. Wood 171 (NU).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), Dieterlen 229A (NH, PRE, SAM, 2 sheets), Dieterlen 229 (SAM).

CAPE - 3128 (Umtata): Ugie (-AA), Britten 4653 (GRA); Umtata waterfall (-DA), Schonland 3925 (GRA); The Haven (-DC), J.L. Gordon-Gray 1438 (NU).
3129 (Port St. Johns): Port St. Johns (-DA), Schonland 4179 (GRA).

3227 (Stutterheim): Mount Coke (-CD), L.E. Taylor 3535 (NBG), King Williams Town (-CD), Sim 1129 (NU, SAM), 1855 (NU), Batten 6 (NBG, PRE); Komgha (-DB), Flanagan 1810 (SAM).

3228 (Butterworth): near Kei Mouth (-CB), Flanagan 1810 (PRE).

3325 (Somerset East): Zuurberg (-AD), Paterson s.n. (GRA, Oct. 1911); Zuurberg Sanatorium, Uitenhage (-CD), Lang 177 (GRA).

3326 (Grahamstown): Grahamstown (-BC), Daly 78 (PRE, 2 sheets); Bathurst (-DB), L.E. Taylor 4966 (NBG).

3327 (Peddie): East London (-BB), L.E. Taylor 5584 (NBG), Courtenay-Latimer s.n. (NBG, Oct. 1945), Barker 3428 (NBG, 2 sheets).

without precise locality:

Compton 24706 (NBG), Ranches, Swaziland; Rudatis 1736 (PRE), Campbellton, Natal; Gerstner 3638 (NH), Zululand; Thode 2541 (STE), Smith's Crossing, Natal; Kotze 507 (PRE), Umtlatuzi, Zululand; Harrison 183 (NH), Palm Ridge Farm, Zululand; Pegler 1143 (PRE), District Kentani; Sim 1120, 1124, 1129 (NU), Kabongaba, Transkei; Scully 117 (SAM), Stockenstroom; Rogers 28367 (STE), Manly Flats, Albany; Gerrard & McKen 1828 (NH); Tyson 2745 (STE).

11. Hypoxis zululandensis S.E. Wood sp. nov.

Type: South Africa, Ubombo, Manzengwenya, Moll 4740 (~~SAM~~, holo.!)
NBG

Cormus ± 4,0 cm diametro., sub-globosus, coronatus setis. Folia 4-10, 15,0-45,0 cm longitudine, 0,3-0,4 cm maxima latitudine, linearia, semi-erecta, instructa 10-20 costis, aequalibus magnitudine, approximatis, pili stellati, praediti solo brachio attingenti usque ad 2,0 mm, residuum brachiarum ± 0,25 mm longitudine, pili opaci, densi marginibus carinaque, pili in lamina siti praecipue basi inter

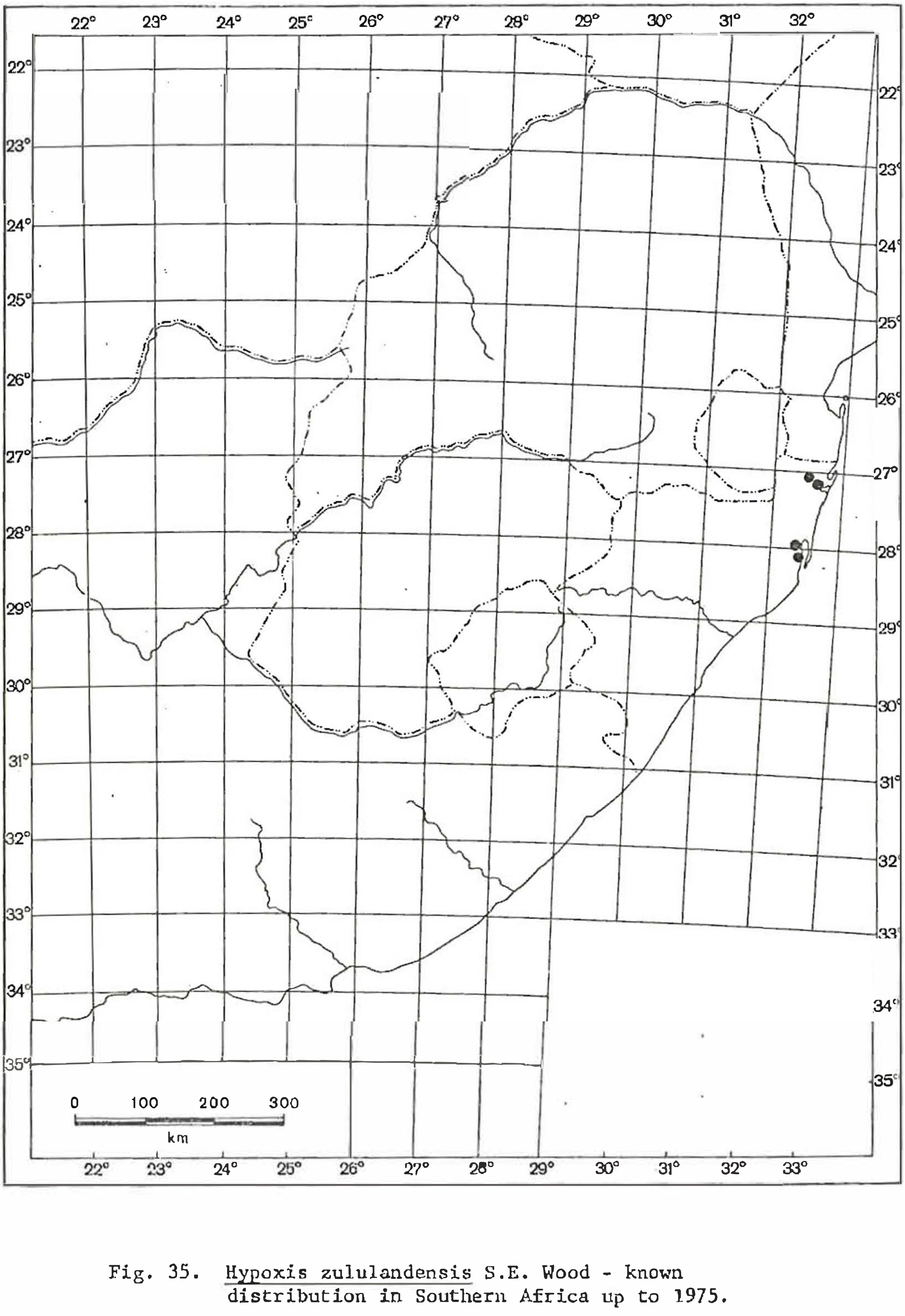


Fig. 35. Hypoxis zululandensis S.E. Wood - known distribution in Southern Africa up to 1975.

costas, hi pili instructi brachiis aequalibus longitudine $\pm$ 0,25 mm, praeditique interdum solo brachio longiore, similes pilis carina marginibusque, vel lamina glabra, (folia basalia infima subter vestita sunt pilis stellatis instructis brachiis aequalibus longitudine). Pedunculi ancipites, hirsuti. Inflorescentia praedita 2-5 floribus. Pedicelli 0,5-1,5 cm longitudine tempore patendi florum, hirsuti. Bracteae lineares-subulatae, setosae, 0,5-1,2 cm longitudine. Perianthium segmenta lutea superficie, in floribus reclusis 1,0-1,5 cm longitudine. Filamenta subulata, inaequalia longitudine. Antherae 4,5-6,5 mm longitudine, lanceolatae, sagittatae, parum bifurcatae apice. Stylus cylindricus, 1,0-2,0 mm longitudine. Stigma concretum, 2,0-2,5 mm longitudine, pyramidale formatum tribus concavis faciebus. Fructus, capsula supra medium circumscissa, operculo deciduo.

Corm $\pm$ 4,0 cm in diam., sub-globose, crowned with bristles. Leaves 4-10, 15,0-45,0 cm long, 0,3-0,4 cm at widest point, linear. semi-erect with 10-20 uniform ribs close together, hairs stellate, one arm up to 2,0 mm, the remainder $\pm$ 0,25 mm long, opaque, dense on margins and keel, laminal hairs mainly at the base between ribs, these with equal arms $\pm$ 0,25 mm long, occasionally one arm longer as with hairs on keel and margins, or lamina glabrous, (the first basal leaves are abaxially covered with stellate hairs with arms of equal length). Peduncles ancipitous, hairy. Inflorescence 2-5 flowered. Pedicels 0,5-1,5 cm long at time of flower opening, hairy. Bracts linear-subulate, setose, 0,5-1,2 cm long. Perianth segments yellow adaxially, in open flowers 1,0-1,5 cm long. Filaments subulate, unequal. Anthers 4,5-6,5 mm long, lanceolate, sagittate, apex slightly bifurcate. Style cylindrical, 1,0-2,0 mm long. Stigma

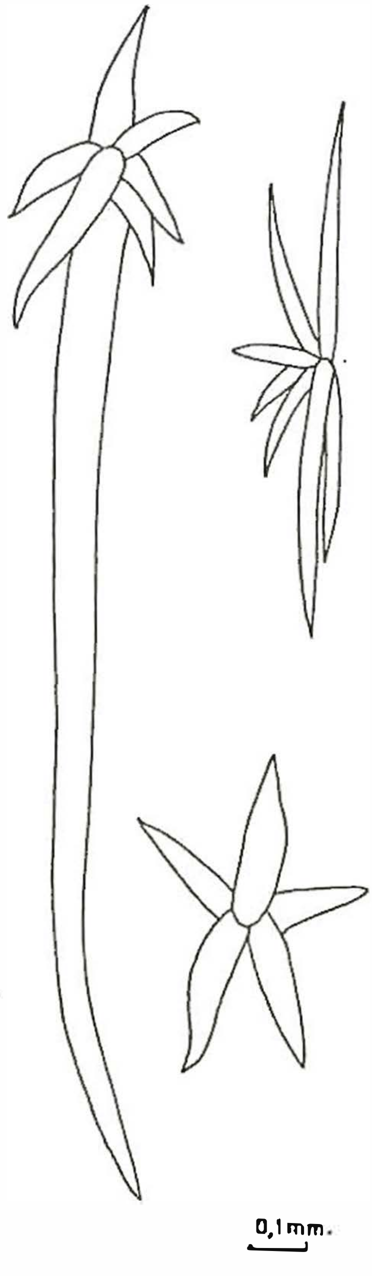


Fig. 36. H. zululandensis: hair types

concrete, 2,0-2,5 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: October-December.

This species is at present known only from the districts of Hlabisa and Ubombo in Zululand, Natal (Fig. 35), at altitudes of not more than 40 m. Plants appear to prefer grassland habitats but have been recorded near vleis. The specific name reflects the locale of the plants.

Hypoxis zululandensis has characteristically thin, linear leaves which are strongly nerved with often short, squat, stellate hairs (Fig. 36) on the keel and margins. The lamina is unusual in that there is a tendency for the hairs, which are situated mainly in the channels between the ribs, to be limited to the basal portion. *H. rigidula* is the only other Natal species in which the hairs lie within the channels, but this species is distinct because of its fewer, rigid leaves which are flat and not subterete in cross section as in *H. zululandensis*. The pedicels of *H. zululandensis* are also much longer than those of the subsessile flowers of *H. rigidula*.

Another close morphologically ally of *H. zululandensis* is *H. obtusa*, in which the dense covering of opaque hairs on the margins and keel, and the strongly nerved leaves are similar. However, in this species the leaf lamina is wider, slightly sickle-shaped and glabrous.

The inflorescences of *H. zululandensis* and *H. filiformis* are essentially similar except that first formed flowers are, respectively, either carried on pedicels $\pm$ 0,5 cm long or are sub-sessile. The leaf shape, ribbing and hair covering in H. filiformis are distinct from similar features in H. zululandensis, thus confusion between these taxa is unlikely.

Citations:

NATAL - 2732 (Ubombo): Bazwana (-AB), Gerstner 3692 (NH); just east of Vazi Swamp, Manzengwenya (-BA), Moll 4740 (NBG); Redman's camp near False Bay (-CD), Gerstner 4936 (PRE).
2832 (Mtubatuba): Lake St. Lucia, eastern shores (-BA), Smook 636 (NU); R.H. Taylor 255 (NU).

12. Hypoxis filiformis Baker in J. Linn. Soc. 17:109 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:232 (1893), et in Fl. Cap. 6:180 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:305 (1914); Bews, Fl. Natal & Zululand: 65 (1921); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Cape, Queenstown, Cooper 462 (K, syn.!)

Corm 0,6-2,0 cm in diam., globose, crowned with bristles. Leaves 2-10, 6,0-30,0 cm long, 0,1-0,3 cm at widest point, not 3-ranked, erect, rigid, filiform or linear with 6-8 prominent ribs usually close together; lightly pilose all over, hairs fine, white, simple and bifurcate. Peduncles $\pm$ terete, slender, grooved, silky villous below inflorescence, becoming glabrous to slightly pilose in the lower part. Inflorescence 1-3(-4) flowered. Pedicels 0,3-1,5 cm long at time of flower opening, the first-formed flower with the longest pedicel, densely villous. Bracts linear-subulate, lightly setose

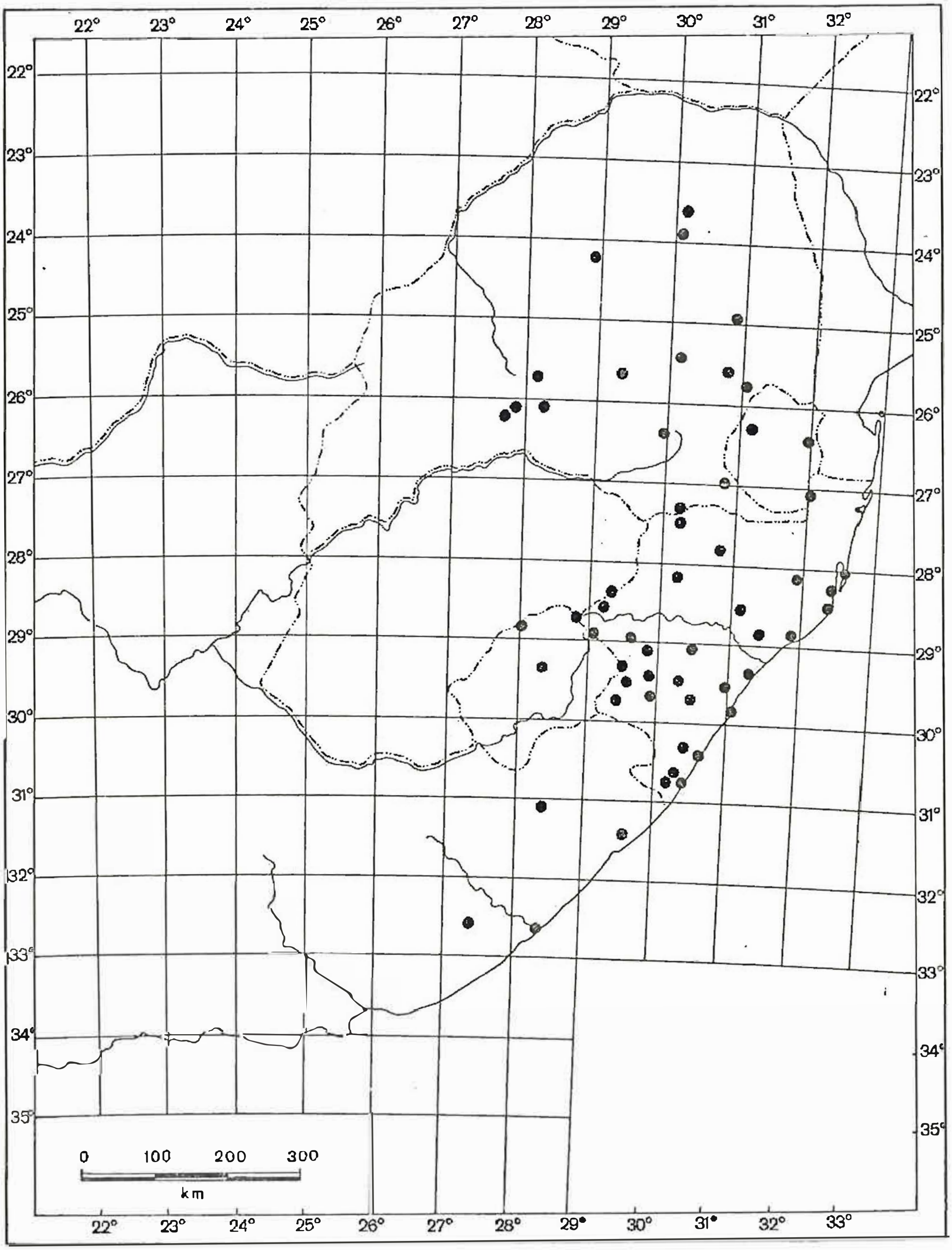


Fig. 37. Hypoxis filiformis Bak. - known distribution in Southern Africa up to 1975.

0,25-0,5 cm long. Ovary oblong, densely covered with silky, stellate hairs. Perianth segments yellow adaxially, in open flowers 0,4-1,0 (-1,4) cm long. Filaments unequal: 3 long, 3 short. Anthers 2,5-3,0 mm long, oblong-lanceolate, sagittate, apex bifid. Stigma sub-sessile, concrete, approximately 2,0 mm long, pyramidal with 3 concave faces. Fruit a capsule, opening by circumscissile dehiscence below the apex.

Flowering Period: July-February.

Hypoxis filiformis is a small species appearing "grass-like" amongst other vegetation. It is characterized by its small, globose corm; erect, subterete leaves; channelled peduncle and the arrangement of the flowers in the inflorescence (Fig. 9). Only within *H. filiformis* and *H. angustifolia* are aberrant plants known that produce flowers with 4 perianth segments instead of the usual 6. These flowers have 4 anthers, a 2-loculed ovary and 2 connate bracts at the base of the pedicel, one of which is very much shorter than the other. Also, the perianth parts, ovary and pedicel are glabrous. Specimens of this form are recorded from the Underberg district, Natal (Killick & Vahrmeijer 4048); the Wakkerstroom district, Transvaal (Devenish 1521a and Mauve 4504), and from Lesotho (Guillarmod, Getliffe & Mzamane 274 (K)). They may be no more than occasional variants in normal populations, but this must be confirmed in the field.

H. filiformis occurs in all four provinces of the Republic (Fig. 37). The species has a wide altitude range and a varied habitat tolerance (plants were found growing at sea level in Natal and at 2500 m in Lesotho). Although there is a preference for marshy or damp areas, plants also inhabit open grassland and sandy soil near the coast. In the Port Shepstone area of Natal, H. filiformis tends to be more robust with the leaves up to 3.0 mm wide and not as sub-terete as usual. There are also up to six peduncles per plant, four flowers per peduncle and the bracts are 1 or 2 mm longer than average.

H. filiformis is not readily confused with any other Natal species because of the nature of the leaves and form of the inflorescence. Its closest ally morphologically is H. zululandensis but this likeness is in the inflorescence rather than the leaves (see also H. zululandensis).

Citations:

TRANSVAAL	-	2330	(Messina): Duivels Kantoor (-CA), Thode A1646 (NH); Woodbush Mountains (-CC), Moss 15428 (J, PRE).
		2428	(Nylstroom): Moordrift (-BB), Leendertz 7350 (PRE).
		2430	(Pilgrims Rest): Pilgrims Rest (-DD), Davidson & Mogg 33288 (J); Belvedere (-DD), Davidson 484 (J); Graskop (-DD), Moss 18515 (J).
		2528	(Pretoria): Pretoria (-CA), Repton 3512 (PRE).
		2529	(Witbank): Middleburg (-CB), Jenkins 7524 (GRA).
		2530	(Lydenburg): 9,5 m. n. of Dullstroom (-AC), Codd 6659 (PRE); 6 m. n.e. of Kaapschehoop (-DB), Codd 5750 (PRE); Kaapschehoop (-DB), Rogers 21416 (GRA).
		2531	(Komatipoort): Barberton (-CC), Galpin 1101 (GRA, NH, PRE, SAM); Badplaats (-CC), Thompson 2379 (NBG).
		2627	(Potchefstroom): Libanon (-BA), L.E. Taylor 5047A (NBG); Witwatersrand: Frankenwald (-BB), Maguire s.n. (J 25554).
		2628	(Johannesburg): Birchleigh, Witwatersrand (-AA), Kowarsky 12082 (J).
		2629	(Bethal): Breyten, Ermelo (-BD), Steyn 973 (NBG).
		2630	(Carolina): Piet Retief (-DD), Pienaar 72 (NU).
		2730	(Vryheid): Wakkerstroom (-AC), Devenish 766, 691, 181 (PRE); Mauve 4504 (J, STE).
O.F.S.	-	2828	(Bethlehem): National Park, Witsieshoek (-DA), v.d. Zeyde s.n. (NBG, 9.11.1969).

SWAZILAND - 2631 (Mbabane): Mbabane (-AC), Compton 19724, 24518, 25189, 27149, 28281, 28249 (NBG), 26129 (NBG, PRE); Stegi (-BB), Compton 29266 (NBG, PRE).

NATAL - 2730 (Vryheid): Donkerhoek (-AC), Devenish 1521, 1521a (NU); 10 m. south of Vryheid (-DD), Acocks 11771 (NH).

2732 (Ubombo): Ingwavuma (-AA), Martin 063 (NU).

2828 (Bethlehem): National Park, Bergville (-DD), B.E. Martin 476 (NBG).

2829 (Harrismith): Van Reenen (-AD), Bews 8 (NU); Haygarth s.n (NH 12358); Oliviers Hoek Pass (-CA), Thode 2535 (STE); Cathedral Peak (-CC), Killick 967 (NPC, PRE), S.E. Wood 151, 160 (NU); Doreen Falls, Cathedral Area (-CC), Schelpe 920 (NH, NU); Draycott Hill (-DC), Acocks 10587 (NH).

2830 (Dundee): Dundee (-AA), Shirley 5, 90 (NU).

2831 (Nkandla): Hlabisa (-BB), Harrison 21 (NH); Ngoye Forest (-CA), Stirton 444 (NU); Eshowe (-CD), Lawn 53, 1187 (NH); Umlazi Nature Reserve (-DD), Ward 4284 (NH, NU, PRE).

2832 (Mtubatuba): Near Fanie Is. (-AB), Ward 1484 (NH, NU); Dukuduku (-AD), Hitchins 71 (PRE), Strey 5538 (NH); Lake St. Lucia (-BA), R.H. Taylor 256 (NU).

2929 (Underberg): Kamberg Game Pass (-AD), C.G. Gordon-Gray 65 (NU); Giants Castle Reserve (-AD), McKeown 54 (NU); Killick & Vahrmeijer 4048 (NH); Castle Gardens (-AD), Solomon 61 (NU); Yorkshire Wolds (-BB), Thode 2536 (STE); Fort Nottingham (-BD), Wright 1566 (NU); Nottingham Road (-BD), Galpin 10,244 (PRE); Pevensey turn off on Underberg Rd. (-CB), S.E. Wood 126 (NU); Bamboo Mt. (-CD), Grice s.n. (NU, Dec. 1973); Umgeni Vlei (-DB), Wright 1602 (NU).

2930 (Pietermaritzburg): Dargle (-AC), Smook 613 (NU); near Howick (-AC), Thomas 23 (SAM); Greytown (-BA), Wylie s.n. (NH 21683); 40 km to Bulwer (-CB), S.E. Wood 122 (NU); 32 km to Umbumbulu (-CB), S.E. Wood 101 (NU); Inanda (-DB), Medley Wood 1030 (NH, SAM).

2931 (Stanger): Groutville (-AD), Moll 2545 (NU); Durban (-CC), Medley Wood 4660 (PRE, SAM).

3030 (Port Shepstone): 'Ellesmere' (-AD), Rudatis 1151 (STE); Park Rynie (-BC), Strey 6838 (NH, NU, PRE); Uvongo (-CA), Strey 6182 (NH, NU); Oribi (-CB), Davidson 2007, 2450 (J); on road to Port Edward from Izingolweni (-CC), S.E. Wood 163 (NU).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), Dieterlen 650 (NH, SAM).

2928 (Marakabei): Bokong Camp (-AD), Guillarmod 344B (PRE).

CAPE - 3128 (Umtata): near Maclear (-AB), Flanagan 2771 (PRE, SAM); Lusikisiki (-BC), Hone 28 (PRE).
3227 (Stutterheim): Döhne Research Station (-CB), Acocks 9301 (PRE).
3228 (Butterworth): Kei Mouth (-CB), Flanagan 1811 (PRE, SAM).

without precise locality:
McKen 1046 (NH); Moss 17125 (J), Natal; Sim 1117 (NU), Mount Kemp.

13. Hypoxis neliana Schinz in Vierteljahrsschr. Nat. Ges. Zurich 71:136 (1926). Type: South Africa, Natal, mountains by Estcourt, Schlechter 3348 (K, iso.!)

Corm approximately 1,0 cm in diameter, oblong, crowned with bristles. Leaves 4-7, 9,0-12,0 cm long, 0,1-0,3 cm at widest point, erect, linear, hairs fine, yellowish, mainly 2-armed appearing U-shaped, some stellate, occasionally on lamina, mostly along keel and margins, ribs 5-10, prominent, close together, the abaxial surfaces of the first one or two membranous leaves covered with hairs. Peduncles 1-4, with many stellate hairs at the apex grading to few or none at the channelled base. Inflorescence 2(-3) flowered. Pedicels 0,6-1,5 cm long at time of flower opening, hairy. Bracts linear - slightly subulate, setose, 0,5-1,1 cm long. Perianth segments yellow adaxially, 0,7-1,0 cm long in open flowers. Filaments subulate, equal. Anthers 2,0-3,0 mm long, lanceolate, sagittate, apex entire. Style up to 1,0 mm long or stigma subsessile. Stigma concrete, 1,0-1,5 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-December.

Baker in 1878 established H. sericea var. dregei (syntypes Drège 8525, Cape of Good Hope, and Cooper 1811, Kaffraria). The latter specimen is H. filiformis Bak. but before this was determined it was cited under H. argentea var. sericea (Bak., 1896) and under H. dregei (Bak.) Nel (Nel, 1914).

Baker himself sank H. sericea under H. argentea in 1896, as var. sericea and maintained the two original syntypes under this taxon.

Nel in 1914 upgraded to specific rank Baker's H. sericea var. dregei placing only Cooper 1811 under this taxon. Drège 8525 he referred to typical H. argentea, under which species he, unlike Baker, recognised no varieties. Under typical H. dregei Nel cited a number of other specimens. He also established H. dregei var. biflora (H. biflora de Wild. 1913: type Hock s.n. Belgian Congo, Katanga). Under this last variety Nel cited Schlechter 3348.

Schinz, in 1926, established H. neliana, a species he based upon Schlechter 3348, but without reference to either H. dregei or H. hiflora. An entity fitting the description of H. neliana and agreeing with Schlechter 3348 exists in Natal. I have not examined the type of H. biflora and so cannot comment upon the relationship of H. biflora and H. neliana. Until this comparison is made I continue to use Schinz's name, H. neliana, for the Natal entity.

Plants of H. neliana are small and characterized by narrow, strongly ribbed leaves which are covered, especially on the keel and margins, with yellow U-shaped hairs. H. lata Nel has a similar

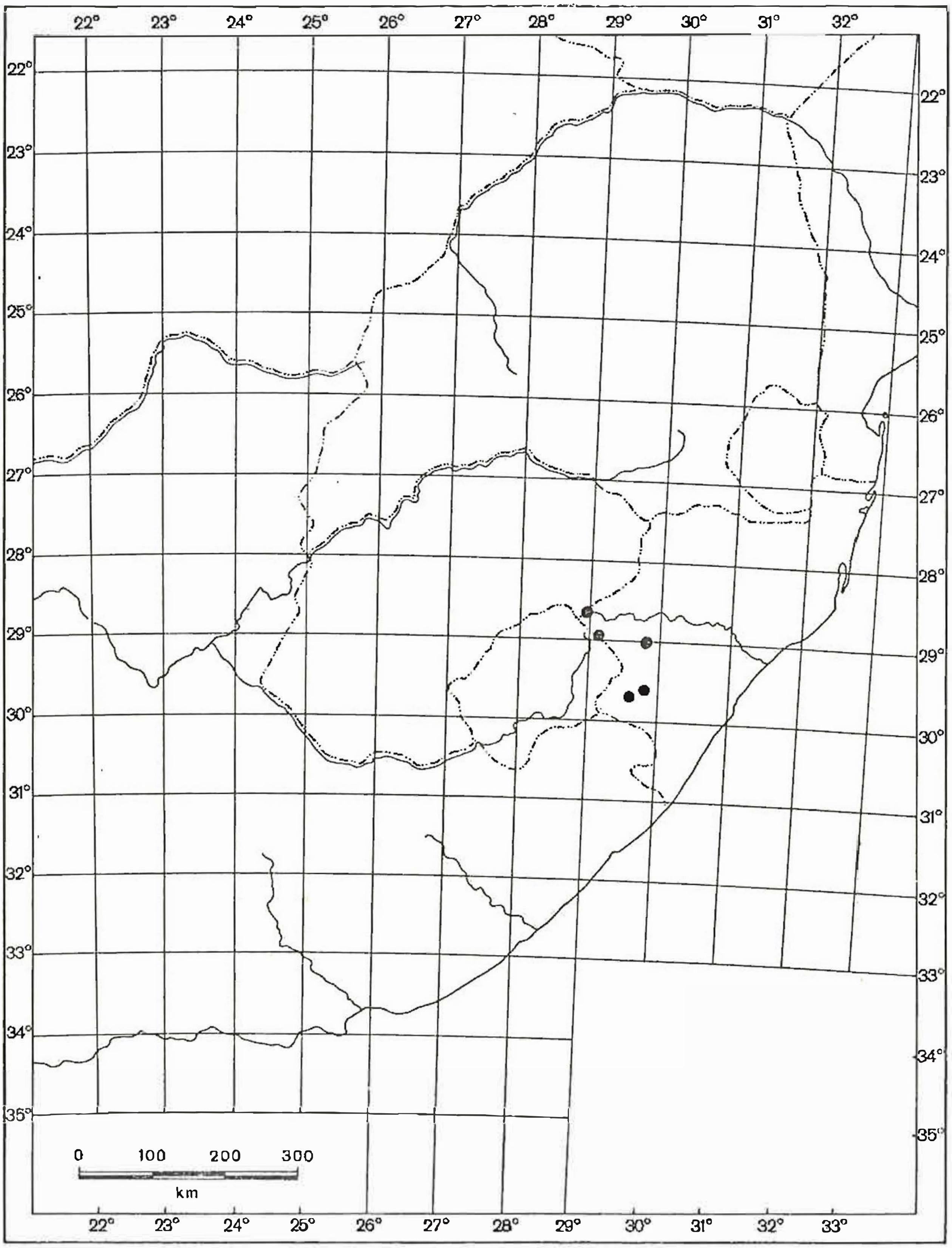


Fig. 38. Hypoxis neliana Schinz - known distribution in Southern Africa up to 1975.

vesture but the hairs are finer and whitish. The leaves of H. lata are broader, membranous and the ribs are not pronounced. Young plants of H. gerrardii Baker may resemble plants of H. neliana, but the leaves of the former have a denser, woolly hair covering and there are only 2-4 prominent ribs on a wider lamina.

Only 5 specimens of H. neliana have been recorded, all from Natal (high areas of the Drakensberg, Estcourt and Impendhle - Fig. 38). Further collecting is likely to determine the distributional limits, range of habitat and altitudinal preferences of this taxon.

Citations:

NATAL - 2828 (Bethlehem): National Park (-DB), Hutchinson, Forbes & Verdoorn 133 (NH).
2829 (Harrismith): Cathedral Peak (-CC), Ruch 1477 (PRE).
2929 (Underberg): Estcourt (-BB), Schlechter 3348 (GRA, NH, PRE); 28 km to Impendhle from Himeville (-DA), S.E. Wood 130 (NU); Impendhle (-DB), Levett 40 (NH).

14. Hypoxis kraussiana Buching. ex Krauss in Flora 28:311 (1845); Baker in J. Linn. Soc. 17:109 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:232 (1893), et in Fl. Cap. 6:180 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:306 (1917); Bews, Fl. Natal & Zululand:64 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, hills near Pietermaritzburg, Krauss 104 (B.M. holo.!)

Corm 1,0-2,0 cm in diam., globose-oblong, crowned with bristles. Leaves 4-7, up to 28,0 cm long, 0,1-0,3 cm at widest point, lanceolate to linear-acuminate, erect, subterete, ribs 6-12, hairs stellate and

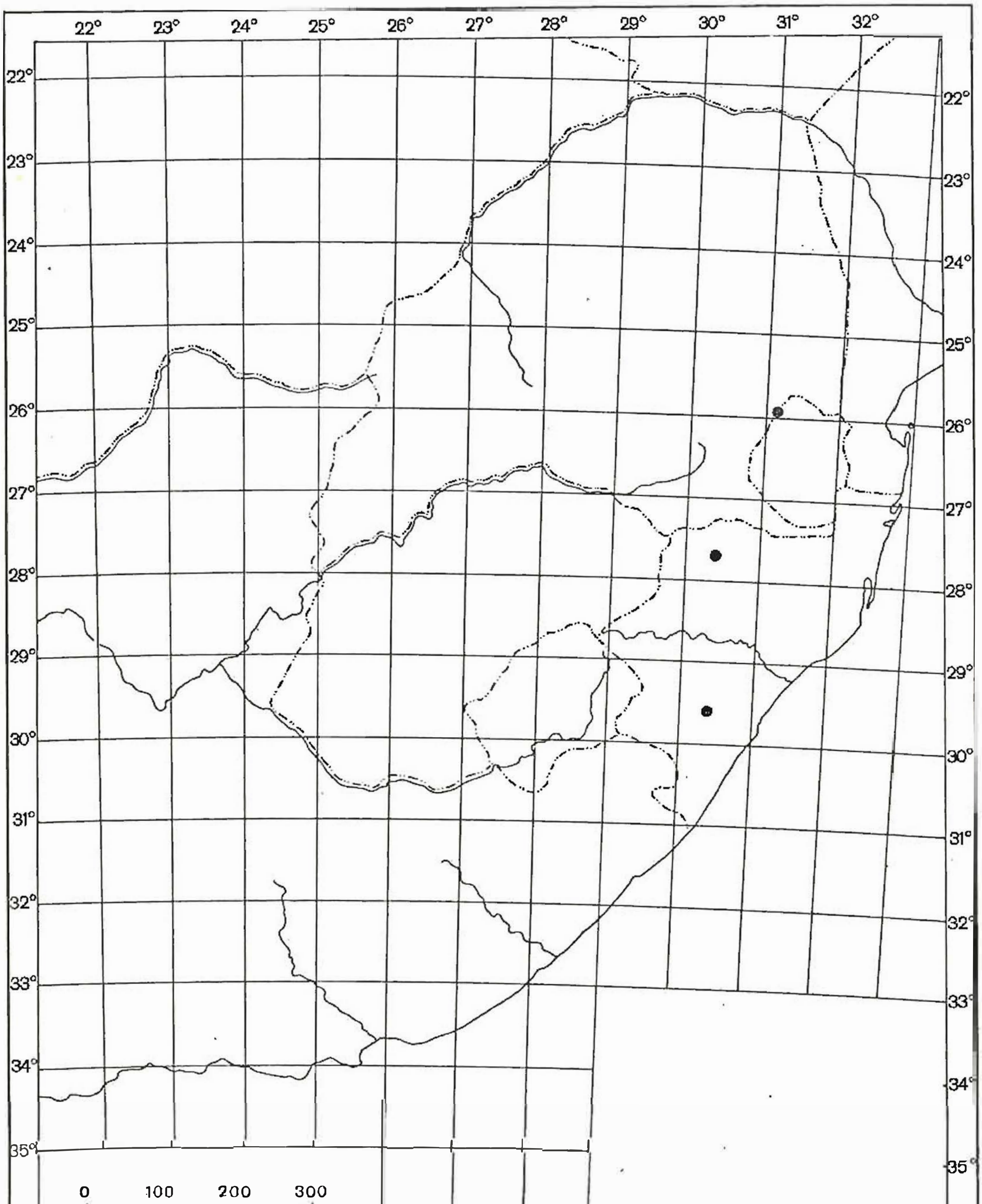


Fig. 39. Hypoxis kraussiana Buching. - known distribution in Southern Africa up to 1975.

bifurcate (more predominant) intermingled, sometimes up to 6,0 mm long, white, usually patent, sparsely to densely scattered over surface. Peduncles densely hairy, hairs patent. Inflorescence 2-3(-4) flowered. Pedicels 0,5-1,7 cm long at time of flower opening, that of the first formed flower longest. Bracts linear-subulate, setaceous, 1,0-1,5 cm long. Perianth segments yellow adaxially, in open flowers 0,6-1,4 cm long. Filaments unequal, subulate. Anthers, 3,5-5,0 mm long, lanceolate, sagittate, apex slightly or deeply bifurcate. Style cylindrical, 0,5-1,0 mm long. Stigma concrete, 1,5-3,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: July-November.

Hypoxis kraussiana is known from Natal and Swaziland (Fig. 39). Its closest ally is *H. neliana* which occurs in the Drakensberg and south-western Natal (south of the Tugela River). Both species have narrow, erect leaves but those of *H. neliana* are more strongly ribbed with a predominance of yellow, bifurcate hairs on the keel and margins. The hairs are usually more numerous, shorter and more abundant than those of the leaves of *H. kraussiana*. The inflorescence of *H. kraussiana* closely resembles those of *H. neliana* and *H. filiformis*, with the first formed flower having the longest pedicel.

Citations:

SWAZILAND	-	2531	(Komatipoort): Nottingham Peak, Havelock concession (-CC), Saltmarshe 984 (GRA, PRE, SAM).
NATAL	-	2730	(Vryheid): Utrecht (-CB), Devenish 1174 (NH).
		2930	(Pietermaritzburg): Pietermaritzburg (-CB), Allsopp 411, 911 (NH); Town Hill, Pieter-

maritzburg (-CB), Joliffe 52 (NU); Worlds View (-CB), Morris 366 (NU), Hodson 10 (NU); Swartkopskloof (-CB), C. Robertson 12 (NU).

15. Hypoxis gerrardii (=Gerrardi) Baker in J. Linn. Soc. 17:110 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:232 (1893), et in Fl. Cap. 6:181 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:306 (1914); Bews, Fl. Natal & Zululand:65 (1921); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, without locality, Gerrard & McKen 1827 (NH, holo.!)

Corm 1,0-2,5 cm in diam., obconic, crowned with fine bristles. Leaves 5-19, 10,0-50,0 cm long, up to 1,1 cm broad at widest point, 3-ranked, linear-lanceolate, semi-erect, with usually 2, but occasionally 4, prominent ribs, woolly-villous all over, especially on margins and keel, hairs fine, whitish-golden, predominantly bifurcate, very occasionally stellate. Peduncles densely villous. Inflorescence 2-4 flowered. Pedicels 1,5-4,0 cm long at time of flowering, densely hairy. Bracts linear-subulate, setose, 0,5-1,2 cm long. Ovary oblong-turbinate, densely hairy. Perianth segments yellow adaxially, 0,6-1,3 cm long in open flowers. Filaments unequal. Anthers 3,0-4,0 mm long, lanceolate, deeply sagittate, apex bifurcate. Style subulate or stigma subsessile. Stigma concrete, up to 4,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex, followed by longitudinal splitting into 3 valves.

Flowering Period: All year.

Hypoxis gerrardii is a very common Natal species, occurring predominantly in grassland habitats where the soil is sandy and often rocky. Plants are also known from the Transvaal, N.E. Cape and Swaziland, where they occur over an extensive distributional range (Fig. 40).

The species is characterized by its narrow, linear leaves, which are densely covered with bifurcate hairs and thus appear woolly, and in which there is usually a single prominent rib (sometimes 2) on either side of the keel. The pedicels are comparatively long (1,5-4,0 cm).

H. gerrardii is the only species known to flower all year under field conditions. During the months of May, June and July (1975) this species was in flower in the Highflats area. Most of the plants were sheltered by rocks and were growing on the north-eastern aspect of a slope. It is more likely that these plants were sheltered from fire and frost by the rocks and thus they realized their potential for continued growth throughout the year.

H. gerrardii is very closely allied to H. argentea (for details see under this species).

Citations:

TRANSVAAL	-	2530	(Lydenburg): Belfast (-CC), Leendertz 7892 (PRE).
SWAZILAND	-	2631	(Mbabane): Mbabane (-AC), Compton 27211 (NBG).
NATAL	-	2732	(Ubombo): Ubombo Hill (-CA), Ward 1655 (NH, NU).
		2829	(Harrismith): Cathedral Peak (-CC), S.E. Wood 156, 149A (NU).
		2830	(Dundee): Krantzkloof (-DD), Rogers 24583 (STE); Haygarth 76 (STE); Kranskop (-DD) S.E. Wood 98 (NU).

2831 (Nkandla): Spind Estates, Melmoth (-AD), S.E. Wood 90 (NU); Eshowe (-CD), Lawn 1019, 1019a, 1746 (NH); Umhlatuzi valley (-DA), Lawn 1684 (NH); Mtunzini (-DD), Lawn 783 (NH).

2832 (Mtubatuba): Hluhluwe Game Reserve (-AB), Fakude 15 (NH), Ward 1448 (NH).

2929 (Underberg): Cathkin Park (-AB), Howlett 9 (NH); Kamberg (-AD), Wright 24, 1552 (NU), C.G. Gordon-Gray 107 (NU); Giants Castle (-AD), Skead 203 (NU), Trauseld 869 (NU), Bruyns-Haylett 89 (NU); Yorkshire Wolds (-BB), Thode 2533 (STE); Lowlands (-BB), Schelpe 13 (NU); Balgowan (-BD), Mogg 3518 (PRE); Sani-Pass (-CC), Werdermann & Oberdieck 1440 (PRE); Lot 7 Mawaqua, Polela (-DA), Rennie 91 (NU); Impendhle (-DB), Levett 25 (NH); near Bulwer (-DD), Landsdell s.n. (NH 34266).

2930 (Pietermaritzburg): Greytown (-BA), Wylie s.n (PRE, Nov. 1936; NH 28020); 10 km from Wartberg (-BC), S.E. Wood 75 (NU); Kingscliffe (-BC), S.E. Wood 78 (NU); between Glenside and Kingscliffe (-BD), S.E. Wood 77A (NU); Pietermaritzburg (-CB), Allsopp 728, 921 (NH, NU); Pennefather 28 (NU), Irwin 18 (NU), Fairall 57 (SAM), Barker 5162 (NBG), S.E. Wood 74, 83, 137, 142 (NU), Ram s.n. (NU, 2.3.74), Stirton s.n. (NU, 21.10.74); Elandskop (-CB), Webb 26 (NU); Table Mtn. (-CB), Killick 225 (NU); Thornville (-CD), Moll 3394 (NU); Cato Ridge (-DA), Ross 2159 (NH, PRE); 30 km to Umbumbulu on Eston Rd. (-DA), S.E. Wood 103A (NU); Inanda (-DB), Medley Wood 327 (NH), Strey 5170 (NH); Botha's Hill (-DC), Hutchinson, Forbes & McClean 52 (NH); Drummond (-DC), Stirton 1091 (NU); 32 km to Umbumbulu (-DC), S.E. Wood 103 (NU); 8 km to Mid-Illovo (-DC), S.E. Wood 109, 115 (NU); Hillcrest (-DD), Nieuwoudt 33 (NU); Umlaas River (-DD), Stirton 513 (NU); Key Ridge (-DD), S.E. Wood 120 (NU); Cowies Hill (-DD), Lawson 1219 (NH, PRE).

2931 (Stanger): Kearsney (-AB), Milner s.n. (NH 23260).

3029 (Kokstad): Harding (-DB), L.E. Taylor 5376 (NBG).

3030 (Port Shepstone): Highflats (-AA), S.E. Wood 81 (NU); 'Campbellton' (-AB), Rudatis 1381 (STE); Hlutankungu (-AB), S.E. Wood 80 (NU); on road to Port Edward from Izingolweni (-CC), S.E. Wood 164 (NU).

CAPE - 3029 (Kokstad): Cedarville (-AC), Baudert 24 (GRA); Kokstad (-AA) Bayliss 2547 (SAM).

3128 (Umtata): between Qumbu & Shawbury (-BB), Schonland 4144 (GRA).

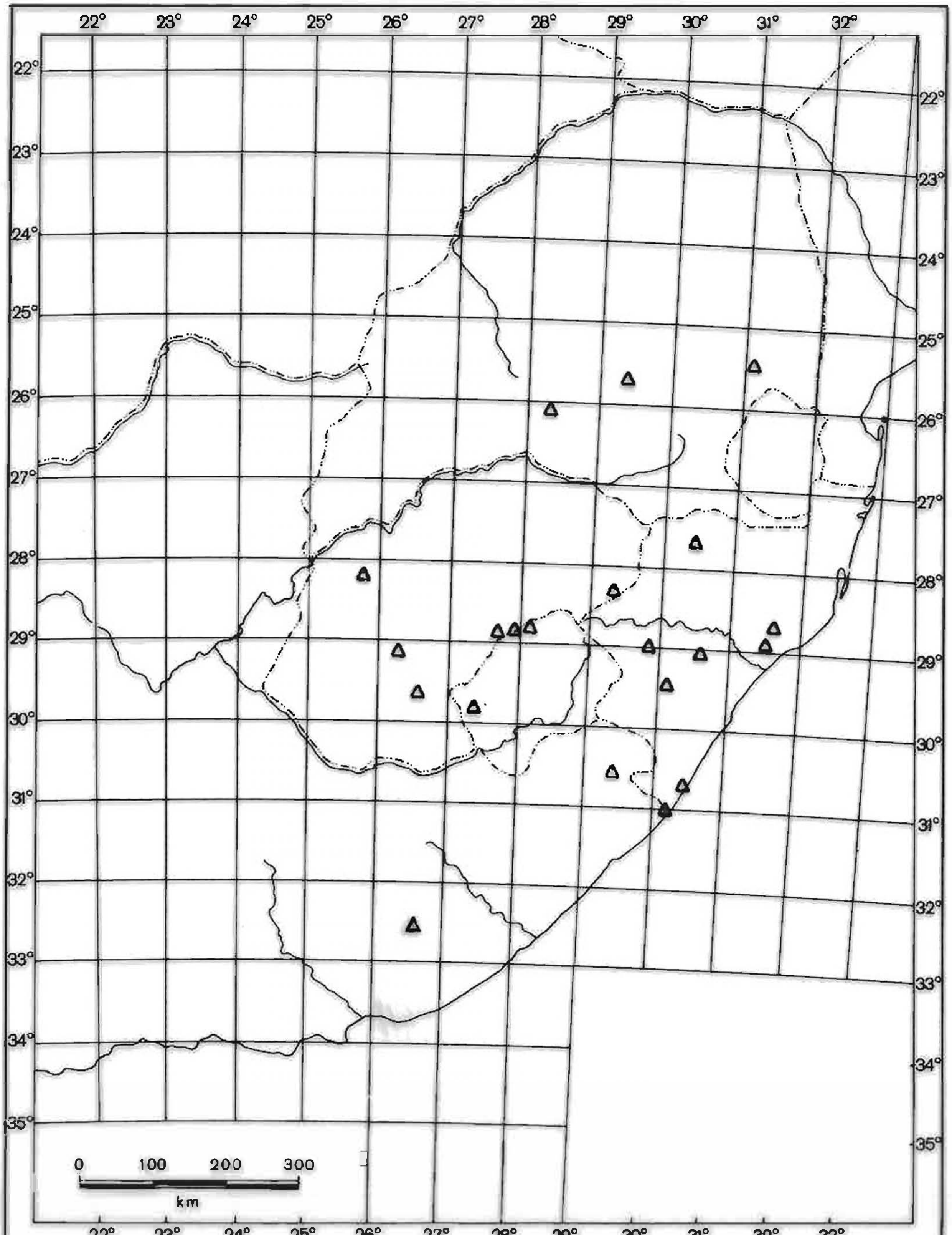
3326 (Grahamstown): Grahamstown (-BC), Rogers 27546 (STE).

without precise locality:
Gerrard & McKen 1827 (NH); Markotter 8692 (STE), Nhlopenkulu Mission station, Zululand.

16. Hypoxis argentea Harv. ex Baker in J. Linn. Soc. 17:110 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6:181 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:305 (1914); Bews, Fl. Natal & Zululand:64 (1921); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Cape, Grahamstown, MacOwan 50 (GRA, SAM, iso-syn.!)

Corm 0,5-2,0 cm in diam., globose-oblong, crowned with few, fine bristles. Leaves 4-14, 5,0-50,0 cm long, 0,1-0,7 cm at widest point, linear to linear-lanceolate, prominent ribs 2-8, covered with long, fine, golden (occasionally whitish especially on older leaves), appressed, stellate or bifurcate hairs, or both types intermingled, which produce a sericeous effect abaxially and on the margins. Peduncles hairy. Inflorescence 1-4(-5) flowered. Pedicels 0,9-3,0(-3,9) cm long at time of flower opening, hairy. Bracts linear, setose, 0,5-1,2 cm long. Perianth segments yellow adaxially, 0,5-1,2 cm long, in open flowers. Filaments 3 long, 3 short. Anthers 1,5-3,5 mm long, lanceolate, deeply sagittate, apex bifurcate. Style 1,0 mm long or stigma subsessile. Stigma concrete, 1,0-2,5 mm long, pyramidal with 3 concave faces. Fruit a capsule, opening by circumscissile dehiscence below the apex.

Flowering Period: August-March.



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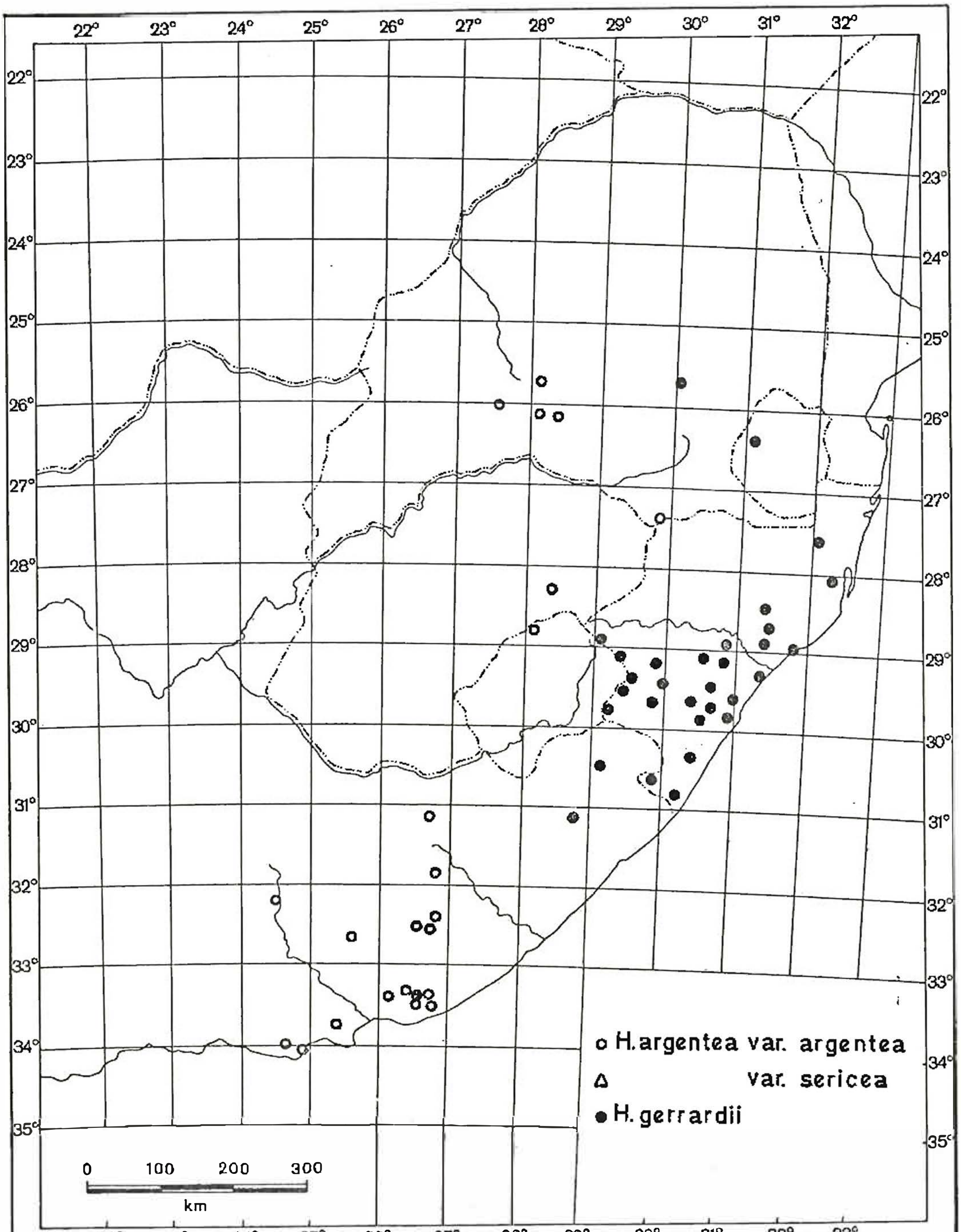


Fig. 40. Hypoxis argentea Bak. and Hypoxis gerrardii Bak. - known distribution in Southern Africa up to 1975.

At the time of publishing H. argentea, Baker, in the same journal, also established H. sericea (syntype: Zeyher 950, Uitenhage). This latter species was said to differ from H. argentea in possessing a greater number of larger and wider leaves in which the veins were "distinctly sculptured" (unlike H. argentea where the veins were said to be not prominent), and with the "underneath clothed with sericeous, appressed hairs," (not as in H. argentea where they were "finely silky all over"). Baker established two varieties under H. sericea: var. dregei (syntype Drège 8525 from the Cape of Good Hope), and var. flaccida (syntypes Williamson s.n., Albany, and Burke s.n. "Seven Fountains"). In 1896 Baker himself sank H. sericea under H. argentea. H. sericea var. sericea and H. sericea var. dregei he placed with H. argentea as var. sericea, but H. sericea var. flaccida he maintained as H. argentea var. flaccida. Examination of the specimen Burke s.n. (syntype of H. argentea var. flaccida) showed it to be synonymous with the cited material of H. argentea var. sericea. The specimen was collected in February, (thus at the end of its growing season) and has exceptionally long leaves. This range of leaf length was not taken into consideration when var. flaccida was established.

In the course of this study it has become apparent that two entities are evident within the limits of H. argentea. The distributions of these taxa are not discrete (Fig. 40), and they are only slightly differentiated morphologically. Thus they are treated as varieties, namely H. argentea var. argentea and H. argentea var. sericea (Baker's variety in which is now included his var. flaccida).

Vars. argentea and sericea differ by the hair covering on the leaves. Plants of var. argentea are densely clothed with stellate hairs on the keel, margins and abaxial lamina surface; the leaves of var. sericea Baker are less densely hairy, the predominantly bifurcate hairs, that are occasionally intermingled with the stellate type, being confined mainly to the margins and keel.

H. argentea var. argentea
Baker in J. Linn. Soc. 17:110 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6:181 (1896); Nel in Engl. Jahrb. 51:305 (1914). Type: South Africa, Cape, Grahamstown, MacOwan 50 (GRA, SAM, iso-syn.!)

Leaves 4-14, 5,0-30,0 cm long, densely covered with appressed, stellate hairs which produce a sericeous effect especially on the abaxial surface, prominent ribs 2-4, ± equal. Inflorescence 1-4 flowered. Pedicels 0,9-3,0(-3,9) cm long at time of flower opening.

Flower Period: August-February.

Hypoxis argentea var. argentea is not known in Natal, but it occurs in the eastern Cape, the Orange Free State, the Transvaal and Lesotho (Fig. 40).

Citations:

var. argentea

TRANSVAAL	-	2528	(Pretoria): Wonderboom reserve (-CA), Repton 2763 (PRE).
		2627	(Potchefstroom): Magaliesberg (-BA), Moss 13492 (J).
		2628	(Johannesburg): Thorntree Kloof, Johannesburg (-AA), Moss 5576 (J); Melville Koppies Nature Reserve (-AA), Lucas s.n. (J 40087); Benoni (-AB), Moss 11932 (J).
		2729	(Volksrust): Volksrust (-BD), Jenkins 10686 (PRE).
O.F.S.	-	2828	(Bethlehem): 6 m. S.E. of Bethlehem (-AD), Scheepers 1371 (PRE).
LESOTHO	-	2828	(Bethlehem): Leribe (-CC), Dieterlen 176 (NH, SAM).

CAPE - 3126 (Queenstown): Jamestown (-BB), Barker 2124 (NBG); Fincham's Nek (-DD), Galpin 2194 (GRA); Mtns. Queenstown (-DD), Galpin 1062 (K).
3224 (Graaff-Reinet): near Graaff-Reinet (-BA), Bolus 176 (K).
3226 (Fort Beaufort): Fairford (-BD), Cotterrell 63 (GRA); Katberg (-DA), Sole 393 (GRA); nr. Seymour (-DB), Scully 107 (SAM).
3325 (Somerset East): Uitenhage (-CD), Thode A703 (NH), Zeyher 6 (STE), 950 (K, SAM, STE); Uitenhage & Drostdy Farm (-CD), Burchell 4469 (K).
3326 (Grahamstown): nr. Sidbury (-AC), Daly 766 (GRA); Albany (-AD), L.E. Taylor 5946 (NBG); Grahamstown (-BC), Glass 378 (SAM), L.E. Taylor 3634 (NBG), Rogers 27404, 28367 (STE), MacOwan 50 (GRA, K, SAM), Daly & Cherry 977 (GRA); Southwell (-DB), Bayliss 3138 (NBG).
3424 (Humansdorp): between Jeffries Bay and Ferreisatown (-BB), Gillett 2316 (STE); Humansdorp (-BB), Thode A1049 (NH).

Hypoxis argentea var. sericea Baker in Fl. Cap. 6:181 (1896); Medley Wood, Fl. Natal:132 (1907); Bews, Fl. Natal & Zululand:64 (1921); Guillarmod, Fl. Lesotho:149 (1971); Ross, Fl. Natal:132 (1972). Type: South Africa, Cape of Good Hope, Drège 8525 (BM, syn.!)

Leaves 5-9, 5,0-50,0 cm long, ribs 4-8, of which 2 are more prominent than the others, hairs long, fine, mainly bifurcate, occasionally with a few stellate intermingled, appressed, situated predominantly on margins, keel, and abaxial surface, but not as dense nor as markedly sericeous as in var. argentea. Inflorescence 2-4(-5) flowered. Pedicels of open flowers 1,2-2,8 cm long.

Flowering Period: August-March.

Plants of var. sericea are present in all four provinces of South Africa (the southern-most limit at the present time being Katberg, Cape Province), and Lesotho (Fig. 40, overlay).

The closest morphological ally of H. argentea is H. gerrardii Bak. Leaves of the latter species are covered with bifurcate hairs which are not appressed, so the indumentum appears woolly: in all other characteristics it is similar to H. argentea, but it is more eastern in distribution (Fig. 40). Comparison of distributions shows that H. argentea var. argentea occurs inland, H. gerrardii is more coastal, while H. argentea var. sericea is sympatric over the distributional area of the two first-named taxa. It is tempting to postulate that H. argentea var. sericea had its origin in hybridization between the two adjacently distributed taxa H. argentea and H. gerrardii, and that progeny of this crossing now constitutes an established entity showing some morphological similarity with each of the putative parents. Proof of this is impossible without experimental crossings and more exhaustive field work. Until such time as further evidence supports this conjecture, I have maintained H. gerrardii as distinct, since the species is already established and since plants are reasonably easily differentiated from H. argentea var. argentea, and H. argentea var. sericea.

Citations:

var. sericea

TRANSVAAL	-	2529	(Witbank): Middleburg (-CB), Rudatis 75 (STE).
		2531	(Komatipoort): Plaston (-AD), Halt 27 (NH).
		2628	(Johannesburg): Dunswart (-AB), Moss 13981 (J).
O.F.S.	-	2827	(Senekal): Gumtree (-CD), Ross 45 (NU); Ficksburg (-DD), Galpin 13840 (PRE).
		2829	(Harrismith): Swinburne (-AD), Jacobsz 141 (PRE).
		2926	(Bloemfontein): Bloemfontein (-AA), Pretorius s.n. (STE, Jan. 1936), Rehmann 3761 (K); Thaba Nchu (-BB), Roberts 2388 (PRE); Dewetsdorp (-DA), Steyn 933 (NBG).
NATAL	-	2730	(Vryheid): Utrecht (-CB), Thode A1296 (NH).
		2831	(Nkandla): ½ m. s. of Nkwalini (-DA), Codd 1849 (PRE); Nkwalini (-DA), Acocks 12960 (PRE).
		2929	(Underberg): Estcourt (-BB), Mogg 3449 (PRE).

2930 (Pietermaritzburg): Tweedie (-AC), Mogg 3479 (PRE); Greytown (-BA), Wylie s.n. (NH 27957).
2931 (Stanger): Durban (-CC), Medley Wood 101 (SAM).
3030 (Port Shepstone): Port Shepstone (-CA), Strey 7261 (NH, PRE).
3130 (Port Edward): hills near Umtamvuna bridge, Strey 5986 (NH).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), Dieterlen 536 (PRE), E. Phillips 932 (SAM).
2927 (Maseru): Likhoele (-CD), Dieterlen s.n. (PRE 33599).

CAPE - 3029 (Kokstad): Kokstad (-CB), Tyson 1095 (GRA, 2 sheets, K, SAM), 480 (SAM), Coleman 465 (NH).
3225 (Somerset East): near Somerset East (-DA), MacOwan 1593b (K).
3226 (Fort Beaufort): Katberg (-DA), Drège 8525 (K).

without precise locality:
Moss & Rogers 996 (J), Zoekmekaar; Zeyher (STE 30404), Orange River; Thode 2545 (STE), Koolhoek, O.F.S.; Burke s.n. (K), Fish River; Burke s.n. (K, Feb. 1841), Seven Fountains Mission station; Baur s.n. (K), Kaffraria.

17. *Hypoxis angustifolia* Lam. Encycl. méth. Bot. 3:182 (1789); Schult. Syst. Veg. 7:767 (1819); Fisch. et Mey. Animad. bot. in Ind. sem. hort. petrop. 10:49 (1845); Baker in Fl. of Maur.:369 (1877), in J. Linn. Soc. 17:111 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6:180 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:303 (1914); Bews, Fl. Natal & Zululand:64 (1921); Perrier de la Bathie in Fl. Madag. 41:10 (1950); Guillarmod, Fl. Lesotho:148 (1971); Ross, Fl. Natal:132 (1972). Type: ~~South Africa, Orange Free State, Cooper 1089 (? holo.)~~

Corm 0,6-2,5 cm in diam., oblong-globose, crowned with fine bristles. Leaves 5-9 (-15), 7,0-60,0 cm long, 0,2-1,7 cm at widest point, 3-ranked, lanceolate, oblong-lanceolate or linear-acuminate, flaccid or semi-erect, membranous, usually with 2-4 prominent ribs, hairs white, fine, pilose, simple or simple and bifurcate intermingled, at 45^{o} angle, predominantly along margins and keel. _Inflorescence_ 1-7 flowered. _Pedicels_ 1,0-6,5 cm long at time of flower opening, pilose. _Bracts_ linear-acuminate, with sparse keelar hairs, 0,6-1,2 cm long. _Ovary_ oblong, in some cases up to 1,0 cm long. _Perianth_ segments yellow adaxially, 0,6-1,2 cm long in open flowers. _Anthers_ 2,0-4,0 mm long, lanceolate, sagittate, apex bifurcate. _Filaments_ not equal, 3 long, 3 short. _Style_ subulate, approximately 1,0 mm long. _Stigma_ concrete, up to 3,0 mm long, pyramidal with 3 concave faces. _Fruit_ a capsule opening by circumscissile dehiscence below the apex, followed by the splitting of 3 longitudinal valves.

Flowering Period: July-May.

Within the limits of _H. angustifolia_, Baker recognized two entities, typical _H. angustifolia_ and _H. angustifolia_ var. _buchananii._ These two taxa are retained because the difference in their leaves renders them morphologically distinct. Var. _angustifolia_ has narrow, lanceolate or linear-acuminate, semi-erect leaves, while the leaves of var. _buchananii_ are wider (up to 1,7 cm), oblong-lanceolate, and flaccid. Var. _buchananii_ also tends to have a larger corm, longer pedicels, and more flowers per inflorescence than var. _angustifolia._

Hypoxis angustifolia var. _angustifolia_

Lam. Encycl. méth Bot. 3:182 (1789); Schult. Syst. Veg. 7:767 (1819); Fisch. et Mey. Animad. bot. in Ind. sem. hort. petrop. 10:49 (1845); Baker in Fl. of Maur.:369 (1877), in J. Linn. Soc. 17:111 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6:180 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:303 (1914); Bews, Fl. Natal & Zululand:64 (1921); Perrier de la Bathie in Fl. Madag. 41:10 (1950); Guillarmod, Fl. Lesotho:148 (1971); Ross, Fl. Natal:132 (1972).

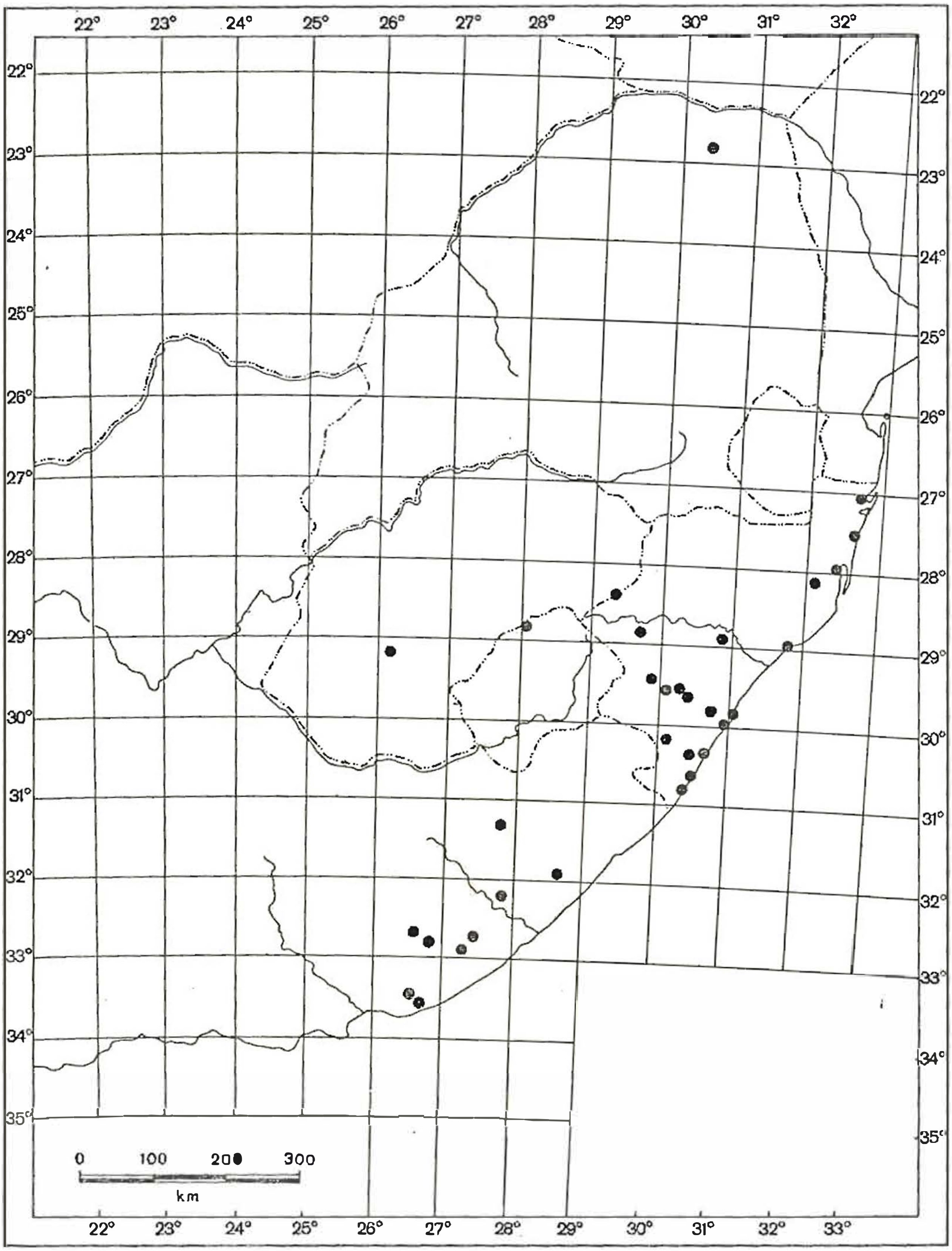


Fig. 41. Hypoxis angustifolia Lam. var. angustifolia - known distribution in Southern Africa up to 1975.

Type: South Africa, Orange Free State, Cooper 1089 (? holo.)

Corm 0,6-2,0 cm in diam., oblong-globose. Leaves 7,0-30,0 cm long, 0,2-0,9 cm at widest point, lanceolate or linear-acuminate, semi-erect. Inflorescence 1-4 flowered. Pedicels 1,0-3,5 cm long.

Flowering Period: September-May.

Plants of var. angustifolia are known from all four provinces of South Africa and Lesotho (Fig. 41). Distribution tends to be concentrated in the eastern sector of the country, and records for the Transvaal are sparse. H. angustifolia extends to North Africa and is also the only species of Hypoxis to occur on the islands of Mauritius and the Seychelles.

Plants of this variety are generally small. The membranous leaves are subglabrous carrying, as a rule predominantly on the margins and keel, only a few scattered, fine, usually white, hairs.

Citations:

var. angustifolia

TRANSVAAL	-	2230	(Messina): Sibasa (-CD), Smuts & Gillett 3165 (PRE, STE), Junod 25453 (PRE).
O.F.S.	-	2926	(Bloemfontein): O.F.S. Botanic Garden, Bloemfontein (-AA), Müller 333, 369 (NBG).
NATAL	-	2732	(Ubombo): Sordwana Bay Park (-AD), S.E. Wood 86A (NU); Road to Maputa (-BA), Strey 4772 (NH); False Bay Park (-CD), Ward 4131 (NH).
		2829	(Harrismith): Van Reenen (-AD), Medley Wood 9649 (SAM), Haygarth s.n. (NH 9923); Brakfontein nr. Frere (-DD), Acocks 10832 (NH).
		2830	(Dundee): Krantzkloof (-DD), Rogers 24665 (STE).
		2831	(Nkandla): Mtunzini (-DD), Mogg 5880 (NH).
		2832	(Mtubatuba): Hluhluwe Game Reserve (-AA), Mngomezulu 7 (NH).

2929 (Underberg): 6 km from Michaelhouse to Nottingham Rd. (-AD), Stirton 1044 (NU).
2930 (Pietermaritzburg): Edwards Farm, Dargle (-AC), S.E. Wood 179 (NU); Howick (-AC), Moll 1060 (PRE); Town Bush Valley, Pietermaritzburg (CB), de Villiers 5 (NU); Pietermaritzburg (-CB), Barker 7951 (NBG); Mr. Marwick's Garden, Richmond Road (-CB), Ram s.n. (NU); Botanic Gardens, Pietermaritzburg (-CB), Ram s.n. (NU); University of Natal, Pietermaritzburg (-CB), S.E. Wood 133 (NU); Orhtmann Road, Pietermaritzburg (-CB), S.E. Wood 71A (NU); Forest Hill (-DD), Duthie 735 (J); Isipingo Beach (-DD), Ward 971 (NU).
2931 (Stanger): Merebank West, Durban dist. (-CC), Baijnath 187 (NU); Greenwood Park (-CC), Wylie s.n. (NH 23112).
3030 (Port Shepstone): Ixopo (-AA), Nass s.n. (NBG 65086); 1 m. east of Highflats (-AA), Strey 4386 (NH, PRE); Hlutankungu (-AD), S.E. Wood 80A (NU); Park Rhynie (Park Rynie) (-BC), Moss 17328 (J); "The Valleys", Port Shepstone (-CB), Mogg 13930 (PRE); Port Shepstone (-CB), Strey 10023, 10066 (NH); Uvongo near bridge (-CD), Strey 5813 (NH); Beach Terminus (-DA), Thode 2532 (STE).

LESOTHO - 2828 (Bethlehem): Leribe (-CC), E. Phillips s.n. (SAM 6755), Dieterlen 6968 (SAM), 639 (NH, PRE, STE).

CAPE - 3127 (Lady Frere): Elliot (-BD), Malan s.n. (SAM 58326).
3128 (Umtata): The Haven (-DC), J.L. Gordon-Gray 696 (NU).
3130 (Port Edward): Umtamvuna waterfall, Bizana (-AA), Strey 4474 (NH, PRE).
3226 (Fort Beaufort): Katberg (-DA), Garabedian s.n. (SAM 49882), Moss 15016 (J); Hogsback Pass (-DB), McGillet 1306 (STE); Fort Hare (-DD), Wilsenach s.n. (PRE 33559).
3227 (Stutterheim): Kotana (-BB), Lussem 50 (NBG); Kabaku hills, Stutterheim (-CB), Acocks 9331 (PRE); Mount Kemp, King Williams Town (-CD), Compton 19217 (NBG); King Williams Town (-CD), Sim 1854 (NU); Komgha (-DB), Flanagan 1174 (SAM).
3326 (Grahamstown): Grahamstown (-BC), Rogers 2062 (STE); Blaauwkrantz (Bloukrans) (-BC), Hilner 82 (GRA).
3327 (Peddie): East London (-BB), Bokelmann 1, 3 (NBG); Banks of Buffalo River, East London (-BB), Galpin 3343 (GRA).

without precise locality:
Medley Wood 6633 (NH), Malvern; Moss 19744 (J), Pepite Falls, N. Tvl.; Pegler 814 (PRE), Merine.

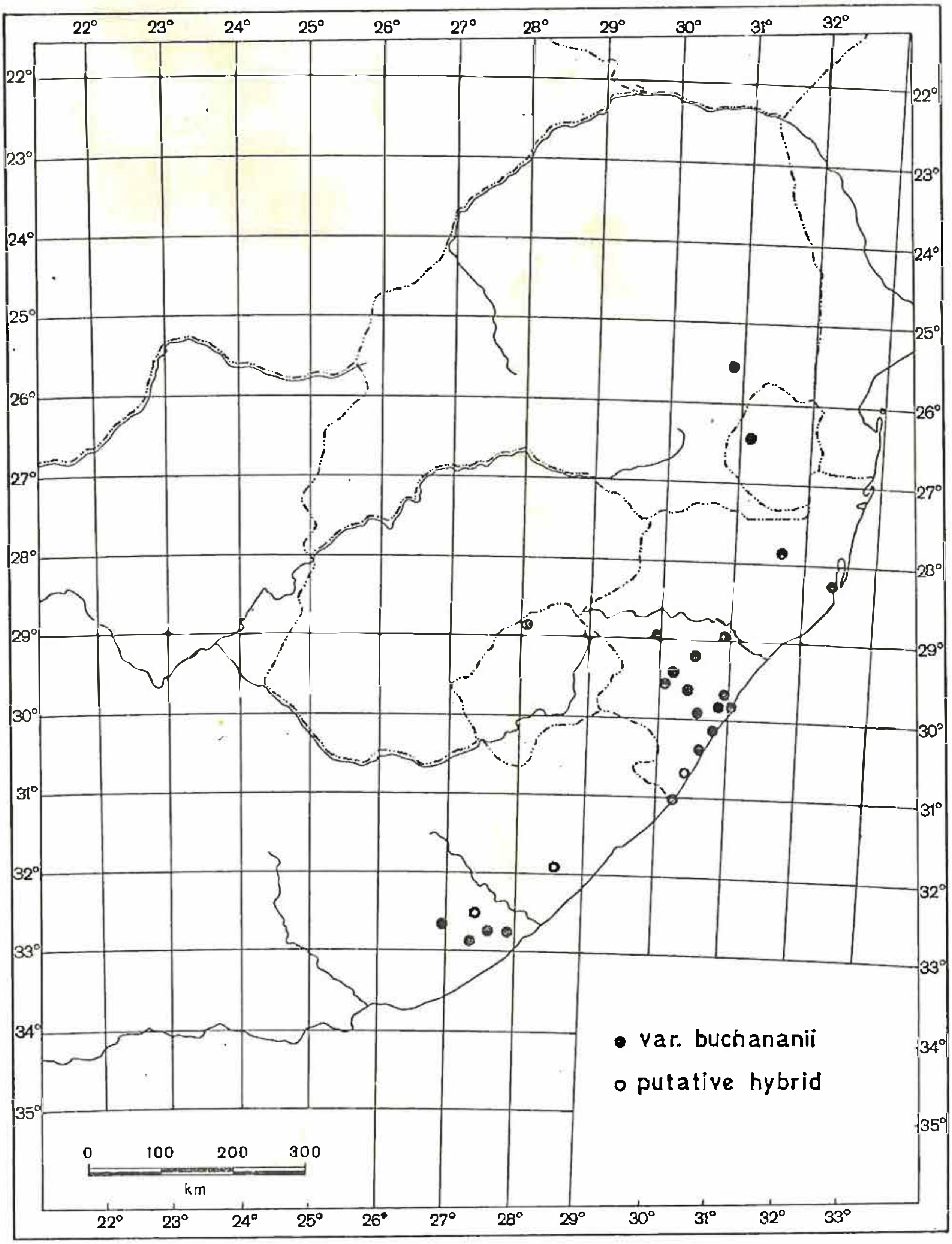


Fig. 42. Hypoxis angustifolia Lam. var. buchananii Bak. - known distribution in Southern Africa up to 1975.

H. angustifolia var. buchananii Baker in J. Linn. Soc. 17:111 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:231 (1893), et in Fl. Cap. 6:180 (1896); Medley Wood, Fl. Natal:132 (1907); Bews, Fl. Natal & Zululand: 64 (1921). Type: South Africa, without locality, Buchanan s.n. (K, holo.!)

H. woodii Baker in Britt. J. Bot.:3 (1889), in Dur. & Schinz Consp. Fl. Afr. 5:236 (1893), et in Fl. Cap. 6:183 (1896); Medley Wood, Fl. Natal:132 (1907). Type: South Africa, Natal, Inanda, Medley Wood 426a (K, holo.!)

H. obliqua var. woodii Nel in Engl. Jahrb. 51:309 (1914); Bews, Fl. Natal & Zululand:64 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Inanda, Medley Wood 426a (K, syn.!)

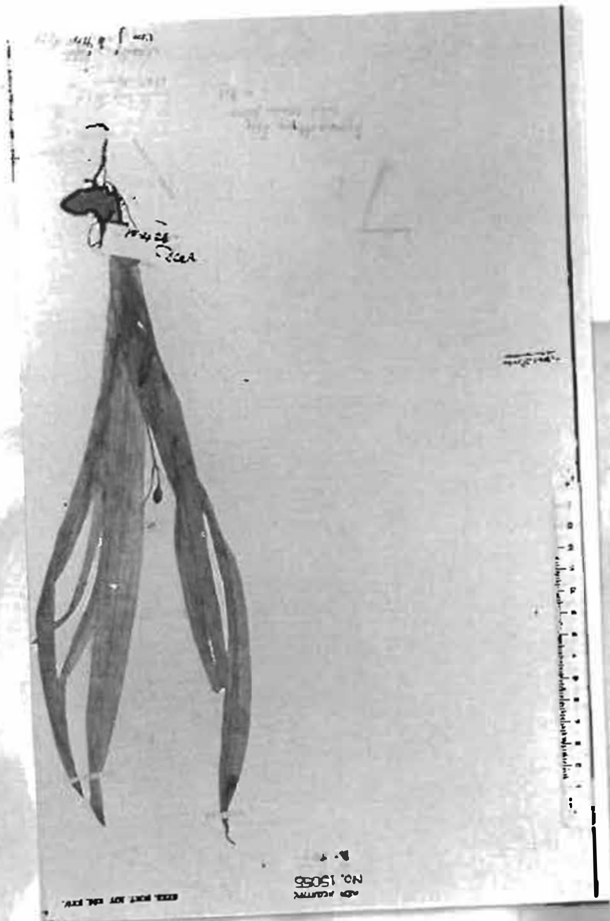
Corm up to 2,5 cm in diam., oblong. Leaves up to 60 cm long, 0,6-1,7 cm at widest point, oblong-lanceolate, flaccid, membranous. Inflorescence (1-)2-7 flowered. Pedicels usually very long, up to 6,5 cm.

Flowering Period: July-December.

The distribution of var. buchananii is similar to that of var. angustifolia except that one gathering is known from Swaziland (Fig. 42).

Baker in 1889 established H. woodii (type: Medley Wood 426a). Seven years later he cited (Baker, 1896) Medley Wood 426 as H. angustifolia var. buchananii. Examination of both these Medley Wood specimens (Fig. 43) showed them to be conspecific, thus H. woodii must become a junior synonym of H. angustifolia var. buchananii.

Nel in 1914 placed Baker's H. woodii as a variety of H. obliqua, (type: Medley Wood 426a). This variety must also become a synonym of H. angustifolia var. buchananii. H. obliqua is a distinct species limited to the Cape and is not affected by this synonymy.



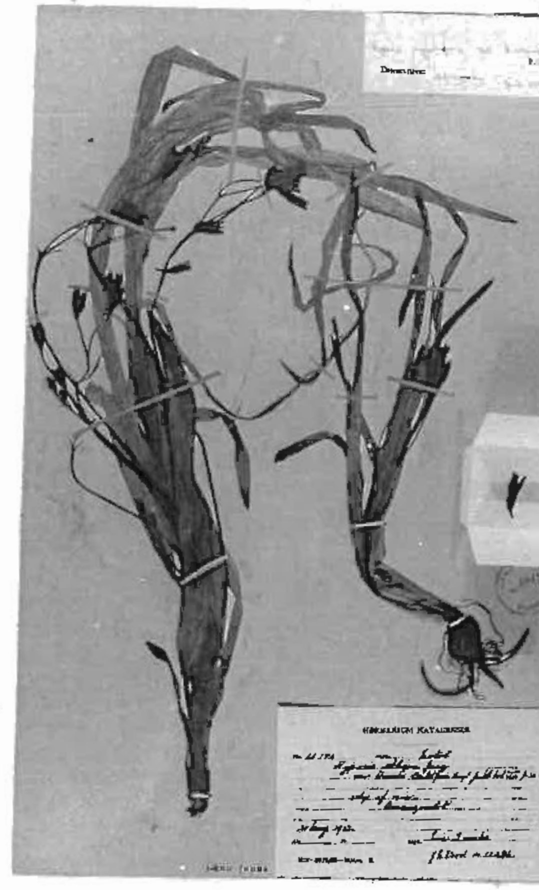
a

b

Fig. 43. a - H. angustifolia var. buchananii
Medley Wood 426 (K)

b - H. woodii
Medley Wood 426a (K, holo.)
(with acknowledgement to the Herbarium,
Royal Botanic Gardens, Kew)

a



b

c

Fig. 44. Herbarium specimens of putative parents and their hybrid

a - H. membranacea, b - H. angustifolia var. buchananii, c - putative hybrid

The closest morphological ally of H. angustifolia is H. lata. These taxa differ in that the leaves of the latter species are sickle-shaped (not linear-lanceolate), with more frequent, less fine, patent hairs situated predominantly on the margins and keel. The perianth segments of H. lata also tend to be longer (1,2-1,7 cm).

There is some evidence that H. angustifolia var. buchananii hybridizes in nature. Studies of natural populations of this species that grow sympatrically with populations of H. acuminata have revealed, among the putative parents, a range of intermediates that are probably hybrids (for further details see under Chapter 4 - Hybridization).

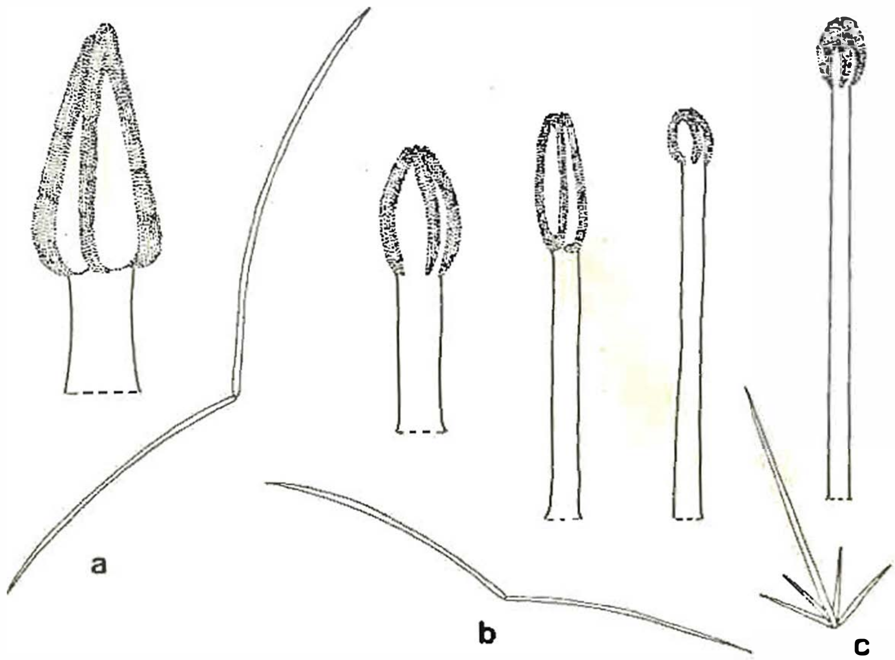
Another species with which var. buchananii seems to hybridize is H. membranacea, but intermediates in this case have only been detected by study of herbarium specimens (Fig. 44).

In these two species there are differences in the styles and stimas, namely:

H. membranacea: stigma minute, ($\pm$ 0,5 mm) spherical; style filiform, $\pm$ 3,0 mm long (Fig. 45 c).

H. angustifolia var. buchananii: stigma concrete, up to 3,0 mm long, pyramidal with 3 concave faces; style subulate, $\pm$ 1,0 mm long (Fig. 45a).

Herbarium specimens were found which exhibited characters of both the above taxa. All specimens possessed flaccid, membranous, lanceolate leaves with bifurcate hairs on the margins and keel (characteristic of H. angustifolia var. buchananii). Perianth segments were yellow or white adaxially (characteristic of H. membranacea where flower colour is white or yellow). One specimen of H. angustifolia var. buchananii (Medley Wood 771) was stated to have white flowers. This possibly



a

H. angustifolia var. buchananii

Umzinto:
Strey 5974
Weintroub 17124

Komgha:
Compton 17668

Stutterheim:
de Vries 85

King Williams Town:
Dyer 298

b

putative var. buchananii x membranacea

Port Shepstone:
Strey 5990, 9149, 6879

Elliotdale:
J.L. Gordon-Gray 949

Kentani:
Compton 17716

Port St. Johns:
Strey 10241

c

H. membranacea

Transkei:
Taylor 3710

Port Edward:
Nicholson 713

Port Shepstone:
Klopper s.n.
Glen 274

East London:
Smith 3770
Galpin 5810

Komgha:
Flanagan 1172

Kentani:
Pegler 109

Fig. 45. Stigmatic and hair types of:

a - H. angustifolia var. buchananii,
b - putative hybrids, c - H. membranacea

indicates a similar range in flower colour in this species. The stigmas and styles of the putative hybrids ranged between those of the putative parents (see Fig. 45b).

Both H. angustifolia var. buchananii and H. membranacea have a coastal distribution being sympatric over part of their range. H. membranacea occurs from East London to Barberton, but var. buchananii has wider limits extending into the N. Transvaal and Rhodesia. Both species prefer moist, shady habitats and it seems probable that some degree of hybridization occurs where the taxa overlap (a region from Umzinto to East London).

Population studies in the field, and intensive experimental work are necessary to confirm hybridization.

Citations:

var. buchananii

TRANSVAAL	-	2330	(Tzaneen): "Koofsig", Daviesville (-AC), Markotter s.n. (STE 19066).
		2530	(Lydenburg): Nelspruit (-BD), Liebenberg 3306 (PRE).
SWAZILAND	-	2631	(Mbabane): Mbabane (-AC), Compton 29340 (NBG).
NATAL	-	2731	(Louwsburg): Nongoma (-DC), Gerstner s.n. (NH 22261).
		2830	(Dundee): Krantzkloof (-DD), Haygarth 79 (STE), s.n. (PRE 22309).
		2832	(Mtubatuba): St. Lucia Park (-AD), Dutton 54 (PRE).
		2930	(Pietermaritzburg): Lidgetton (-AC), Mogg 881 (PRE); Dargle (-AC), Smook 615 (NU); Edwards Farm, Dargle (-AC), S.E. Wood 180 (NU); 8 ml. from Greytown (-BA), Wylie s.n. (NH 27962); Oribi, Pietermaritzburg (-CB), Stirton s.n. (NU, 21.10.74); Edendale (-CB), Moss 5574 (J); cnr. New England Rd., Pietermaritzburg (-CB), Ram 508 (NU); Inanda (-DB), Medley Wood 426, 771 (NH); Mid-Illovo (-DC), Thode 2549 (STE) ; Pinetown (-DD), Hall 16 (NU); Everton, Eskotene (-DD), Hilliard 5543 (NU).
		2931	(Stanger): Merebank East, Durban distr. (-CC), Ward 5208 (NH).

		3030	(Port Shepstone): 'Ellesmere' (-AD), Rudatis 1150 (STE); Amanzimtoti (-BB), Franks s.n. (NH 14174); Park Rynie (-BC), Strey 5974 (NH, NU); Umdoni Park (-BC), Moss 17124 (J).
LESOTHO	-	2828	(Bethlehem): Leribe (-CC), E. Phillips (SAM 6755, 2 sheets), Dieterlen 536 (SAM).
CAPE	-	3226	(Fort Beaufort): Hogsback, Amatola Mts. (-DB), Peacock s.n (SAM 65757): Hogsback Forest Reserve (-DB), Dahlstrand 1793 (STE); Hogsback (-DB), Noel 1485 (GRA).
		3227	(Stutterheim): Keiskama Hoek, King Williams Town (-CD), Dyer 298 (PRE); 3 ml. from Amabele (-DA), de Vries 85 (PRE); Komgha (-DB), Compton 17668 (NBG).
without precise locality:			Bell s.n. (NH 14151).

putative hybrids - H. angustifolia var. buchananii X H. membranacea

NATAL	-	3030	(Port Shepstone): Oribi Gorge Nature Reserve (-CB), Kerfoot 7225 (J); Wichmann's Farm, Uvongo (-CD), Strey 9149 (NH, NU, PRE); St. Michaels-on-Sea (-CD), Strey 6879 (NH, PRE).
		3130	(Port Edward): Umtamvuna bridge (-AA), Strey 5990 (NH, NU).
CAPE	-	3128	(Umtata): The Haven, Elliotdale Distr. (-DC), J. Gordon Gray 949 (NU).
		3228	(Butterworth): Kentani (-AD), Compton 17716 (NBG).

18. Hypoxis lata Nel in Engl. Jahrb. 51:324 (1914); Bews, Fl. Natal & Zululand:65 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Van Reenen, Medley Wood 6254 (NH, syn.!)

Corm 0,5-1,2 cm in diam., globose-oblong, crowned with fine bristles. Leaves 5-9, 9,5-37,0 cm long, 0,4-1,2 cm at widest point, lanceolate or linear-acuminate, sickle-shaped, usually membranous, with 2-8 prominent ribs, hairs stellate or bifurcate, or both types inter-

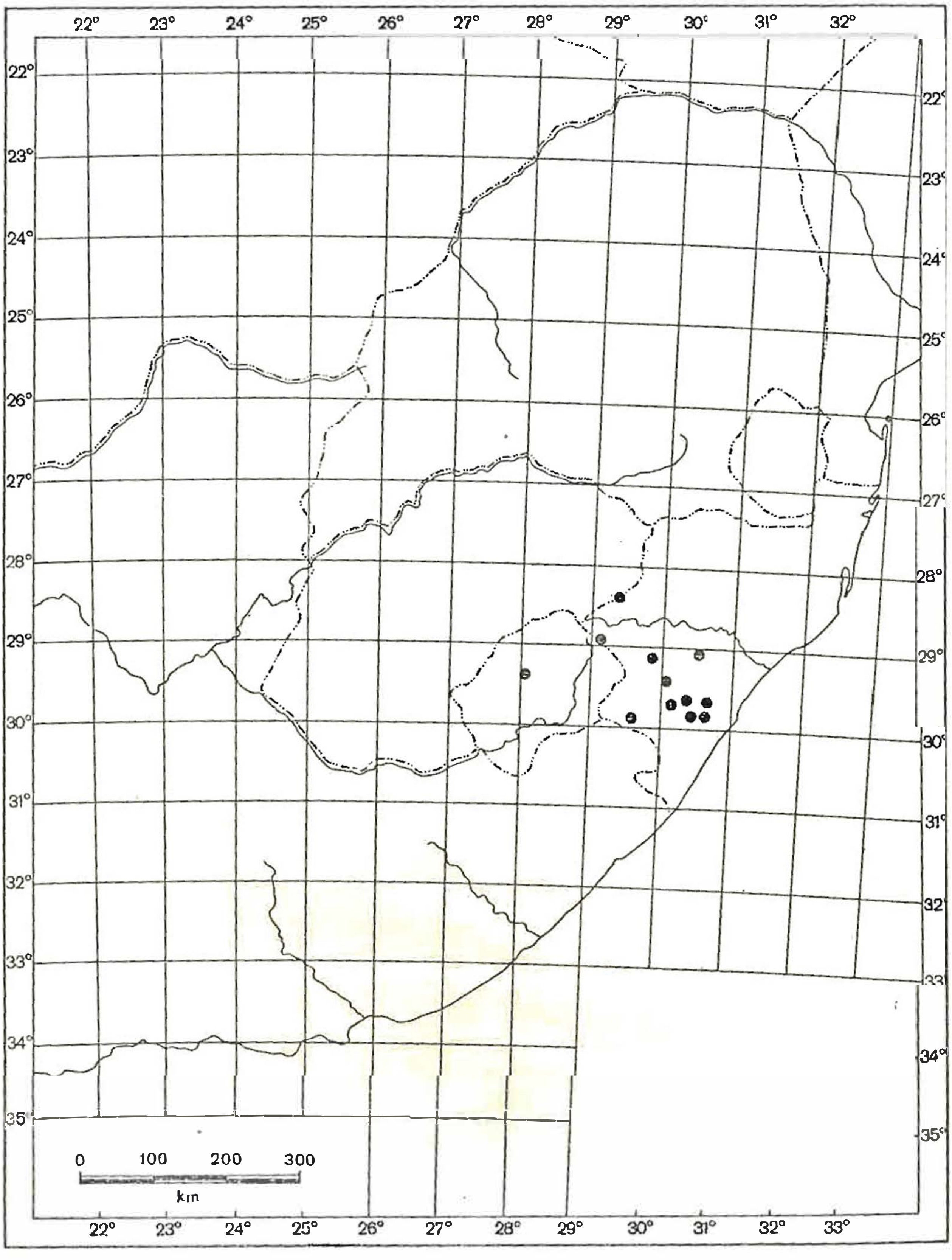


Fig. 46. Hypoxis lata Nel - known distribution in Southern Africa up to 1975.

mingled, patent, predominantly on keel and margins, lamina with few, scattered hairs or glabrous. Peduncles ancipitous, hairs patent, whitish, dense below inflorescence grading to sparse at base. Inflorescence 2-4(-5) flowered. Pedicels 0,5-4,0 cm long at time of flower opening. Bracts linear-subulate, setaceous, 0,6-1,6 cm long. Perianth segments yellow adaxially, in open flower 1,2-1,7 cm long. Filaments unequal, subulate. Anthers 4,0-5,0 mm long, lanceolate, sagittate, apex bifurcate. Style ± 1,0 mm long, or stigma subsessile. Stigma concrete, 2,0-3,5 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-December.

Hypoxis lata is known only from Natal and Lesotho (Fig. 46), at altitudes from 500 to 2000 m. Plants are 2-4(-5) flowered with the inflorescence and peduncle covered with white, patent hairs. Leaves are sickle-shaped, membranous, with a predominance of patent hairs on keel and margins. The lamina of the leaf is usually glabrous but occasionally scattered hairs are present. Plants are recorded from moist or dry grassland habitats.

H. lata is very similar morphologically to its closest ally H. acuminata which differs by possessing leaves that are not sickle-shaped nor membranous: they are hairy all over with more prominent, more closely packed ribs than are the leaves of H. lata. Inflorescences of H. acuminata are clothed with yellowish hairs (unlike the whitish hairs of H. lata) and the pedicels are shorter than those of H. lata. H. lata is also allied to H. angustifolia var. angustifolia (for details see under this species).

Citations:

NATAL - 2829 (Harrismith): Van Reenen (-AD), Medley Wood 6254 (NH), Cathedral Peak; Catchment 1 (-CC), S.E. Wood 150 (NU).

2929 (Underberg): 8 km from Estcourt (-BB), S.E. Wood 145A (NU); Pevensey turn-off on Underberg Rd. (-DC), S.E. Wood 125 (NU).

2930 (Pietermaritzburg): Dargle (-AC), Smook 614 (NU); Greytown (-BA), Wylie s.n. (PRE, Oct.-Nov. 1931); 40 km to Bulwer (-CA), S.E. Wood 121A (NU); Chase Valley, Pietermaritzburg (-CB), S.E. Wood 139, 141 (NU); Howick old main road, Pietermaritzburg (-CB), S.E. Wood 144 (NU); Ferncliff, Pietermaritzburg (-CB), S.E. Wood 138 (NU); 11 km from Mid-Illovo (-CD), S.E. Wood 110 (NU); 8 km from Mid-Illovo (-CD), S.E. Wood 113 (NU); Inchanga cutting (-DA), K.D. Gordon-Gray 10012 (NU); Botha's Hill (-DC), Stirton 1078 (NU).

LESOTHO - 2928 (Marakabei): Mamalapi (-AC), Compton 21365 (NBG).

19. Hypoxis sobolifera (Thunb.) Jacq. Icon. pl. rar. II t. 372 (1786-93), in Coll. bot. (Suppl.):53 (1796) and in Bot. Mag. t. 711 (1804); Nel in Engl. Jahrb. 51:309 (1914); Bews, Fl. Natal & Zululand:64 (1921). Type: South Africa, Cape, Thunberg s.n. (~~K~~, UPS, holo.)

H. villosa var. sobolifera Baker in J. Linn. Soc. 17:114 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:236 (1893).

H. pannosa Baker in Gard. Chron.:134 (1874).

H. villosa var. pannosa Baker in J. Linn. Soc. 17:114 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:236 (1893), in Fl. Cap. 6:184 (1896); Ross, Fl. Natal:132 (1972).

Corm 1,3-3,5 cm in diam., globose-oblong, crowned with bristles. Leaves 5-14, 11,0-41,0 cm long, 0,7-2,5 cm at widest point, abaxial surface, keel and margins with a scattered to dense covering of light-brown to red-brown non-appressed hairs, up to 4,0 mm long, mainly stellate, rarely bifurcate or both types intermingled, adaxial surface as above but with fewer hairs. Peduncles ancipitous, hairy all over or below the inflorescence grading to subglabrous at the base. Inflorescence 2-7 flowered. Pedicels hairy, 1,0-5,5 cm long at time of flower opening, the first formed flowers with the longest pedicels. Bracts linear-subulate, setose, 0,6-2,2 cm long. Perianth segments yellow adaxially, in open flowers 0,8-1,6 cm long. Filaments subulate, 3 long, 3 short. Anthers 2,5-5,0 mm long, lanceolate-oblong, sagittate, apex deeply bifurcate. Style cylindrical, 1,0-2,5 mm long. Stigma concrete, 1,0-3,0 mm long, pyramidal with 3 concave faces. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: All year.

H. sobolifera was first established by Jacquin in 1796. Baker (1878) sank it as a variety of *H. villosa* L., but it was later reinstated as a species by Nel (1914).

Within *H. sobolifera* Nel recognized three infraspecific categories, namely var. *sobolifera* (Jacquin's species), var. *pannosa* (originally Baker's species *H. pannosa*, but later reduced by the same author to a variety within *H. villosa*), and var. *accedens* (Nel's own taxon). Nel did not elaborate on the differences among these taxa except to state that the leaves of var. *accedens* were long and narrow. I have not been able to distinguish plants with such long, narrow leaves or to recognize a third entity within the species. I am thus maintaining only var. *sobolifera* and var. *pannosa*.

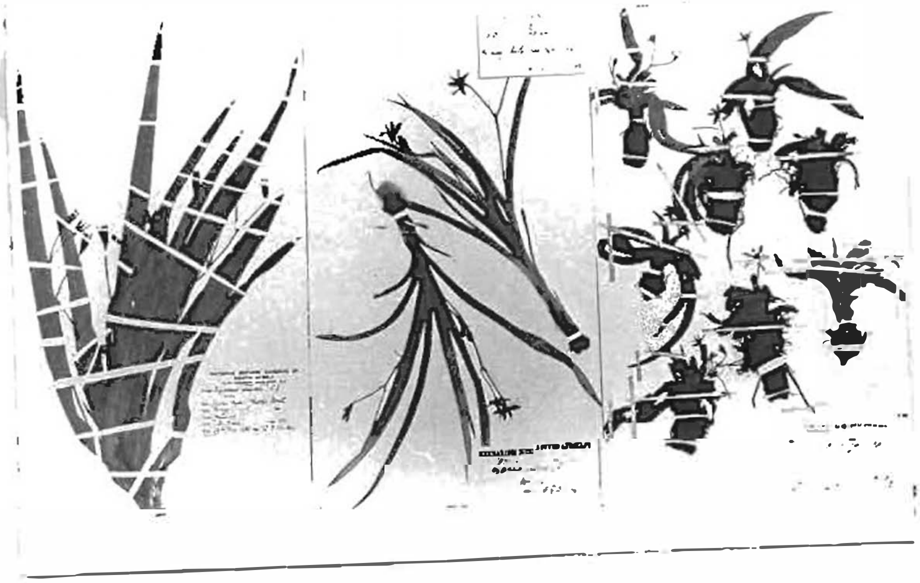


Fig. 47. H. sobolifera var. sobolifera: variation in leaf shape

These two taxa differ according to the hairs on the leaves. Leaves of var. pannosa are densely covered in red-brown hairs, whereas the leaf hairs of var. sobolifera are less dense and light brown. Within both vars. there is a similar range in leaf width, so this criterion cannot be used to distinguish them (Figs. 47 & 48). The peduncles in the former variety are hairy all over, while in the latter they become subglabrous towards the base.

The closest ally of H. sobolifera is H. villosa Bak., a Cape species. Within H. villosa, light-brown haired plants have been placed under var. canescens (Fisch. & Mey.) Baker. I consider H. sobolifera var. pannosa to be a junior synonym of H. villosa var. canescens (Fisch. & Mey.) Baker, but it is inadvisable to sink it formally until H. villosa is treated in detail and in conjunction with H. sobolifera.

Hypoxis sobolifera var. sobolifera
(Thunb.) Jacq. Icon. pl. rar. II t. 372 (1786-93), in Coll. bot. (Suppl.):53 (1796), in Bot. Mag. t. 711 (1804); Nel in Engl. Jahrb. 51:309 (1914); Bews, Fl. Natal & Zululand: 64 (1921). Type: South Africa, Cape, Thunberg, s.n. (~~K~~, UPS, holo.)

H. villosa var. sobolifera Baker in J. Linn. Soc. 17:114 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:236 (1893).

Leaves 5-11, covered with light-brown hairs. Peduncles hairy below the inflorescence grading to subglabrous at the base.

H. sobolifera var. sobolifera is coastal in distribution except for four specimens which are recorded from the Natal Drakensberg. The range of distribution extends from Stellenbosch to Eshowe, Zululand (Fig. 49). This is the only Natal species which is recorded in the southern Cape.

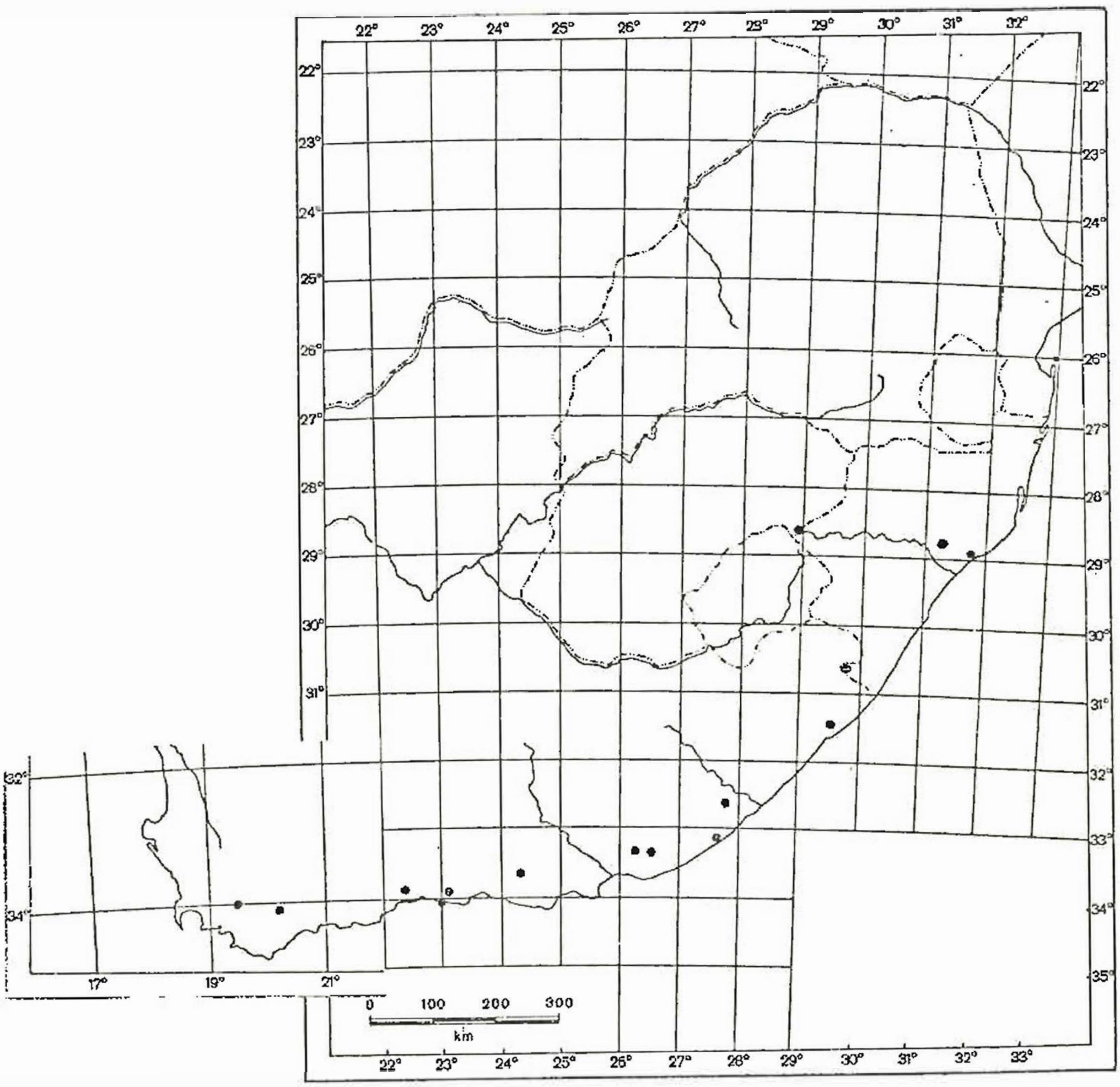


Fig. 49. Hypoxis sobolifera Jacq. var. sobolifera - known distribution in Southern Africa up to 1975.

Its closest morphological ally in Natal is H. angustifolia var. buchananii Bak. The hairs on the leaves of the last-named species are white and bifurcate only, whereas the hairs of H. sobolifera var. sobolifera are brown and are both bifurcate and stellate. Pedicels of both species are exceptionally long; those of the two first formed flowers of H. sobolifera var. sobolifera are often noticeably longer than the remainder, while this is not as pronounced in H. angustifolia var. buchananii where the pedicels are almost equal in length.

Citations:

var. sobolifera

NATAL	-	2828	(Bethlehem): Natal National Park (-DD) Martin 475 (NBG), Stanton 28 (NU); Mont aux Sources (-DD), Bayer & McClean 196 (GRA, PRE).
		2831	(Nkandla): Eshowe (-CD), Lawn 1188 (NH); 'Hamewith' near Mtunzini (-DD), Mogg 4486 (PRE).
		3029	(Kokstad): Rooi Vaal, Harding (-DB), L.E. Taylor 5362 (NBG).
CAPE	-	3129	(Port St. Johns): Lusikisiki (-BC), Story 4221 (GRA, PRE).
		3227	(Stutterheim): Komgha (-DB), Flanagan 813 (GRA, SAM), Compton 17622 (NBG).
		3318	(Cape Town): Stellenbosch, University gardens (-DD), (STE 9010).
		3322	(Oudtshoorn): Touws River, George (-CD), Martin 59 (NBG); Wilderness, George (-CD), Compton 10705 (NBG); 3 ml. from George (-CD), Claasen 3 (STE); Karbonatjieskraal (-CD), H.C. Taylor 588 (NBG); Silver River, George Forest (-CD), Hall 206 (NBG); Blanco, George (-CD), Meyer s.n. (STE 11292); George (-CD), Paterson 1218 (GRA).
		3324	(Steytlerville): Uitkyk, Witte Els Bosch (-CB), Fourcade 4548 (STE).
		3326	(Grahamstown): 10 ml. w. of Grahamstown (-AD), Compton 23389 (NBG); Governors Kop near Grahamstown (-AD), Barker 668 (NBG).
		3327	(Peddie): Gonubie, East London (-BB), no coll. (NBG 61923).
		3420	(Bredasdorp): Swellendam Dist. (-AB), Thode A2398 (NH); Marloth Flower Reserve, Swellendam (-AB), Wurts 467 (NBG).
		3423	(Knysna): Belvedere (-AA), Duthie 692 (J), s.n. (STE 15799); Concordia (-AA), Keet 608 (GRA); Barrington, Knysna (-AA), Steyn 751 (NBG); The Crags, Knysna (-AA), Compton 23581 (NBG).

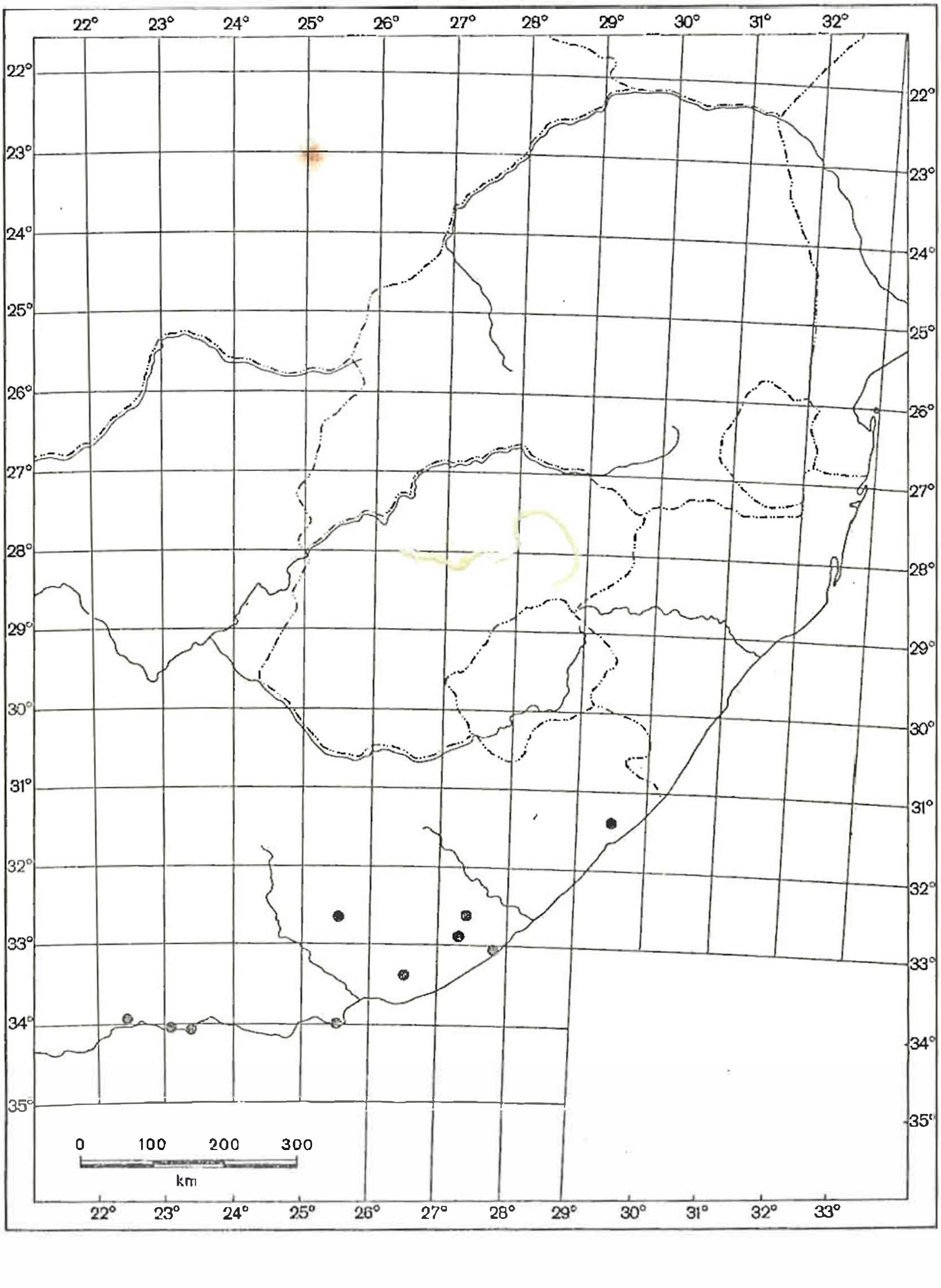


Fig. 50. Hypoxis sobolifera Jacq. var. pannosa (Baker) Nel - known distribution in Southern Africa up to 1975.

Hypoxis sobolifera var. pannosa (Baker) Nel in Engl. Jahrb. 51: 309 (1914). Type: South Africa, without locality, grown in Kew Gardens (K, holo.!)

H. pannosa Baker in Gard. Chron.:134 (1874).

H. villosa var. pannosa Baker in J. Linn. Soc. 17:114 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:236 (1893), in Fl. Cap. 6:184 (1896); Ross, Fl. Natal:132 (1972).

H. sobolifera var. accedens Nel in Engl. Jahrb. 51:310 (1914).

Leaves 5-14, densely covered with red-brown hairs. Peduncles hairy all over.

Flowering Period: October-April.

H. sobolifera var. pannosa is a predominantly Cape ~~species~~ variety occurring in coastal areas in the southern latitudes, but in lower latitudes plants are found at higher altitudes (Fig. 50). Only one specimen is from Natal, namely, Medley Wood 3434, "slopes of Drakensberg".

This variety has no close ally in Natal. The dense covering of red-brown hairs is unique.

Citations:

var. pannosa

NATAL	-		without precise locality: Medley Wood 3434 (NH), slopes of Drakensberg.
CAPE	-	3129	(Port St. Johns): Lusikisiki Distr. (-BC), Moss 16037 (J).
		3225	(Somerset East): Somerset East (-DA), MacOwan 1899 (SAM).
		3227	(Stutterheim): Fort Cunynghame (-CB), Schonland 704 (GRA); Mount Coke (-CD), Sim 1122 (NU, 2 sheets), 1123 (SAM, NU), s.n. (NU, Oct. 1921).
		3322	(Oudtshoorn): Above George (-CD), Guthrie 4387 (NBG).
		3326	(Grahamstown): Grahamstown (-BC), MacOwan 1899 (GRA); Howieson's Poort Hills, Grahamstown (-BC), Galpin 3085 (GRA).
		3327	(Peddie): East London (-BB), Johns (NBG, 11.4.1942).
		3423	(Knysna): Knysna (-AA), Duthie s.n. (STE 22022), Gillett 1262 (STE, 2 sheets); Plettenberg Bay

(-AB), Rogers 27963 (STE).
3425 (Skoenmakerskop): Bethelsdorp (-DC), Paterson 370 (GRA).

20. Hypoxis membranacea Baker in J. Linn. Soc. 17:106 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:232 (1893), et in Fl. Cap. 6: 182 (1896); Medley Wood, Fl. Natal:132 (1907); Nel in Engl. Jahrb. 51:308 (1914); Bews, Fl. Natal & Zululand: 65 (1921); Ross, Fl. Natal:132 (1972). Type: South Africa, Natal, Tugela, Gerrard 1835 (K, holo.!)

Corm 0,4-0,5 cm in diam., 1,0-3,5 cm long, oblong, bristles few, fine. Leaves (4-)5-7(-9), 5,0-14,0 cm long, 0,8-2,2 cm at widest point, oblong-acuminate, membranous, veins not prominent, covered with scattered, white, stellate hairs, especially on the margins and keel. Peduncles 1-4, hairy. Inflorescence 1-3 flowered (at least one peduncle per plant is more than 1-flowered). Pedicels 1,5-4,5 cm long at time of flowering, hairy. Bracts 2 per pedicel, 0,3-0,6 cm long, subulate, setose. Perianth segments white adaxially, 0,5-0,8 cm long in open flowers. Filaments usually 3 long, 3 short, sometimes unequal. Anthers 1,5-2,0 mm long, lanceolate, sagittate, apex bifurcate. Style cylindrical 2,5-3,0 mm long. Stigma spherical, ± 0,5 mm in diam. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: October-January.

Hypoxis membranacea was first described by Baker in 1878. In the same year and in the same journal he established another species,

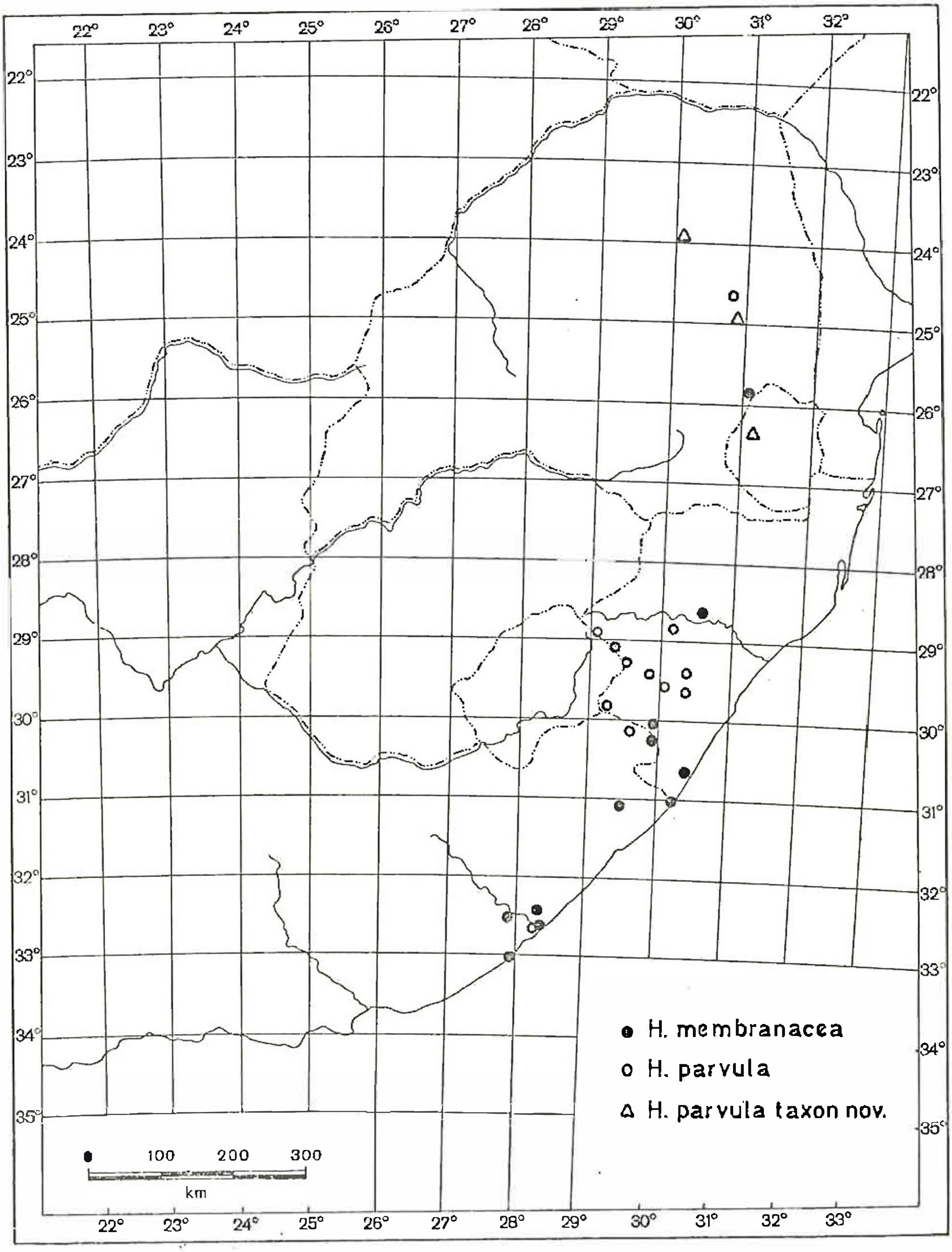


Fig. 51. Hypoxis membranacea Bak. and Hypoxis parvula Bak. - known distribution in Southern Africa up to 1975.

H. parvula. H. membranacea was said to be 2-flowered, with white perianth segments and two bracts subtending each flower, while H. parvula was described as 1-flowered, with yellow perianth segments and lacking bracts.

This author in 1896 sank H. parvula in H. membranacea. At this time he also described H. brevifolia, which he recognized as 1-flowered, with yellow perianth segments and "leaves about 3, ... 1-1¼ ins. long." In 1914 Nel sank H. brevifolia Bak. in H. membranacea Bak.

In the present study of H. membranacea it became apparent that this species was not homogeneous. Two taxa were represented, one corresponding with Baker's H. membranacea of 1878, the other with his H. parvula of the same date. H. brevifolia designated a synonym of H. membranacea by Nel (1914), falls under H. parvula.

The major differences between H. membranacea and H. parvula are that the latter always has only a 1-flowered inflorescence and usually no bracts subtending the pedicel (if present, there is only one which is short). The perianth segments may be white or yellow (further field study is necessary to determine whether other differences are correlated with these colour forms), while those of H. membranacea are always white. The leaves of H. parvula are smaller and usually less in number than those of H. membranacea, though the range for both species overlaps.

The geographical distribution of the two species is similar (Fig. 51). The range appears to be determined by the cool, moist habitat preference of the species. In the more temperate, southern latitudes, plants are found towards the coast, whereas in the lower latitudes there is a tendency for them to be limited to higher altitudes in order to achieve preferred habitat conditions. H. membranacea has a tendency, according to known records, to be more coastal and southern;

H. parvula is more limited to higher altitudes further inland.

H. membranacea and H. parvula are distinct in the genus because of their characteristic stylar and stigmatic form. The style is filiform or cylindrical with a very small ($\pm$ 0,5 mm), spherical, stigma (Fig. 10) whereas other species in the genus have a pyramidal stigma, equal to or longer than, the subulate or cylindrical style.
H. membranacea and H. parvula are also distinct in the form and texture of their leaves, which, as one would expect, are membranous with no prominent veins. H. angustifolia is the only other species with a leaf of similar texture, but there the leaves are much longer and linear.

Citations:

TRANSVAAL	-	2531	(Komatipoort): near Barberton (-CC), Thorncroft 634 (NH).
NATAL	-	2830	(Dundee): Qudeni, above Mfongizi R. (-DA), Hilliard s.n. (NU 28395).
		3029	(Kokstad): Bizweni, Clydesdale (-BB), Tyson 2880 (SAM); Umzimkulu (-BB), Schlechter 6634 (GRA).
		3030	(Port Shepstone): 'Ellesmere' (-AD), Rudatis 910 (STE); Oribi Gorge (-CB), Glen 274 (NH, J), Reyburn s.n. (PRE, 14.11.66); on pathway to Inkonka pt. Oribi (-CB), Davidson 2548 (J).
		3130	(Port Edward): Umtamvuna Forest Reserve (-AA), Nicholson 713 (PRE).
CAPE	-	3129	(Port St. Johns): Mtentu R. near Flagstaff (-BA), Strey 10241 (NH, NU, PRE).
		3227	(Stutterheim): Komgha (-DA), Flanagan 1172 (GRA, PRE, SAM).
		3228	(Butterworth): Kentani District (-AD), Pegler 109 (PRE); near Kei Mouth (-CB), Flanagan 1172 (GRA).
		3327	(Peddie): Greenpoint (-BB), Smith 3770 (PRE); East London (-BB), Galpin 5810 (SAM), Rattray 117 (GRA).

without precise locality:
L.E. Taylor 3710 (NBG), Kabongaba, Transkei; Medley Wood 862 (NH), Itafamasi.

21. Hypoxis parvula Baker in J. Linn. Soc. 17:113 (1878), in Dur. & Schinz, Consp. Fl. Afr. 5:233 (1893). Type: South Africa, Natal, Sanderson s.n., anno 1854 (K, holo.!)

H. brevifolia Baker in Fl. Cap. 6:183 (1896); Medley Wood, Fl. Natal:132 (1907). Type: South Africa, Natal, Liddesdale, Medley Wood 3940 (NH, holo.!)

Corm 0,3-0,6 cm in diam., oblong, bristles few, fine. Leaves 2-5, 2,5-7,0 cm long, 0,5-1,5 cm at the widest point, oblong-acuminate or oblong-lanceolate, membranous, covered with stellate hairs on the margins and keel, and simple or stellate hairs on the lamina. Peduncles 1-3, hairy. Inflorescence always 1-flowered. Bracts usually absent, if present only 1, 1,0-4,0 mm long, membranous, subulate, slightly hairy. Perianth segments yellow or white adaxially, 0,5-1,0 cm long in open flowers. Filaments filiform, 3 long, 3 short. Anthers 1,0-2,0 mm long, oblong-lanceolate, deeply sagittate, apex entire or slightly bifurcate. Style cylindrical or filiform, 3,0-3,5 mm long. Stigma spherical, $\pm$ 0,5 mm in diam. Fruit a capsule opening by circumscissile dehiscence below the apex.

Flowering Period: September-March (-May).

H. parvula is closely allied to H. membranacea, under which species details of this relationship are given.

Hilliard and Burtt (pers. com.) are engaged upon a revision of the genus Rhodohypoxis Nel. They have established that intergeneric hybridization occurs between Hypoxis parvula and Rhodohypoxis milloides (Baker) Hilliard & Burtt. Two hybrid specimens are cited here and further information will be available on publication of the above mentioned authors' work.

Of interest also are a number of specimens from the eastern Transvaal and Swaziland, which appears to constitute a distinct taxon probably within the limits of H. parvula, or closely related to this species. Plants are exceptionally small with the leaves not longer than 4,0 cm, and 0,5-1,3 cm wide. They are nearly always 1-flowered with the perianth segments yellow and only 2,0-3,0 mm long. There is usually one bract, 2,0-4,0 mm long, rarely two, or bracts may be entirely lacking. The anthers are only ± 0,5 mm long.

Their consistent "smallness" is the major reason for considering these specimens as constituting an infraspecific taxon within H. parvula, but the presence of one or two bracts subtending the flower is significant, as is the observation that one plant possessed a 2-flowered inflorescence. No plants of this kind have been found in Natal, and in view of the limited knowledge of this entity, it is considered inadvisable to describe it formally before cited localities have been visited.

Citations:

TRANSVAAL	-	2430	(Pilgrims Rest): Mariepskop (-DB), v.d. Schyff 4818 (PRE).
NATAL	-	2829	(Harrismith): Cathedral Peak (-CC), Killick 1539 (NPC).
		2830	(Dundee): Culvers, Weenen (-CC), Rogers 28312 (STE); Weenen County (-CC), Medley Wood s.n. (SAM 22265).
		2929	(Underberg): on way to Grotto, Cathkin Park (-AB), Howlett 10 (NH); Tabamhlope (-AB), West 1404 (NH); top of Tabamhlope (-AB), Evans 438 (NH); Giants Castle Game Reserve (-AD), Trauseld 683 (NU); Kamberg "Game Pass" (-DB), C.G. Gordon-Gray 66 (NU); Bamboo Mt. Underberg dist. (-CD), Grice s.n. (NU, 11.73).
		2930	(Pietermaritzburg): Howick (-AC), Thomas 17 (SAM); N. part of Karkloof forests (-AD), Acocks 11833 (NH, PRE); Karkloof (-AD), Smook 649 (NU); near York (-AD), Medley Wood 877 (PRE); Umgeni Poort (-CA), Moll 1362 (NU); Pietermaritzburg (-CB), Fisher 724 (NH, NU);

Swartkop (-CB), Hillary 60 (NU); Liddesdale (-CB), Medley Wood 3940 (NH).

CAPE - 3029 (Kokstad): Ensekeni (Insikeni) (-BA), Medley Wood 12077 (NH).
3228 (Butterworth): Kei Mouth (-CB), Bokelmann 9 (NBG).

without precise locality:
Thode 5293 (STE), Springfontein, Natal Province.

taxon nov.

TRANSVAAL - 2330 (Tzaneen): Woodbush mountains (-CC), Moss 15429 (J).
2430 (Pilgrims Rest): near God's Window, Pilgrims Rest area (-DD), Davidson 792 (J).

SWAZILAND - 2631 (Mbabane): Mbabane (-AC), Compton 27243, 29335 (NBG).

without precise locality:
Kerfoot 6459 (J), Belvedere, E. Tvl.

Putative hybrid: Hypoxis parvula x Rhodohypoxis milloides

NATAL - 2929 (Underberg): Impendhle distr., farm "Umgeni Vlei" (-CD), Wright 1600 (NU).
2930 (Pietermaritzburg): Fort Nottingham (-AA), Wright 1567 (NU).

Indeterminate specimens

At the conclusion of this study, five herbarium sheets remained that could not be placed with certainty. It is believed that plants of Hypoxis can undergo hybridization especially within the genus. The "aberrant" specimens represented on these sheets may be the result of this phenomenon. The specimens are listed below together with an indication of the species they most closely resemble.

1. Coetzee 14 (NH), "Shawlands", Nottingham Road: - H. acuminata, but lamina glabrous.

2. Grice (NU, Dec. 1973), Bamboo Mt., Underberg: - H. oblonga, but 2 prominent nerves not apparent, hairs different, flowers pedicelled.

3. Trace 30 (NU), Wembly, Pietermaritzburg: - resembling H. rooperi - a putative hybrid of this species?

4. S.E. Wood 146 (NU), corner Estcourt highway and Winterton turn off: - H. kraussiana, but broader leaves, not subterete, nor as hairy, with different venation.

5. Thienel 12 (NU), Mariannhill: - ?

CHAPTER 3

DISCUSSION

The Natal species of *Hypoxis* are predominantly grassveld plants, but they have a wide habitat tolerance, for plants may occur on coastal sand dunes or on the fringes of marshy vleis. *H. membranacea, H. parvula* and *H. angustifolia* var. *buchananii* do not exhibit this tolerance however, and grow only in damp areas. These are the only species with membranous leaves. *H. membranacea* and *H. parvula* are also distinguished from other species in the genus because of their distinct stigmatic and stylar form (see Diagnostic Characters p. 23). The remainder of the Natal species are grassveld taxa. They are generally robust plants with hairy leaves. *H. latifolia* and *H. interjecta,* although falling within this group, have leaves that are usually glabrous. In no known plant of *H. interjecta* have the leaves been hairy, but in one plant of *H. latifolia* (from ~~the Transvaal~~ N. Natal) the leaves were covered in hairs. This probably indicates that all taxa have the genetic potential to develop hairy leaves. *H. latifolia* is distinct within the genus by virtue of its leaf size and form, having no close ally. Thus within the Natal species there are two small, isolated groups, still geophytic, but distinguished morphologically from the main section of grassveld forbs.

In South Africa many grasslands are subject to annual burning in winter. It is once this has occurred that plants of *Hypoxis* become obvious. No proof is available of the factors that stimulate the renewal of growth, but many hypothetical explanations, that are supported by observation, have been suggested. This renewal of growth may depend on exposure of the soil to the sunlight (absorbtion of heat), or on the direct clearing of the old vegetation and with it unsatured hydrocarbons (ethylene) derived from it, that may possibly have acted as suppressors (alteration of the concentrations of these gases in the ambient and soil atmosphere may suppress then stimulate growth, but this needs experimental confirmation). Abeles, 1973, gives some evidence that ethylene may, in some cases suppress, and in other cases stimulate, the renewal of growth in underground organs (tubers and corms).

Bews (1925) in his early descriptive work on the vegetation of Natal, commented on growth renewal in grassland geophytes as follows:

> "In spring many grassveld plants commence growth even before the first rains, as soon as the temperature rises slightly, a fact which demonstrates that it is not in all cases the winter drought which causes the resting period in South African plants."

However, whether the veld is burnt, or the vegetation cleared by cutting, in autumn, winter, or early spring, the effect is the same. There is a need for physio-ecological studies in order to determine the factors that control the life-cycle of geophytes of the South African grassveld particularily the initiation of inflorescence development and the renewal of aerial growth.

Hypoxis plants rarely compete with other vegetation such as the grasses, despite growing with them. Flowering commences with the regeneration of aerial shoots, and often continues over a comparatively short period only so that on the same plant, flowers and dehisced capsules containing mature, black seeds may frequently be seen. Leaf growth continues throughout the growing season so that the new, short spring growth gives place in full summer, in most cases at any rate, to elongate leaves as tall as the associated grasses, (for example <u>H. rigidula</u> where leaves may range from 10 cm to 1 metre over the growing season).

Where plants occupied habitats where there was no competition, flowering took place all year. For example, <u>H. gerrardii</u> flowered all year on a north facing, rocky slope near Highflats. This strongly suggests that plants may have a potential to flower continuously, but that few individuals realize this potential.

As <u>Hypoxis</u> flowers are mostly bright yellow and clearly evident when the vegetation is sparse, collecting of herbarium material has been mainly during the short period of growth renewal.

Consequently this short period has often been taken to represent the range over the complete growing period. It is this that has led previous authors (who have relied predominantly on herbarium collections), to delimit leaf length in terms of restricted ranges. Thus when a specimen to be identified falls outside the range of possibilities covered by the key, confusion results.

There is evidence that plants of the genus undergo both interspecific and intergeneric hybridization on occasions. Detection of interspecific hybridization is difficult because many of the species are similar morphologically and diagnostic characters exhibit wide ranges of variation.

Two cases of putative interspecific hybridization were observed. One was detected from herbarium specimens, namely, <u>H. angustifolia</u> var. <u>buchananii</u> x <u>H. membranacea</u> (for details see page 89). The other case involved plants of <u>H. acuminata</u> and <u>H. angustifolia</u> var. <u>buchananii</u>, which were growing sympatrically. Specimens were found which exhibited

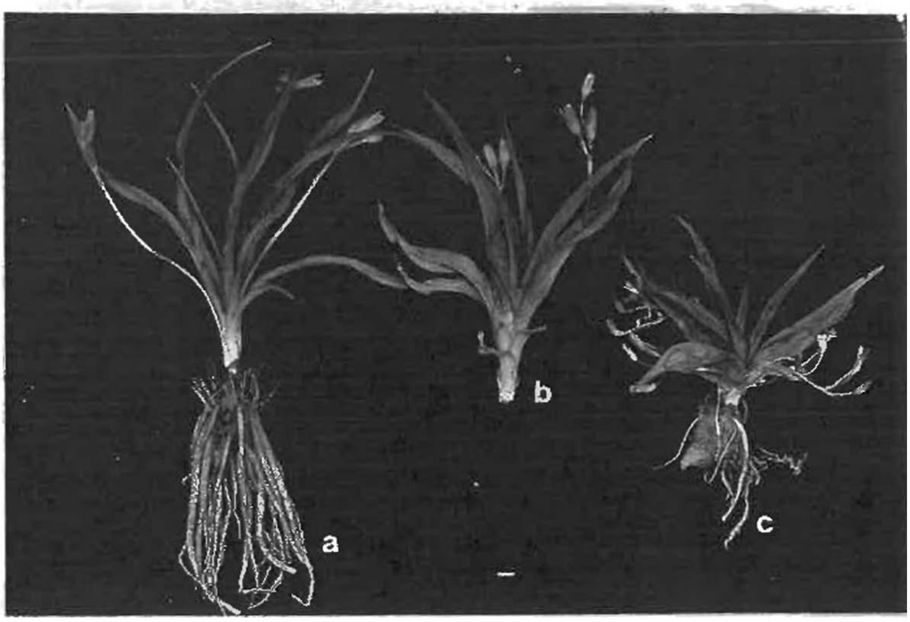


Fig. 52. <u>H. acuminata, H. angustifolia</u> var. <u>buchananii</u> and putative hybrid:
a - <u>H. acuminata,</u> b - putative hybrid,
c - <u>H. angustifolia</u> var. <u>buchananii</u>

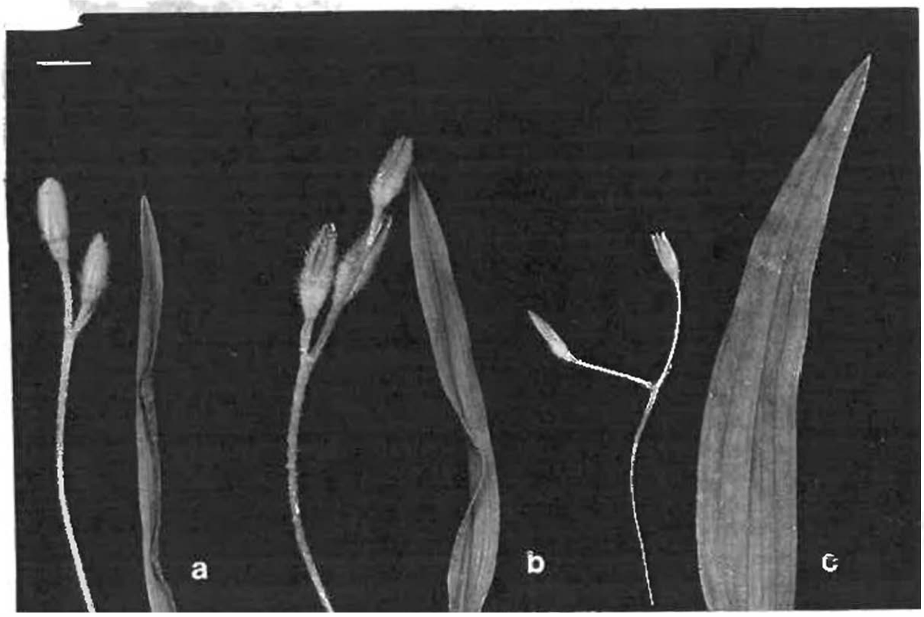


Fig. 53. Enlargement of leaf and inflorescence of each plant shown in Fig. 52

a range of characters between those of the two putative parents. Leaves of these plants were similar to H. acuminata in shape and hairiness (Fig. 52), while inflorescences were intermediate (Fig. 53).

Intergeneric hybridization has been proved between Rhodohypoxis baurii and Hypoxis parvula (Hilliard pers. com.; see page 101). The occurrence of intergeneric hybridization strongly suggests that interspecific hybridization will also be possible, but this last cannot be proved without experimentation which needs to be undertaken.

This thesis has attempted to clarify the taxa within Hypoxis that exist naturally in Natal. Species have been redescribed in more detail, with careful checking for the presence of synonymous taxa. H. colchicifolia and H. oligotricha have become junior synonyms of H. latifolia; H. elliptica of H. rigidula var. rigidula; H. nitida of H. obtusa; and H. woodii of H. angustifolia var. buchananii. Several taxa have not been recorded in Natal before, namely, H. galpinii, H. interjecta and H. costata. One new taxon has been established, H. zululandensis. Concluding this assessment a key to the species was constructed, using predominantly vegetative characters.

Further study (especially field work outside Natal) is required to clarify the relationships among some closely related taxa, for example H. gerrardii and H. argentea; or to elucidate aberrant specimens within individual species, for example H. latifolia and H. obtusa. Further field work outside Natal is also required to explore the extent of variation over their whole distributional range of widespread species such as H. costata and H. multiceps.

No attempt has yet been made to study the floral biology within this genus. The nature of the pollinating vectors is of particular interest. Outbreeding must occur since there is evidence of hybridization. Apomixis is also suspected to occur. Is this an aftermath of hybridization? Cytological studies are necessary to confirm the basic chromosome number for Hypoxis, and to throw more light on polyploidy within the genus.

Chemical and physio-ecological work on the corms, and detailed study of their growth patterns, including the functioning of the contractile roots, should prove interesting, as should studies on seed germination.

With collaboration in all fields of botanical study, a considerable contribution to the knowledge of the genus Hypoxis in southern Africa should be possible.

SUMMARY

A revision of the Natal species of Hypoxis was undertaken. Some of the taxa represented in Natal extend beyond this province, and consequently work on these included the whole area of their distribution in Southern Africa.

A history of the genus is given, together with details of world distribution. A review of cytological literature relating to the genus is also provided.

Study of specimens from a number of South African, and some European Herbaria, provided the foundation of this revision. This was supplemented by both field work and laboratory investigations, including the use of a Scanning Electron Microscope.

Diagnostic criteria used to delimit taxa are enumerated and critically considered. A key to the identification of species and infraspecific taxa, based predominantly on vegetative characters is provided. These characters are discussed in detail.

Detailed descriptions of the species are given, together with a range of flowering periods and brief habitat notes. Twenty one species are listed for Natal. During the course of the study, H. colchicifolia and H. oligotricha were found to be junior synonyms of H. latifolia; H. nitida of H. obtusa; and H. woodii and H. obliqua var. woodii of H. angustifolia var. buchananii. H. parvula was reinstated as a species (previously regarded as synonymous with H. membranacea), and one new species, H. zululandensis was established. Two taxa, not previously known in Natal, H. galpinii and H. interjecta were recorded for this province.

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APPENDIX

INDEX OF NUMBERED COLLECTIONS

This index provides an alphabetical list of collectors, their collections, the herbaria in which the collections are housed and the names of the specimens. The collector's name is followed by the collector's numbers which are grouped in the sequence of the taxa as they are enumerated below. In this enumeration each taxon has a reference number.

Example: BEWS 650 (NU=2) means the specimen was collected by BEWS, number 650, and housed in the Natal University Herbarium. It is Hypoxis galpinii Bak.

The herbarium abbreviations are those of Holmgren & Keuken (1974), except for the Natal Parks Board, Cathedral Peak which is designated NPC. If no collectors number exists reference is then made either to the herbarium number or to the date of collection.

1. Hypoxis latifolia Hook.
2. Hypoxis galpinii Bak.
3. Hypoxis interjecta Nel
4. Hypoxis multiceps Buching.
5. Hypoxis costata Bak.
6. Hypoxis rigidula Bak. var. rigidula
6b. Hypoxis rigidula Bak. var. pilosissima Bak.
7. Hypoxis acuminata Bak.
8. Hypoxis oblonga Nel
9. Hypoxis obtusa Burch.
10. Hypoxis rooperi S. Moore
11. Hypoxis zululandensis S.E. Wood
12. Hypoxis filiformis Bak.
13. Hypoxis neliana Schinz
14. Hypoxis kraussiana Buching.
15. Hypoxis gerrardii Bak.

16a. Hypoxis argentea Bak. var. argentea

16b. Hypoxis argentea Bak. var. sericea Bak.

17a. Hypoxis argustifolia Lam. var. argustifolia

17b. Hypoxis argustifolia Lam. var. buchananii Bak.

18. Hypoxis lata Nel

19a. Hypoxis sobolifera Jacq. var. sobolifera

19b. Hypoxis sobolifera Jacq. var. pannosa (Baker) Nel

20. Hypoxis membranacea Bak.

21a. Hypoxis parvula Bak. var. parvula (will be established at time of publication of var. nov.)

21b. Hypoxis parvula Bak. taxon nov. (not established)

Putative hybrids:

H1. Hypoxis angustifolia Bak. var. buchananii Bak. x Hypoxis membranacea Bak.

H2. Hypoxis parvula Bak. var. parvula x Rhodohypoxis milloides (Baker) Hilliard & Burtt

A. ACOCKS 10606 (NH=4), 10604, 10641, 10833 (NH=6a), 16275 (PRE=6a), 11771, 10587 (NH=12), 9301 (PRE=12), 12960 (PRE=16b), 10832 (NH=17a), 9331 (PRE=17a), 11833 (NH, PRE=21a); ALLSOPP 909 (NH, NU=1), 520 (NU=1), 920 (NH, NU=6a), 682 (NH=10), 411, 911 (NH=14), 728, 921 (NH, NU=15); ARNOLD 841 (NU=4), 835, 837, 838 (NU=6a), 839 (NU=7), 836, 842, (NU=9), 834, 840 (NU=10).

B. BAIJNATH 187 (NU=17a); BAUDERT 24 (GRA=15); BARKER 2585 (NBG=2), 220, 7952 (NBG=6a), 3428 - 2 sheets, 4367 (NBG=10), 5162 (NBG=15), 2124 (NBG=16a), 7951 (NBG=17a), 688 (NBG=19a); BATTEN 6 (NBG, PRE=10); BAUR 904 (SAM=9); BAYER & McCLEAR 196 (GRA, PRE=19a); BAYLISS 2547 (SAM=15), 3138 (SAM=16a); BEETON 27 (NBG=7); BELL s.n. (NH 14151=17b); BEWS 650 (NU=2), 193 (NU=6a), 8 (NU=12); BOKELMANN 1,3 (NBG=17a), 9 (NBG=21a); BOLUS 65814 (NBG=6a), 181 (PRE, STE=9); BOOYSEN 1707 (NBG=9); BOURQUIN 458 (NU=10); BOUWER 6055 (PRE=9), 2229 (PRE=10); BRITTEN 4653 (GRA=10); BRUYNS-HAYLETT 89 (NU=15); BUITENDAG 890 (NBG=6a), 158 (NBG=6b), 619 (NBG=9); BURTT-DAVY 13457 (PRE=1), 3823 (PRE=6a), 682 (NH=6b).

C. CAIN s.n. (J 37931=2); CAIRNS s.n. (NU 8.8.55=8); CLAASEN 3 (STE=19a); CLIVER 403 (NH=7); CODD 9396 (PRE=2), 8049 (PRE=7), 5673 (PRE=10), 5750, 6659 (PRE=12), 1849 (PRE=16b); CODD & DE WINTER 3282 (PRE=2), 3361 (PRE=7); COHEN s.n. (J 18.9.1936=6a); COLEMAN 193 (NH=6b), 159 (NH=10), 465 (NH=16b); COMINS 304 (NU=10); COMPTON 21449 (NBG=1), 22371, 26341, 27095 (NBG=2), 30881 (NBG, PRE=2), 27121 (NBG=4), 21311, 24490, 24578, 25210 (NBG=5), 32393 (NBG=6a), 24492, 26342, 26924, 26988, 28102 (NBG=6b), 24551, 25179, 26071, 27182, 28279, 28289 (NBG=7), 26128, 31728 (NBG, PRE=7), 22360 (NBG=9), 24706, 27337, 28104, 28843, 31790 (NBG=10), 19724, 24518, 25139, 27149, 28249, 28281 (NBG=12), 26129, 29266 (NBG, PRE=12), 27211 (NBG=15), 19217 (NBG=17a), 17668, 29340 (NBG=17b), 21365 (NBG=18), 10705, 17622, 23389, 23581 (NBG=19a), 27243, 29335 (NBG=21b), 17716 (NBG=H1); COTTERRELL 63 (GRA=16a); COURTENAY-LATIMER s.n. (NBG, Oct. 1945=10); CROOK 5 (NH=6a).

D. DALY 78 (PRE, 2 sheets = 10), 766 (GRA=16a); DALY & CHERRY 977 (GRA=16a); DAHLSTRAND 1793 (STE=17b); DAVIDSON 484, 2007, 2450 (J=12), 2548 (J=20), 792 (J=21b); DAVIDSON & MOGG 33288 (J=12); DE VILLIERS 5 (NU=17a); DE VRIES 85 (PRE=17b); DENY s.n. (J 35104=2); DEVENISH 1521, 1521a (NU=12), 181, 691, 766 (PRE=12), 1174 (NH, PRE=14a); DIETERLEN 149 (PRE, SAM=4), 2296 (NH, PRE, SAM=5), 223, 6971 (SAM=6a), 1370 (PRE, SAM=6a), 230 (NH=6b), 290 (PRE, SAM=7), 709 (SAM=7), 223 (NH=9), 310 (SAM=9), 230 (PRE, SAM=9), 229 (SAM=10), 229a (NH, PRE, SAM - 2 sheets=10), 650 (NH, SAM=12), 176 (NH, SAM=16a), 536 (PRE=16b), s.n. (PRE 33599=16b), 639 (NH, PRE, STE=17a), 6968 (SAM=17a), 536 (SAM=17b); DIXON 6 (NU=10); DOUWES-DEKKER 11 (NU=10); DOWNING 31 (NU=6a); DUTHIE 735 (J=17a), 692 (J=19a), s.n. (STE 15799=19a) s.n. (STE 22022=19b); DU TOIT s.n. (NU Aug. 1957=7); DUTTON 54 (PRE=17b); DYER 298 (PRE=17b).

E. EDWARDS 2407 (NU=10); EVANS 438 (NH=21a).

F. FAIRALL 110 (SAM=10),57 (SAM=15); FAKUDE 15 (NH=15); FARQUAHARSON 3 (NU=10); FELDUAN s.n. (NU 7.7.57=7); FISCHER 81 (NU=10), 724 (NH, NU=21a); FLANAGAN 1173 (GRA, SAM=4), 1171, 2842 (SAM=6a), 1170 (SAM=6b), 1642 (SAM=9), 1810 (PRE, SAM=10), 1811, 2771 (PRE, SAM=12), 1174 (SAM=17a), 813 (GRA, SAM=19a), 1172 (GRA - 2 sheets,PRE, SAM=20); FORBES s.n. (STE 12803=10); FOURCADE 4548 (STE=19a); FRANKS s.n. (NH 14174=17b).

G. GALPIN 1098 (GRA, NH, PRE, SAM=2), 1058, 1603 (PRE=4), 8427 (PRE=5), 1604 (GRA, PRE=6a), 1099 (PRE=6b), 412 (GRA, PRE=9), 1605 (PRE=9), 1101 (GRA, NH, PRE, SAM=12), 10244 (PRE=12), 13840 (PRE=16b), 3343 (GRA=17a), 3085 (GRA=19b), 5810 (SAM=20); GARABEDIAN s.n. (NBG 49882=17a); GEEKIE 41 (NU=10); GERRARD & McKEN 1826 (NH=6b), 1828 (NH=10), 1827 (NH=15); GERSTNER s.n. (NH 28986=6a), 3855 (NH, PRE=6b), 2382, 3588 (NH=7), 2590, 3638 (NH=10), 3692 (NH=11), 4936 (PRE=11), s.n. (NH 22261=17b); GILLET 1170 (STE=5), s.n. (STE 30403=9), 2316 (STE=16a), 1262 (STE - 2 sheets=19b); GILLILAND 26911 (PRE=2), 26127 (J=3); GLASS 376 (SAM=10), 378 (SAM=16a); GLEN 274 (NH=20); GODFREY s.n. (PRE 33555=9); GOOSENS 289 (PRE=2), 91 (PRE=3), 138 (PRE=4), 779 (PRE=10); GORDON-GRAY C.G. + J.L. 117 (NU=6a), 1438 (NU=10), 65 (NU=12), 107 (NU=15), 696 (NU=17a), 66 (NU=21a), 949 (NU=H1); GORDON-GRAY K.D. 9950 (NU=6a), 10011 (NU=8); GRICE s.n. (NU Dec. 1973=12), s.n. (NU 11.1973=21a); GUILLARMOD 344B (PRE=12); GUNN s.n. (PRE 33557=9); GUTHRIE 4387 (NBG=19b); GUY & JARMAN 84 (NU=10).

H. HAAGNER s.n. (GRA Oct. 1904=10); HALL 16 (NU=17b), 206 (NBG=19a); HALSE 43 (NH=6b); HALT 27 (NH=16b); HARDS 19 (PRE=10); HARRISON 245 (NH=6b), 183 (NH=10), 21 (NH=12); HART 29 (NU=10); HAYGARTH s.n. (STE Oct. 1921=4), 18 (STE=10); s.n. (NH 12358=12), 76 (STE=15), s.n. (NH 9923=17a), 79 (STE=17b), s.n. (PRE 22309=17b); HERBST s.n. (NBG 78441=1); HEYDOORN 45 (STE=6b); HILLARY 60 (NU=21a); HILLIARD 5543 (NU=17b), s.n. (NU 28395 = 20); HILNER 82 (GRA=17a); HITCHINS 71 (PRE=12); HODSON 7 (NU=2), 10 (NU=14); HOFSTRÖM & ACOCKS

251 (PRE=9); HONE 28 (PRE=12); HOWLETT 9 (NH=15), 10 (NH=21a); HUNTLEY 247 (NH, NU=10); HUTCHINSON, FORBES & McCLEAN 31 (NH=10), 52 (NH=15); HUTCHINSON, FORBES & VERDOORN 133 (NH=13).

I. I'ONS 63/19 (NBG=9); IRWIN 18 (NU=15).

J. JACOBSZ 328 (PRE=5), 329 (PRE=6a), 141 (PRE=16b); JENKINS 10202 (GRA=9), 7524 (GRA=12), 10686 (PRE=16a); JOHNS s.n. (NBG 11.4.1942=19b); JOHNSTONE 528 (NU=5); JOLLIFFE 52 (NU=14); JUNOD 25453 (PRE=17a).

K. KEET 608 (GRA=19a); KEMP s.n. (NBG 65826=9); KERFOOT 6459 (J=21b), 7225 (J=H1); KILLICK 1573 (NPC=5), 1574 (NPC=7), 1113 (NPC, PRE=7), 967 (NPC, PRE=12), 225 (NU=15), 1539 (NPC=21a); KILLICK & STREY 2548 (PRE=7); KILLICK & VAHRMEIJER 4048 (NH=12); KOK 210 (PRE=6a); KOTZE 507 (PRE=10); KOWARSKY 12082 (J=12).

L. LACHINAN 7 (NU=10); LAMBERT s.n.(J 24471=9); LANDSDELL s.n. (NH 34266=15); LANG F.R. 177 (GRA=10); LANG H. s.n. (NH 27190=7); LAUGHTON s.n. (J 34644=9); LAWN 1297, 1788 (NH=6a), 335, 446, 1161 (NH=10), 53, 1187 (NH=12), 783, 1019, 1019a, 1684, 1746 (NH=15), 1188 (NH=19a); LAWSON 1220 (NH=10), 1219 (NH, PRE=15); LEEMAN s.n. (PRE 33554=10); LEENDERTZ 11970 (PRE=3), 7746 (PRE=4), 10203 (PRE=9), 7350 (PRE=12), 7892 (PRE=15); LEISGANG 46 (NU=10); LEVETT 101 (NH=5), 40 (NH=13), 25 (NH=15); LEWIS 6184 (STE=6a), 6184 (NBG=6b); LIEBENBERG 6956 (PRE=5), 7329 (PRE=9), 3306 (PRE=17b); LUCAS s.n. (J 40087=16a); LUSSEM 50 (NBG=17a).

M. MACNAE 1339 (J=6a), 1496 (J=9); MACOWAN 104 (GRA=4), 104 (SAM=5), 1649 (GRA=6a), 1649 (SAM=9), 50 (GRA, SAM=16a), 1899 (GRA, SAM=19b); MAGUIRE s.n. (J 25555=9), s.n. (J 25554=12); MALAN s.n. (SAM 58324=4), s.n. (SAM 58326=17a); MARKOTTER s.n. (STE 16304=6a), 8851 (STE=9), 8692 (STE=15) s.n. (STE 19066=17b); MARTIN A.J. 663 (NU=12); MARTIN B.E. 476 (NBG=12), 59, 475 (NBG=19a); MATTISON 8 (NU=6a); MAUVE

29 (NU=10), 4504 (J, STE=12); McCALLUM 323 (PRE=6a); McCLEAN 905 (NH=7); McGILLET 1306 (STE=17a); McKEN 1046 (NH=12); McKEOWN 54 (NU=12); McMURTY C3(NBG=6a); MEDLEY WOOD 1170 (NH, SAM=1), 5193 (NH=1), 373 (NH=2), 1011 (NH=4), s.n. (SAM 22296=4), 3456, 3870 (NH=6a), 754, 2627 (SAM=6a), 2463 (NH=6b), 1347 (NH=7), 2435, 4372 (NH=8), 6922 (NH=10), 47 (SAM=10), 1030 (NH, SAM=12), 4660 (PRE, SAM=12), 327 (NH=15), 101 (SAM=16a), 6633 (NH=17a), 9649 (SAM=17a), 426, 771 (NH=17b), 3434 (NH=19b), 862 (NH=20), 3940, 12077 (NH=21a), 877 (PRE=21a), s.n. (SAM 22265=21a); MEYER s.n. (STE 11292=19a); MILDRED 2 (NBG=6a), 1 (NBG=9); MILLER 202 (NH=1); MILNER s.n. (NH 23260=15); MNGOMEZULU 7 (NH=17a); MOGG 3240 (PRE=6a); 3189, 5720, 5572 (PRE=7); 272, 3281 - 2 sheets, 935 (PRE=9); 3518 (PRE=15), 3449, 3479 (PRE=16b), 5880 (NH=17a), 13930 (PRE=17a), 881 (PRE=17b), 4486 (PRE=19a); MOLL 1044 (NU, PRE=4), 1255 (NH=6a), 1040 (NU=6a), 1255 (NU=7), 4740 (SAM=11), 2545 (NU=12), 3394 (NU=15), 1060 (NU=17a), 1362 (NU=21a); MOLL & STREY 3807 (NH=10); MORRIS 365 (NU=10), 366 (NU=14); MOSS 13679 (J=1), 3332, 14026, 17720 (J=2), 13585 (J=4), 12080 (J=6b), 5211, 13889, 17713 (J=7), 2556, 2655, 16184 (J=9), s.n. (J 22.10.27=9), 15428, 17125, 18515 (J=12), 5576, 11932, 13492, 17676 (J=16a), 13981 (J=16b), 15016, 17328, 19744 (J=17a), 5574, 17124 (J=17b), 16037 (J=19b), 15429 (J=21b); MOSS & ROGERS 996 (J=16b); MÜLLER 333, 369 (NBG=17a).

N. NASS s.n. (NBG 63086=17a); NELSON 11768 (PRE=10); NICHOLSON 797 (PRE=1), 238 (NH=10), 713 (PRE=20); NIEUWOUDT 33 (NU=15); NOEL 1485 (GRA=17b).

O. OBERMEYER 37 (NH=6a).

P. PATERSON s.n. (GRA Oct. 1911=10), 1218 (GRA=19a), 370 (GRA=19b); PEACOCK s.n. (SAM 65759=6a), s.n. (SAM 65757=17b); PEGEL Jhb. 1 (NH=6a), s.n. (NH 23.1.68 - 5 sheets =9); PEGLER 1143 (PRE=10), 814 (PRE=17a), 109 (PRE=20); PELLATT 2 (NU=8); PENNEFATHER 28 (NU=15); PHILLIPS E. 932 (SAM=16b), s.n.

(SAM 6755=17a), s.n. (SAM 6755=17b); PHILLIPS J. s.n. (J 32949=7); PIEK 89 (NH=6a); PIENAAR 16, 74 (NU=10), 72 (NU=12); PONT 184 (PRE=6a); POOLEY 662 (NU=10); POTGIETER 34 (PRE=9); POTT 4687 (PRE=2); PRETORIUS s.n. (STE Jan. 1936 =16b); PRONSER s.n. (J 29380=9).

R. RAM s.n. (NU 2.3.74=15), s.n. (NU - 2 sheets=17a), 508 (NU=17b); RANDLES 55 (NU=4); RATTRAY 117 (GRA=20); RENNIE 610 (NU=9), 91 (NU=15); RENSBURG 25 (NU=7); REPTON 3512 (PRE=12), 2763 (PRE=16a); REYBURN s.n. (PRE 14.11.66=20); ROBERTS 2388 (PRE=16b); ROBERTSON C. 12(NU=14); ROBERTSON R. s.n. (PRE 33558=6a), 2 (PRE=9); ROGERS 27505 (J=2), 28267 (STE=2), 27547 (STE=4), 23539 (J=6a), 27786 (STE=6a), 237 (GRA=6b), 11561 (GRA=7), 24612, 28367 (STE=10), 21416 (GRA=12), 24583, 27546 (STE=15), 27404, 28367 (STE=16a), 2062, 24665 (STE=17a), 27963 (STE=19b), 28312 (STE=21a); ROSS 1305 (NU=4), 1458 (NU=6a), 2157 (NH=10), 2159 (NH, PRE=15), 45 (NH=16b); ROSS & MOLL 2281 (NH, PRE=10); RUCH 1477 (PRE=13); RUDATIS 1791 (PRE=1), 472 (STE=6a), 39 (STE=9), 1736 (PRE=10), 1151 (STE=12), 1381 (STE=15), 75 (STE=16b), 1150 (STE=17b), 910 (STE=20); RUMP s.n. (NH 20300=10).

S. SALTMARSHE 984 (GRA, PRE, SAM=14); SCHEEPERS 1371 (PRE=16a); SCHELPE 466 (NU=6b), 920 (NH, NU=12), 13 (NU=15); SCHLECHTER 3348 (GRA, NH, PRE=13), 6634 (GRA=20); SCHÖNLAND 69 (GRA=4), 3925, 4179 (GRA=10), 4144 (GRA=15), 704 (GRA=19b); SCOTT 5 (NU=7); SCULLY 117 (SAM=10), 107 (SAM=16a); SHARPE s.n. (PRE 7234=9); SHIRLEY 6 (NU=4), 76 (NU=6a), s.n. (NU 32355=6a), 241 (NU=10), 5, 90 (NU=12); SIM 1127 (NU=4), 1125 (NU=6a), 1126 (NU=9), 1120, 1124, 1855 (NU=10), 1129 (NU - 2 sheets SAM=10), 1117 (NU=12), 1854 (NU=17a), 1122 (NU - 2 sheets = 19b), 1123 (NBG, NU=19b), s.n. (NU Oct. 1921=19b); SKEAD 203 (NU=15); SMITH 1724 (PRE=10), 3770 (PRE=20); SMOOK 636 (NU=11), 613 (NU=12), 615 (NU=17b), 614 (NU=18), 649 (NU=21a); SMUTS & GILLETT 2465 (PRE=5), 3165 (PRE, STE=17a); SOLE 393 (GRA=16a); SOLOMON 61 (NU=12); STANTON 28 (NU=19a); STAPLES s.n. (NH 18533=1); STEPHANSON s.n. (STE 16223=6a); STEPHEN V. GRAAN & SCHWAKE 1151 (PRE=10); STEWART 10191

(PRE=2), 180 (NBG=7); STEYN 973 (NBG=12), 933 (NBG=16b), 751 (NBG=19a); STIRTON s.n. (NU 21.10.74=1), 1054, 1219 (NU=6a), 1317 (NU=9), 105 (NU=10), s.n. (NU 21.10.74=10), 444 (NU=12), 513, 1091 (NU=15), s.n. (NU 21.10.74=15), 1044 (NU=17a), s.n. (NU 21.10.74=17b), 1078 (NU=18); STOKOE 1598 (STE=7); STORY 689 (PRE=6a), 4221 (GRA, PRE=19a); STREY 4521, 5949 (NH=1), 10117 (NH=4), 9100 (NH=6a), 9101 (NH, PRE=9), 5163, 9256 (NH=10), 5942, 9962 (NH, NU=10), 5538 (NU=12), 6182 (NH, NU=12), 6838 (NH, NU, PRE=12), 5170 (NH=15), 5986 (NH=16b), 7261 (NH, PRE=16b), 4386, 4772, 5813, 10023, 10066 (NH=17a), 4474 (NH, PRE=17a), 5974 (NH, NU=17b), 10241 (NH, NU, PRE=20), 5990 (NH, NU=H1), 6879 (NH, PRE=H1), 9149 (NH, NU, PRE=H1); SYMONS 70 (NBG=7), 72 (PRE=9).

T. TAYLOR H.C. 588 (NBG=19a); TAYLOR L.E. 5292 (STE=2), 5262 (STE=7), 3535, 4966, 5584 (NBG=10), 5047A (NBG=12), 5376 (NBG=15), 3634, 5946, (NBG=16a), 5362 (NBG=19a), 3710 (NBG=20); TAYLOR R.H. 255 (NU=11); THERON 675, 1191, 2115 (NH=6a), 1190 (NH=10); THINGES 1904 (PRE=9); THODE 2542, 4662 (STE=1), 2538, 2544 (STE=2), 2539 (STE=4), 2543 (STE=5), 2546, 2547 (STE=7), 2534 (STE=8), A249 (NH=9), A2856 (NH=10), 2541, 2546 (STE=10), A1646 (NH=12), 2535, 2536 (STE=12), 2533 (STE=15), A703, A1049 (NH=16a), A1296 (NH=16b), 2545 (STE=16b), 2532 (STE=17a), 2549 (STE=17b), A2398 (NH=19a), 5293 (STE=21a); THOMAS 23 (SAM=12), 17 (SAM=21a); THOMPSON 2379 (NBG=12); THORNCROFT 634 (NH=20); TOD 33 (NU=10); TRACE 59 (NU=1); TRAUSELD 661, 866, 867 (NU=6a), 865 (NU=66), 868 (NU=9), 869 (NU=15), 683 (NU=21a); TYSON 1211 (SAM=6a), 1478 (GRA=10), 2745 (PRE=10), 1125, 1210 (SAM=10), 2745 (STE=10), 2880 (SAM=20).

V. v. GINKEL 257 (PRE=10); v. RENSBURG 25556 (J=3), 25556, 25557 (J=9); v. ROOYEN 5 (NU=10); v.d. SCHYFF 4818 (PRE=21a); v.d. ZEYDE s.n. (NBG 9.11.69=2), s.n. (NBG 28.11.72=5), s.n. (NBG 9.11.69=7), s.n. (NBG, 4.2.70, 12.10.70=9), s.n. (NBG 9.11.69=12).

W. WARD 6654 (PRE=1), 1583 (NH, NU=6b), 1586 (NH, NU, PRE=10), 398, 459 (NU=10), 1484 (NH, NU=12), 4284 (NH, NU, PRE=12), 1148 (NH=15), 1655 (NH, NU=15), 971 (NU=17a), 4131 (NH=17a), 5208 (NH=17b); WEBB 26 (NU=15); WEEKS 25 (J=9); WEIDERMANN & OBERDIECK 1147 (PRE=6a), 1440 (PRE=15); WEISS s.n. (STE 16907=7); WELLS 1578 (NU=10), 2113 (NH=10); WEST 1404 (NH=21a); WESTHUIZEN 820 (PRE=6b); WILKER 116 (NU=10); WILSENACH s.n. (J 35565=6b), s.n. (PRE 33559=17a); WINTER 617 (NBG=9); WOOD S.E. 73, 85, 111, 161 (NU=1), 104, 117, 153, 159 (NU=2), 91, 97, 131 (NU=4), 155, 158 (NU=5), 92, 94, 95, 106, 107, 108, 114, 124, 128, 128A, 140, 143, 152, 161A, 164A, 175 (NU=6a), 92A, 121, 132, 149, 154 (NU=7), 210 (NU=8), 72, 75, 76, 77, 79, 82, 86, 100, 102, 106, 118, 145, 165B, 167, 168, 170, 171, 173, 174 (NU=10), 101, 122, 126, 151, 160, 163 (NU=12), 130 (NU=13), 74, 75, 77A, 78, 80, 81, 83, 90, 98, 103, 103A, 115, 120, 137, 142, 149A, 156, 164, 209 (NU=15), 71A, 80A, 86A, 133, 179 (NU=17a), 146, 180 (NU=17b), 121A, 125, 138, 139, 141, 144, 145A, 150 (NU=18); WRIGHT 1549 (NU=3), 1566, 1602 (NU=12), 24, 1552 (NU=15), 1567, 1600 (NU=H2); WURTS 467 (NBG=19a); WYLIE s.n. (PRE, NH 27973=1), (com. Medley Wood) 10606 (NH=4), s.n. (NH 21681, 23357, 28016=6a), s.n. (NH 21682, 27977=7), s.n. (NH 22420, 23107=10), s.n. (NH 21683=12), s.n. (NH 28020, PRE Nov. 1936=15), s.n. (NH 23112=17a), s.n. (NH 27962=17b), s.n. (PRE Oct.-Nov. 1931=18).

Z. ZEYHER 1670 (STE=6a), 6 (STE=16a), 950 (SAM, STE=16a), s.n. (STE 30404=16b).

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