

A REVISION OF THE SOUTH AFRICAN

SPECIES OF HOLOTHRIX

RICH. EX LINDL.

(ORCHIDACEAE)

by

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## CONTENTS

SUMMARY .....	1
ACKNOWLEDGEMENTS .....	3
TAXONOMIC HISTORY OF <u>HOLOTHRIX</u> IN SOUTH AFRICA .....	4
TAXONOMIC CHARACTERS AND THEIR RELATIVE VALUE .....	10
COMPUTER-AIDED METHODS .....	14
TAXONOMIC TREATMENT OF THE SOUTH AFRICAN SPECIES OF <u>HOLOTHRIX</u> .....	18
APPENDIX I : HABITATS .....	90
APPENDIX II : SPECIMENS EXAMINED .....	91
APPENDIX III : BIBLIOGRAPHY .....	123

Plate numbers

1. <u>Holothrix pilosa</u>	4:1
2. <u>H. longicornii</u>	12: 1,2,3
3. <u>H. exilis</u>	5:1
4. <u>H. hispida</u>	14:3-5
5. <u>H. cernua</u>	6:1, 8:1-5
6. <u>H. villosa</u> var. <u>villosa</u>	4:2
6a. <u>H. villosa</u> var. <u>condensata</u>	14: 1-2
7. <u>H. thodei</u>	11: 1
8. <u>H. secunda</u>	5: 2
9. <u>H. incurva</u>	10: 1
10. <u>H. micrantha</u>	15: 3
11. <u>H. filicornis</u>	7: 2
12. <u>H. scopularia</u>	13: 1-2
13. <u>H. parviflora</u>	11: 2
14. <u>H. orthoceras</u>	6: 2
15. <u>H. mundtii</u>	7: 1
16. <u>H. aspera</u>	3: 1
17. <u>H. macowaniana</u>	12: 3
18. <u>H. culveri</u>	12: 2
19. <u>H. burchellii</u>	3: 2
20. <u>H. randii</u>	15: 1
21. <u>H. schlechteriana</u>	15: 2
22. <u>H. grandiflora</u>	9: 1

H. rupicola

pl. 10: 2

now H. incurva

H. multisecta

pl. 13: 3

now H. scopularia



## SUMMARY

The genus Holothrix in South Africa is described and its taxonomic history discussed.

The results of using a computer to draw up a key and a dendrogram of the species are briefly discussed, as are some of the problems experienced.

Various morphological characters are evaluated for their usefulness or otherwise in distinguishing species, and a key is provided.

Where applicable, problems commonly encountered when attempting to identify the species are mentioned, and those characters pointed out which will distinguish the species. Details of biological interest are mentioned. Each species is illustrated by a drawing of sepal, petal and lip. Those species available in liquid preservative have the whole flower drawn as well, while those where a live plant could be obtained are illustrated in full, with a drawing of the whole plant, leaves, column and pollinia. In those cases where a range in shape, as opposed to size, is experienced, drawings are presented to illustrate this range.

A detailed map of each species is presented, using the 1<sup>0</sup> grid-square system, and also a table of the ranges of rainfall and altitude within the range of each species.

One new species is described, H.filicornis Immelman, and H.hispida

(Thunb.) Immelman comb. nov. is proposed. One species is reduced to varietal level, and a number of species and varieties are shown to be impossible to distinguish.

An appendix of all specimens seen by the author is included. This is organized by species, and within each species by grid number, taken from west to east and then from north to south. Within each 1<sup>0</sup> grid-square, the specimens are organized by  $\frac{1}{4}$ <sup>0</sup> squares, first A, then the B, C and D squares.

A bibliography is given which includes works dealing with the genus Holothrix, as well as the more important of the references used in preparing the text and the maps.

# ACKNOWLEDGEMENTS

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TAXONOMIC HISTORY OF HOLOTHRIX RICH. EX LINDL. NOM. CONS.

The name Holothrix, proposed by Richard (1818), was validated by Lindley (1835). Holothrix is antedated by Scopularia (Lindl. 1834) but the genus Holothrix has been conserved. The earliest species of Holothrix to be described was Orchis cernua Burm. f. (1768), followed by O.hispidula Linn. f. (1781) and O.hispida Thunb. (1823). In 1834 Lindley proposed a division of the Ophrydeae into two sections, the one containing Orchis, Scopularia and other genera, while the other was comprised of, among others, the genera Holothrix, Tryphia and Monotris. Lindley's new genera: Scopularia, Tryphia, Monotris and Holothrix, are now regarded as congeneric. In the same article Lindley described Scopularia and Monotris. In 1836 Lindley described the genus Tryphia, as well as the two new genera Saccidium and Bucculina. These, together with Scopularia and Monotris, were transferred to Holothrix by Reichenbach fil. (1881), as was Deroemera which had been described by himself in 1852.

In 1895 Rendle, in collaboration with Schlechter, proposed reviving the genus Deroemera, misspelling it as Deroemeria. He also maintained the genus Tryphia as a separate genus.

The first revision of all the species of Holothrix was that of Schlechter in 1898-1899, as he considered there were too many species in the genus. He did not revive Deroemera in this article, but must have accepted it tacitly as he later transferred Holothrix culveri Bol. into Deroemera and also described new species of Deroemera from other parts of Africa. He accepted, however, the transferring of Lindley's genera into Holothrix.

When Lindley (1834) divided the Ophrydeae, and also the genus Holothrix (as conceived today) into two sections, it was on the grounds that the first group (Orchis, Scopularia, etc.) have the anther-sacs contiguous and parallel, with bases not much elongated or divaricate. On the other hand, the second group (Holothrix, Tryphia, Monotris, etc.) have anther-sacs which are separate and which have diverging and often elongated bases. This article contained descriptions of Scopularia and Monotris, but the only mention of Tryphia is "Tryphia = O.secunda Thunb.". However the species he later described as T.secunda (1836) is not the same as O.secunda Thunb. (1823), nor does his later description of the genus Tryphia agree with the characteristics of O.secunda Thunb. The main characters of Scopularia were given by Lindley as: membranous, lobed petals; a many-lobed lip; anther-sacs parallel and close at the base; and <sup>e</sup>unequal glands which are not covered by the anther-sacs. Lindley defined Monotris as having fleshy, acuminate petals; a fleshy, tri-lobed lip which is also "hooded"; and anther-sacs which are divergent at the base and which cover the glands.

In 1836 Lindley described another genus Saccidium, having saccate lateral sepals, fleshy petals, convolute lip and reclinate anthers with the anther-sacs separate at the base. He also noted that Saccidium differs in its "whole habit" but did not enlarge on this. However, he used this last character to distinguish Saccidium not from Holothrix, but from Peristylis and Platanthera and thus is probably referring to the leafles, hairy scape.

In the same article Tryphia is described as having linear, membranous petals adnate to the lip; the lip is also membranous

and partly connate with the column for most of the column's height; the anthers are erect, diverging, with naked glands; and the rostellum is ovate and flat.

Also in 1835, but in <sup>Hooker's</sup> Companion to the Botanical Magazine, he wrote that he was dissatisfied with his description of the anthers of Tryphia, which had been based on T. secunda Lindl., as these anthers were too delicate for effective dissection. He re-described them from the type-specimen of T. parviflora, and noted that the anther-sacs were arcuate and narrowed at the base; that the pollinium-glands were naked and situated on the small, slender rostellum, and that the column was mucronate in the centre. Lindley also considered the adnation of the petals to the lip as being important in delimiting the genus Tryphia.

Lindley described another genus in this article, Bucculina, as having the "calyx helmet-shaped", the "petals fleshy ... converging or perhaps cohering. .... Column with the margins produced and adnate to the face of the labellum". He was uncertain of the anthers but considered them to be similar to those of the Platantherae. Bucculina was distinguished from Tryphia by having petals free from the lip, and from Platanthera in the column-sides being extended and adnate to the lip. He also noted that the petals of B. aspera form "a sort of vaulted, pointed arch, giving the flower the appearance of having two little cheeks (Bucculae)".

In 1895 when Rendle proposed reviving the genus Deroemera, he considered it distinct from Holothrix on its having a bracteate scape and "a very high union of the auricled labellum to the column, the stigma being sunk in the tube thus formed. The column



was also different in appearance from that of a true Holothrix". He did not elaborate on what this difference was.

When Schlechter revised Holothrix, he divided the genus into three sections as follows:

- Eu-Holothrix      -    petals undivided and fleshy.
- Tryphia            -    petals undivided, thin in texture, white.
- Scopularia        -    petals divided.

He noted that these sections are not geographically disjunct. The first two he compared to Bartholina because of the absence of leaves on the scape, but noted that section Scopularia had four species with this character.

When the younger Reichenbach (1878) transferred Scopularia, Monotris, Bucculina, Saccidium and Tryphia into Holothrix he gave no reasons for his decision. However, Bentham and Hooker, in the Genera Plantarum (1883), who followed Reichenbach in treating Holothrix as "natural and well defined", do enlarge on their decision. They noted that in Saccidium the "saccate" sepals are no more so than in many other species, and that Bucculina (i.e. B.aspera) is only distinguishable on its more spreading perianth and on the outgrowths of its column (auricles), but is otherwise similar to H.parvifolia Lindl. This last I cannot agree with: H.parvifolia Lindl. is either H.cernua, H.hispida or H.villosa, which all differ from H.aspera Lindl. in having fleshy petals, a 3 or 5-lobed not a 7-lobed lip, and a pilose or squamous leaf instead of the glabrous leaf of B.aspera.

Bentham and Hooker also noted that Scopularia (i.e. S.secunda) had dimorphic flowers, which Lindley had missed, but gave no reasons for Scopularia being considered congeneric with Holothrix. Tryphia

they noted, had the same habit as Holothrix and they queried whether the petals were adnate to the lip, as they saw it neither in dissected flowers nor in Harvey's plates of the species (T.secunda Lindl. and T.orthoceras Harv.) of Tryphia.

This last query is justified as Harvey showed neither species with petals adnate to the lip, but Harvey was mistaken in the case of T.secunda as it definitely does have the petals adnate. In T.orthoceras the petals were correctly drawn as being free from the lip. With regard to Scopularia Lindl., both the species Lindley described (S.secunda and S.grandiflora) do not have the divided petals membranous, but distinctly fleshy, at least at the tips, though the bases are broad and more delicate in texture. Lindley described M.secunda as having the petals acuminate, but M.secunda (= H.cernua) actually has the obtuse, fleshy-tipped petals characteristic of many Holothrix species. As for the anther characters of Monotris, Saccidium, Tryphia and Holothrix given by Lindley, it should be noted that the minute and delicate column is easily distorted when reconstituted and dissected, and this can make the anther-sacs appear divergent. The glands of all Holothrix species are naked and are always extruded below the anther-sacs, being found on the sticky, viscous fluid of the rostellum.

The mucronate column mentioned by Lindley in his description of T.parviflora is not very obvious in this species, but does occur in other species of Holothrix, notably H.grandiflora (Lindl.) Reichb.f. Lindley also considered the adnation of the petals to the lip in Tryphia as being important in delimiting the genus, but this occurs in another Holothrix species, H.secunda (Thunb.) Reichb.f. (non T.secunda Lindl.). However, Lindley did consider these



two species as being conspecific, as he had no access to Thunberg's herbarium and worked from Thunberg's descriptions alone.

In the single species of Bucculina described by Lindley (B.aspera) the petals are in fact free of each other, and are certainly not fleshy, but rather are broad, white and delicate in texture. The column does have the sides extended so that it forms a shallow arch over the throat of the lip, but this character is not sufficiently marked to justify the species being placed in a separate genus. In every other respect B.aspera can be considered a member of the genus Holothrix.

In 1895 Rendle and Schlechter revived the genus Deroemera, describing a new species from Ethiopia<sup>i</sup>. Schlechter later reverted to the opinion that Deroemera and Holothrix were conspecific, as did both Rolfe (F.T.A. 7 : 197 (1898); Fl. Cap. 5(3) : 96 (1913)) and Summerhayes (K.B. 1927 : 418; F.T.E.A. 156 : 5 (1968)), who had at first considered Deroemera a separate genus.

## TAXONOMIC CHARACTERS AND THEIR RELATIVE VALUE.

### Leaves:

These are always two, though one may be considerably reduced. Their size is of little use taxonomically, as it varies very greatly, as does the density of the indumentum (when present). Some species however, are consistently glabrous. The type of hair present on the upper surface is often useful, especially in dividing the squamous or scabrid cernua- hispida- thodei group from the otherwise similar villosa-exilis group, which has long, fine hairs. Colour of leaf differs only in H.orthoceras where the leaves are veined with white or silver. Shape of leaf is of little use, being consistently ovate or oblong-ovate, though the lower leaf is often broader than usual in H.villosa var. condensata.

### Scape:

The presence or absence of bracts on the scape is a very useful character indeed, being correlated with divided petals in H.burchellii, H.randii, H.schlechteriana and H.grandiflora. The hairs on the scape in the cernua- hispida- thodei group are stiff, scabrid and reflexed, while those of the rest of the genus are soft and fine, either at  $90^{\circ}$  to the scape or else short and at no particular angle. The length and thickness of the scape are too variable to be of use, being determined by shelter, nutrition and water availability.

### Bracts:

These vary greatly in their degree of hairiness. Their length varies

between some species, but as this variation is usually related to variation in flower size, it is of no particular usefulness, as other, more reliable characters exist for the identification of the species.

### Sepals:

The amount of indumentum varies, though many species are consistently glabrous, e.g. H.pilosa, H.secunda and all species of the two groups with divided petals and membranous petals respectively. The type of hair appears to be the same throughout, of the fine, soft type, regardless of the type of hair found on scape or leaves. In proportion, the sepals vary little, being ovate-acute and about twice as long as broad. However, those of H.villosa var. condensata are somewhat broader than usual. Their proportions with regard to the petals varies somewhat, though not sufficiently to be useful. In H.mundtii and sometimes H.villosa the sepals are more than half the length of the petals; in H.pilosa and those species with divided petals they are less.

### Petals:

The petals are one of the main means of grouping species of Holothrix, this being done on the basis of their colour, texture and whether <sup>or not</sup> they are divided. In the group with divided petals, the number of divisions is indefinite, except for the two species, H.scopularia and H.longicornu which consistently have three lobes to the petal. Size and shape of petal is sometimes of use in distinguishing species, for instance in H.pilosa the petal is long and strap-shaped. However, petal size (considered

as an index to flower size) usually varies with water availability, nutrition and other environmental factors.

#### Lip:

In the relatively simple flower of Holothrix, the most useful characters are those of the lip. This is usually divided into lobes, whose number and arrangement are characteristic for the species, and whose texture corresponds with that of the petals, i.e. fleshly or membranous.

The number of lobes however, may vary within a species, e.g. 3 - 7 in H.cernua. Colour is correlated with texture, the fleshy-lipped species being green or cream, and the membranous white, sometimes with maroon or pale purple stripes.

#### Spur:

In the majority of species, the spur is broadly conical, slightly curved and half to equal the length of the lip. However, in some it differs markedly from this basic pattern, being characteristic for the species concerned. Curvature may differ, e.g. straight in H.orthoceras (and others), bent forward in H.aspera, or narrow and circinnate in H.parviflora. The length also may vary, and in H.longicornu and H.filicornis the spur is longer than the lip.

#### The column:

This cannot be reliably reconstituted in boiling water. The following species have been seen either in a living state or in liquid preservative: H. villosa var. villosa, H.cernua, H.aspera, H.mundtii, H.burchellii, H.exilis, H.grandiflora, H.pilosa,

H.filicornis, H.parviflora and H.orthoceras. In these species it was observed that the column was not fused to the floor of the lip, but rather to either side of the lip so that it straddled the opening to the spur. This is most obvious in H.aspera where the column forms an arch and where the floor of the lip is sometimes covered with small papillae. In other species the opening can be found by pushing a blunt needle gently under the column.

The anther-sacs are often of a contrasting colour to the rest of the column, the throat of the lip and the bases of the petals.

It is then usually a dark reddish-brown, red-yellow or brick-red, which contrasts with the green or white flower.

This is the case in H.mundtii, H.aspera, H.secunda, H.filicornis, H.orthoceras, H.burchellii and H.cernua. Other species, again, do not have contrasting anther-sacs, for instance, H.villosa, H.exilis and H.pilosa.

## COMPUTER-AIDED METHODS

### Key:

It proved difficult to express qualitative characters, e.g. pattern of lip divisions, numerically, and this limited the usefulness of the computer in producing a key. However, it was useful in finding correlations between two characters, e.g. lip length and plant height. Another problem found in the key-forming program was that it was not forward-looking. A way of possibly avoiding this problem would be to have provision for adapting the alternative couplets while the key is being formed.

### Similarity indices between species:

The results were somewhat disappointing, again possibly due to problems in coding the complex shapes or patterns of Holothrix for the computer. This is important in this genus where the quantitative characters of a species may vary greatly.

An example of the results obtained is that of H.incurva and H.micrantha. These two species are so similar as to give rise to doubt as to whether they should not be considered conspecific, yet in every case they were relatively widely separated in the dendrogram. (0,50 and 100% similarity co-efficients were used, as well as excluding or including size factors). When the data matrix was checked however, it showed that these two species were nonetheless highly similar, yet this would not appear in the dendrogram. This could be due to the fact that only one specimen of H.micrantha was used, and thus there was not sufficient variation in the data. Species collected only once would have to be



excluded therefore.

50% S.C. proved more satisfactory than 100% or 0%, as the South African species of Holothrix represent only a sample of the genus as whole. Size factors were included in the program, as in a genus very variable in size, such as Holothrix, with some flowers very large and some very small, it was necessary rather to compare properties. Deweights were used for those properties which were probably homologically similar, e.g. leaf length and leaf breadth. Those qualitative characters which could be expressed numerically were scaled up to a maximum of one hundred, otherwise they would have played little part in determining the similarity indices. With a 50% S.C., with deweights and with size factors included, the genus Holothrix divided roughly into three sections at 60% similarity. These were:

1. A section characterized by an absence of bracts on the scape, and, in the main, by fleshy undivided petals. H.scopularia and H.filicornis, with a bractless scape but divided petals, were included.
2. A section with, generally, a bractless scape, and delicate-textured, undivided petals. H.culveri was included though it does have bracts on the scape.
3. A section with bracts on the scape and divided petals.

Within the first group relationships seemed to be complex, but by and large, the group with squamous or hispid leaves and with hispid reflexed hairs on the scape, i.e. H.cernua, H.hispida and H.thodei, are grouped together.

The characters used were as follows:

Leaf:

Maximum and minimum length, deweighted by 50% in its contribution to overall similarity.

Maximum and minimum breadth, deweighted by 50%.

Type of hair on upper surface of the leaf.

Scape:

Maximum and minimum length.

Angle hairs make with the scape, maximum and minimum.

Bracts of flowers:

Bracts present or absent on the scape.

Maximum and minimum length and breadth, deweighted by 50%.

Sepals:

Maximum and minimum length, deweighted by 50%.

Maximum and minimum breadth, deweighted by 50%.

maximum and minimum density of hairs on sepals.

Petals:

Maximum and minimum length, deweighted by 50%.

Maximum and minimum breadth, deweighted by 50%.

Maximum and minimum number of divisions.

Petal texture membranous or carnose.

Petals free or adnate to the lip.



Lip:

Maximum and minimum length, deweighted by 50%.

Maximum and minimum breadth, deweighted by 50%.

Maximum and minimum number of lobes.

Spur:

Maximum and minimum length, deweighted by 50%.

Degree of curvature of spur.

HOLOTHRIX

Holothrix Rich. ex Lindl. nom. cons., Rich. in Mem. Mus. Par.

4 : 55 (1818); Lindl. Gen. et sp. Orch. : 283 (1835); Benth. and Hook. Gen. Pl. 3 Orchideae : 623 (1883); Schlechter, Dest. Bot. Zeitschr. 11 (1898), 12 (1899); Die Orchideen : 202 (1975); Bolus, Orchids of South Africa 1 : tab. 13, 14 (1896), 2 : tab. 34-40 (1911), 3 : 17-21, 100 (1913); Orchids of the Cape Peninsula, 2nd Ed., tab. 10-14 (1918); Summerhayes, in F.T.E.A. 156 : 5 (1968); Schelpe, in S. Afr. Orch. Journ. 8 (1) : 5 (1976).

Terrestrial or lithophytic tuberous herbs. Leaves two, one sometimes much reduced, ovate or orbicular, flat on the ground, sometimes withered before flowering. Scape arising between the two leaves, erect, unbranched, usually with hairs, with or without bracts. Inflorescence a spike, usually second or sub-second. Flowers usually from 1,5 up to 25 mm in length. Sepals sub-equal, green, smaller than petals. Petals green, cream, white or tinged with red or purple, entire or with the apex divided, apices thickened and fleshy or with the petal membranous. Lip fleshy or membranous, undivided or divided into three to many lobes, coloured as for petals, produced into a spur. Column small, simple, erect, fused by its edges to the lip, anther sacs above the stigma, rostellum much reduced. Pollinia two, in anther-sacs, granular, each with a short caudicle and separate viscidium, the viscidia naked, often resting on small flaps of tissue on either side of the column.

Species about 55, distributed from Arabia through eastern and tropical Africa, Cameroons, to South Africa; also in Madagascar, the Comoro

Islands and Socotra. There are 22 species in South Africa, with the greatest concentration in the Southern and South-Western Cape.

Holothrix is derived from the Greek words for "completely hairy", and refers to the hirsute scapes and, usually, leaves.

Type-species: Holothrix parvifolia Lindl. (1835) (= H. hispida (Thunb.) Immelman).

Scopularia Lindl., in Edward's Bot. Reg. sub t. 1701 (1834).

Monotris Lindl., in Edward's Bot. Reg. sub t. 1701 (1834)

Tryphia Lindl., in Edward's Bot. Reg. sub t. 1701 (1834)

Saccidium Lindl., Gen. et Sp Orch. : 301 (1835)

Bucculina Lindl., in Hook. Comp. Bot. Mag. : 209 (1836)

Deroemera Reichb. f., Pol. Orch. Comm. : 29 (1852); Rendle in Journ. Bot. 33 277 (1895) as Deroemeria.

Key to the Southern Africa species of Holothrix:

- |    |   |                     |
|----|---|---------------------|
| 1. | Scape without bracts .....  | 2)                  |
|    | Scape with bracts .....   | 24) 25              |
| 2. | Petals undivided .....  | 3)                  |
|    | Petals divided at the apex .....  | 18) 4               |
| 3. | Petals green or cream, carinose at the apices .....                     | 4)                  |
|    | Petals white, membranous at the apices .....                            | 19) 5               |
| 4. | Petals linear, lip lobes short and triangular<br>with obtuse tips ..... | 1. <u>H. pilosa</u> |
|    | Petals broader at centre than at apex, lip<br>lobes various .....       | 5)                  |
| 5. | Lip lobes 1-3 .....   | 6)                  |
|    | Lip lobes 5-7 .....   | 13)                 |

ERRATA

P 19 ; numbers on the right hand margin : "24" should read "25".

P 21 : numbers on the right hand margin : "20" should read "21".

first "21" should read "20".

second "21" should read "22".

6. Spur longer than lip ..... 2. H.longicornu  
 Spur shorter than lip ..... 7)
7. Lip undivided ..... 3. H.exilis  
 Lip divided ..... 8)
8. Lip lobes rectangular, breadth at least  
 half the length ..... 4. H.hispida  
 Lip lobes linear, breadth less than half the  
 length, side lobes sometimes shorter than  
 central lobe ..... 9)
9. Lip lobes sub-equal ..... 10)  
 Side lobes of lip half or less than half of  
 the central lobe in length ..... 12)
10. Hairs on leaves usually broad (squamules),  
 hairs on the scape reflexed and hispid ..... 5. H.cernua  
 Hairs on leaves long and fine, at right  
 angles to the scape ..... 11)
11. Scape slender, inflorescence lax, lip lobes  
 narrowly linear ..... 6. H.villosa  
 Scape short and stout, inflorescence dense,  
 lobes broadly linear ..... 6a.H.villosa var.  
condensata
12. Leaf usually withered at flowering time,  
 with hispid hairs, Drakensberg ..... 7. H.thodei  
 Leaf not usually withered at flowering time,  
 with fine soft hairs, S.W. and S. Cape ..... 3. H.exilis
13. S.W. and S. Cape ..... 14)  
 Natal, Transvaal, O.F.S. .... 12)
14. Spur longer than lip ..... 2. H.longicornu  
 Spur shorter than lip ..... 15)
15. Petals adnate to the lip at the base ..... 8. H.secunda  
 Petals free from the lip ..... 16)
16. Lip lobes short, broad ..... 4. H.hispida  
 Lip lobes linear, lip less deeply divided  
 between lobes Nos. 1 and 2, and 4 and 5 so  
 that these lobes look slightly shorter  
 than the central lobe ..... 5. H.cernua
17. Petals more than 5 mm long, flowering  
 Dec. to April, Drakensberg ..... 9. H.incurva  
 Petals less than 5 mm long, flowering  
 Sept. and Oct., Transvaal ..... 10. H.micrantha
18. Spur 1,25-2,0 times the length of the  
 lip, Namaqualand ..... 11. H.filicornis  
 Spur 0,25-1,0 times the length of the  
 lip, E. Cape, Natal, Lesotho, S. Transvaal ..... 12. H.scopularia

19. Lip lobes 5 ..... ~~20~~ 21  
 Lip lobes 7 or more ..... ~~24~~ 20
21. ~~20~~. Lip lobes 7 ..... ~~21~~ 22  
 Lip lobes more than 7 ..... ~~24~~ 23
20. ~~21~~. Spur circinnate, leaves uniform in colour,  
 petals adnate to lip ..... 13. H. parviflora  
 Spur straight, leaves veined with white,  
 petals free from lip ..... 14. H. orthoceras
22. Lip lobes short and triangular except  
 for the outermost lobe on either side,  
 petals tapering to acute tips ..... 14. H. orthoceras  
 Lip lobes linear, lobes Nos. 2 and 3, and  
 5 and 6 much shorter than the outermost  
 and central lobes, petal tips not tapering ..... 23)
23. Inflorescence condensed at top of spike,  
 spur short and straight ..... 15. H. mundtii  
 Inflorescence not condensed, spur curved  
 sharply forward ..... 16. H. aspera
24. Outermost lobe of lip on either side longer  
 than the central lobes, leaves veined white ..... 14. H. orthoceras  
 Lobes of lip sub-equal, very short, giving  
 the lip a serrated appearance, leaves not  
 veined white ..... 17. H. macowaniana
25. Petals undivided ..... 18. H. culveri  
 Petals divided ..... 26)
26. Flowers dimorphic ..... 19. H. burchellii  
 Flowers not dimorphic ..... 27)
27. Lip lobes filamentous, Central and S. Transvaal .. 20. H. randii  
 Lip lobes thickened, Namaqualand,  
 W., S. and E. Cape ..... 28)
28. Spur  $\frac{1}{2}$  to nearly equal the length of the lip,  
 scape with a covering of short, fine,  
 somewhat velvety hairs ..... 21. H. schlechteriana  
 Spur  $\frac{1}{5}$  -  $\frac{1}{4}$  the length of the lip, scape  
 usually glabrous but sometimes with a few  
 short hairs at the base ..... 22. H. grandiflora

1. Holothrix pilosa (Burch. ex Lindl.) Reichb. f., in Otia Bot.

Hamb. : 119 (1881) Type : Swellendam Div., on a dry hill east of the Breede River, Burchell 7483 (K!). Saccidium pilosum Lindl. Gen. et Sp. Orch. : 301 (1835).

Leaves with upper surface glabrous, rarely with hairs, under surface densely pilose with long, fine hairs, leaves large, succulent, upper leaf reduced in size, leaves usually withered at flowering. Scape densely pilose with long, fine hairs, hairs recurved at the base, at right angles to the scape at the top, without bracts, 160-550 mm. Inflorescence sub-second. Sepals glabrous, edges paler than the bright green centre, 2,5 - 5,0 x 1,0 - 2,5 mm. Petals undivided, carnose at the apices, long and narrowly linear, 5,5 - 10,0 x 0,5 - 1,0 mm, creamy-white with a green centre. Lip divided into (3-)5-8 short, broad, obtuse, carnose lobes, long and narrow, 5,5 - 9,0 x 4,5 - 9,0 mm, cream with green veins. Spur broadly conical, straight or slightly curved, 1,5 - 5,5 mm. Anther-sacs yellow.

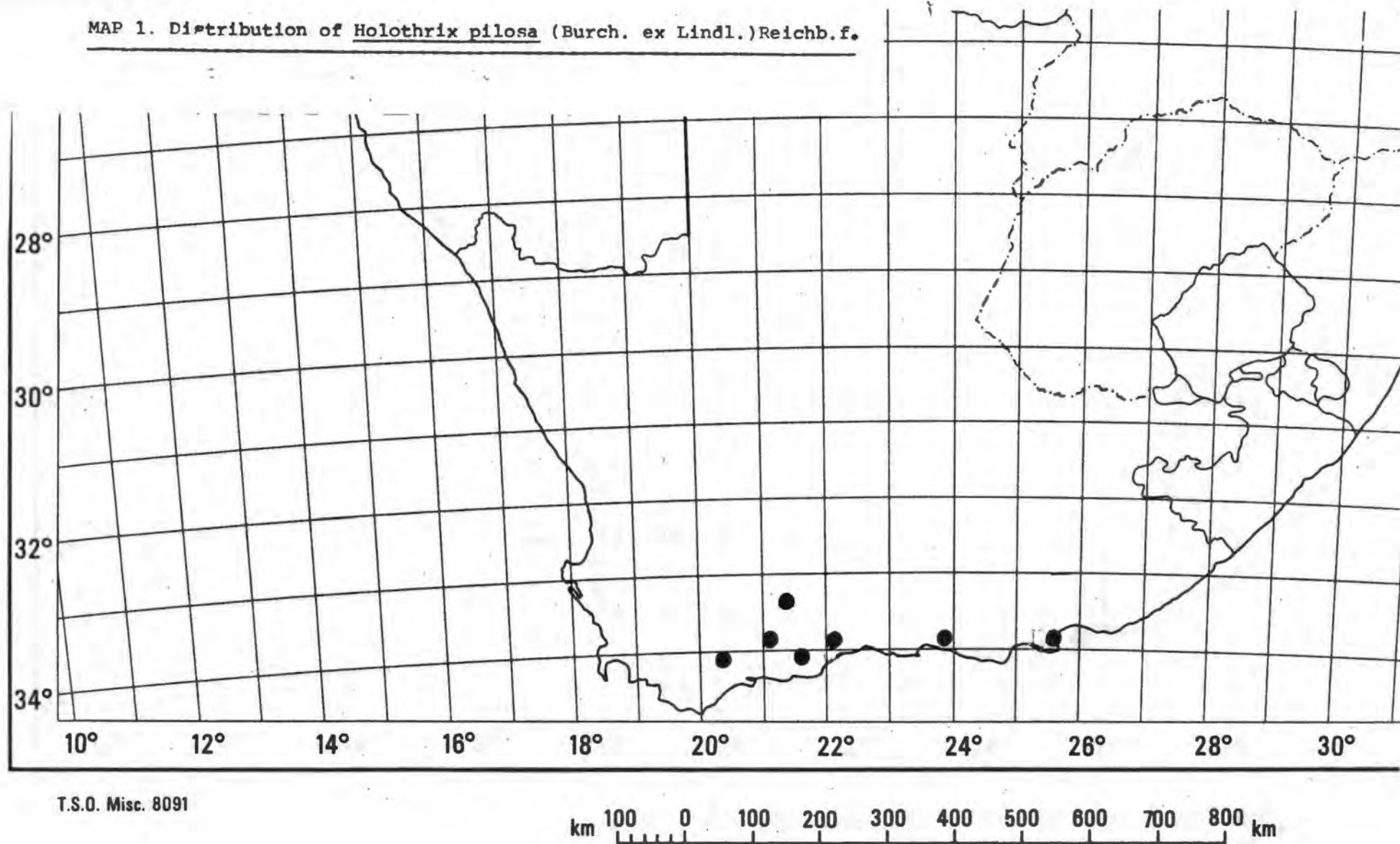
Vouchers:

Linder 1704 (BOL), Muir 1225 (BOL), Long 938 (PRE), Thode A26392 (PRE).

H. pilosa is distributed along the Southern Cape from Bredasdorp to Port Elizabeth, and grows in semi-arid, stony localities. Flowering time is from November to March.

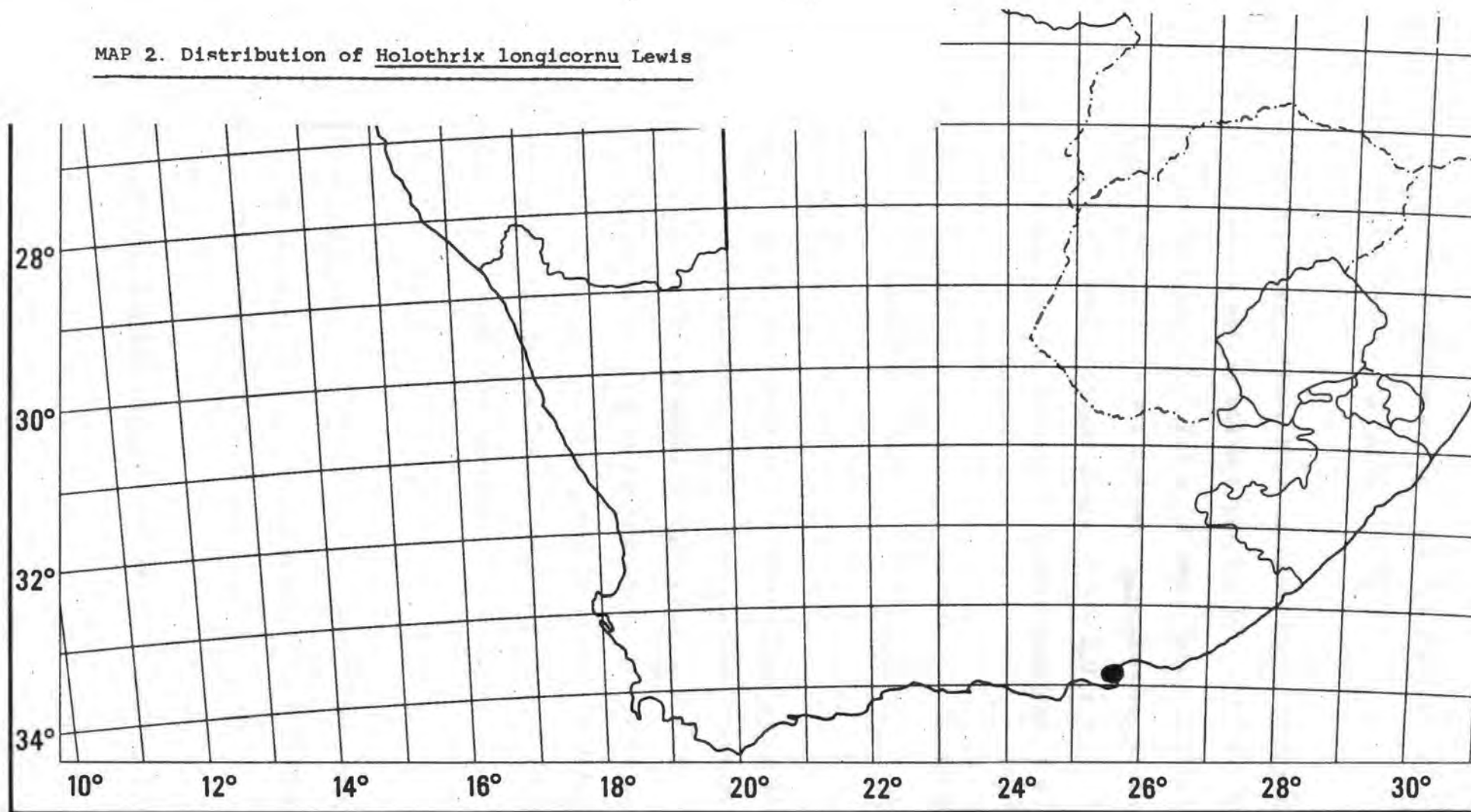


MAP 1. Distribution of Holothrix pilosa (Burch. ex Lindl.) Reichb.f.



T.S.O. Misc. 8091

MAP 2. Distribution of Holothrix longicornu Lewis



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km



2. Holothrix longicornu Lewis, in J.S. Afr. Bot. 4 : 35 (1938)

Type : Port Elizabeth, Cutting 69 (BOL!).

Leaves with dense, short, fine, sinuous hairs. Scape with dense, short, recurved hairs, without bracts, 65 - 154 mm. Sepals glabrous, connate, 1,5 - 2,5 x 1,0 mm. Petals undivided, carnose at the apices, 2,5 - 3,5 x 0,5 mm. Lip carnose, divided into 3 - 5 short, broadly linear lobes, 2,5 - 3,0 x 1,0 - 1,5 mm. Spur narrowly conical, straight, longer than lip, 3 - 4 mm long.

The only specimen of this species is the type, which was collected near Port Elizabeth in October. The habitat is not given.

TAXONOMIC NOTES

Holothrix longicornu is closely related to H.cernua and H.hispida, with its recurved, hispid hairs on the scape. However, the short lip-lobes distinguish it from the former, while the long, straight spur distinguishes it from both. As there are a number of plants in the type gathering, which consistently show these characters, it can be regarded as a species separate from both the above mentioned species.

3. Holothrix exilis Lindl., Gen. et. Sp. Orch : 283 (1835) Type :

In a walk to the white clay pit, bearing true N-E from our station at Zoetmelksrivier, Burchell 6738 - 1 (K!).

H.exilis var. brachylabris (Sond.) Bol., Ic. Orch. Aust. 1 : t.14

fig. A(1896) Type : Uitenhage, Zeyher s.n. (K!). H.brachylabris Sond. in Linnaea 19 : 78 (1847).

Leaves densely to very sparsely pilose with long, fine hairs, small, sometimes withered at flowering. Scape densely to very sparsely pilose with long, fine hairs at right angles to the scape, without bracts, slender, 40 - 290 mm. Inflorescence usually lax with small flowers. Sepals usually glabrous or with a few long hairs, 0,8 - 2,5 x 0,5 - 1,0 mm. Petals undivided, with carnose tips, 1,5 - 4,0 x 0,3 - 1,0 mm, creamy green; Lip carnose, undivided or three-lobed with the outer lobes from very short to half the length of the central lobe, 1,8 - 3,5 x 0,5 - 1,5 mm, creamy green. Spur conical, slightly curved, 0,8 - 1,8 mm. Anther-sacs pale yellow-green.

H. exilis occurs in the Cape Peninsula, and along the Southern Cape from Riversdale to Kei Mouth in the Transkei. It flowers from October to March.

Vouchers:

Glass 6237 (BOL), Hall 1162 (BOL), Jeppe s.n.(PRE), Flanagan 1298 (PRE)

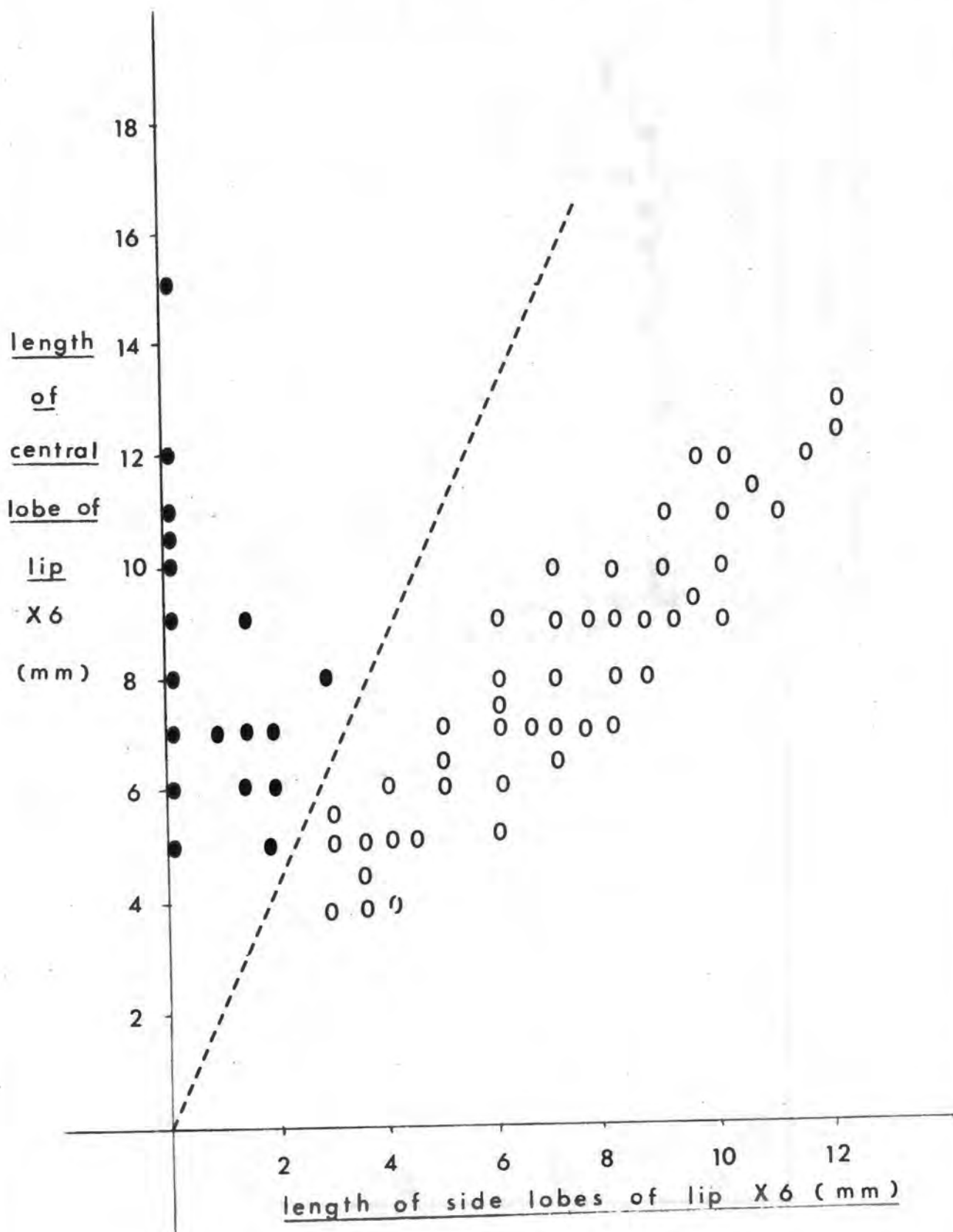
TAXONOMIC NOTES

Considerable difficulty has been experienced in distinguishing H.exilis from H. villosa on the characters on the flower size, slenderness of scape, degree of hirsuteness and laxness of inflorescence, as these are inter-grading without any clear disjunction. Even the length of the side lobes of the lip appeared to be overlapping. Flowering time, distribution and habitat

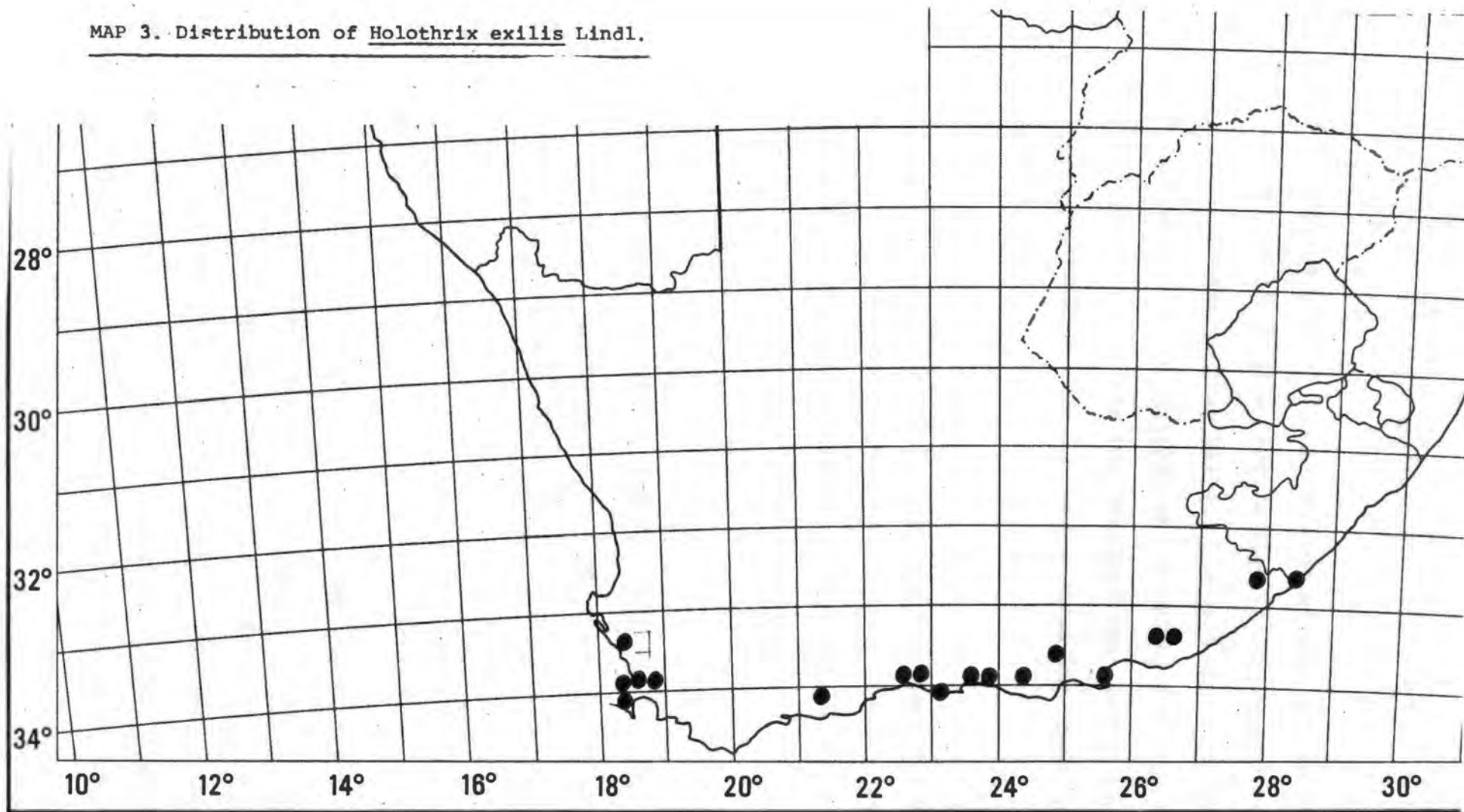
Plate 1 : Scatter diagram of length of central lobè of  
lip against length of side lobes (x 6)

H. exilis ----- ●

H. villosa ----- ○



MAP 3. Distribution of Holothrix exilis Lindl.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

are the same for both species.

A scatter diagram of length of central lobe of lip plotted against length of side lobes showed it was possible to separate the two species on this basis. H.exilis can therefore be distinguished from H.villosa by its having the side lobes of the lip from 0 to 0,4 times the length of the central lobe, while H.villosa has them from 0,6 to 1,0 times the length of the central lobe.

The variety H.exilis var. brachylabris was described by Bolus on the basis of an unlobed lip rather than a three-lobed lip. This character showed intergradation on the above scatter diagram, and the variety therefore cannot be upheld.

4. Holothrix hispida (Thunb.) Immelman comb. nov. Lectotype :  
Table Mountain, Thunberg s.n.  $\alpha$  (UPS, K!). Orchis hispida  
Thunb., Prod. Pl. Cap. : 4 (1794), Fl. Cap. : 48 (1823).  
*misetue of H. curvata & H. villosa*

H. hispidula sensu Lindley, Gen. et Sp. Orch. : 283 (1835).

Leaves densely covered with small squamules or stout hairs, sometimes withered at flowering. Scape with stout, hispid, reflexed hairs, without bracts, stout, 60 - 310 mm. Sepals densely pilose, 1,0 - 2,5 mm. Petals undivided, carnose at the apices, 2,5 - 3,5 x 0,5 - 1,5 mm, yellow-green. Lip carnose, lip and petals sometimes warty, lip oval in shape with 3 - 5 short, broad lobes, 2,5 - 3,5 x 2,0 - 3,5 mm, yellow-green. Spur conical, slightly curved, 1,0 - 2,0 mm.

H.hispida occurs in the South Western Cape and in the Southern Cape areas towards Port Elizabeth. It grows in sand and shallow soil in rock-crevices, and though it can be found in flower from August to April, it usually flowers between October and January.

Vouchers:

Wolley Dod 2339 (BOL), Duthie s.n. (BOL), Jeppe s.n. (PRE), Bruyns 141/75 (PRE).

The squamules or stout hairs on the leaves of this species, and the reflexed hairs on the scape, are similar to those of H.cernua. However, the lip lobes are much shorter and broader than the linear lobes of H.cernua.

TAXONOMIC NOTES

Orchis hispida Thunb. was described from a mixed type, Thunberg s.n. According to the International Code of Botanical Nomenclature (1978), a lectotype must be chosen. According to N.E. Brown, Thunberg s.n.  $\alpha$  = H.hispida and  $\beta$  = H.villosa. The  $\alpha$  specimen is therefore proposed as the lectotype here.

The confusion caused by having a mixed type is evident in Thunberg's descriptions of O.hispida, of which there are two. In the *Prodromus Plantae Capensis* the lip was given as five-lobed, while in the *Flora Capensis* it was given as three-lobed.

In both of these publications the leaves are described as hispid (i.e. corresponding with H.hispida) and the lip-lobes as linear (i.e. H.villosa).



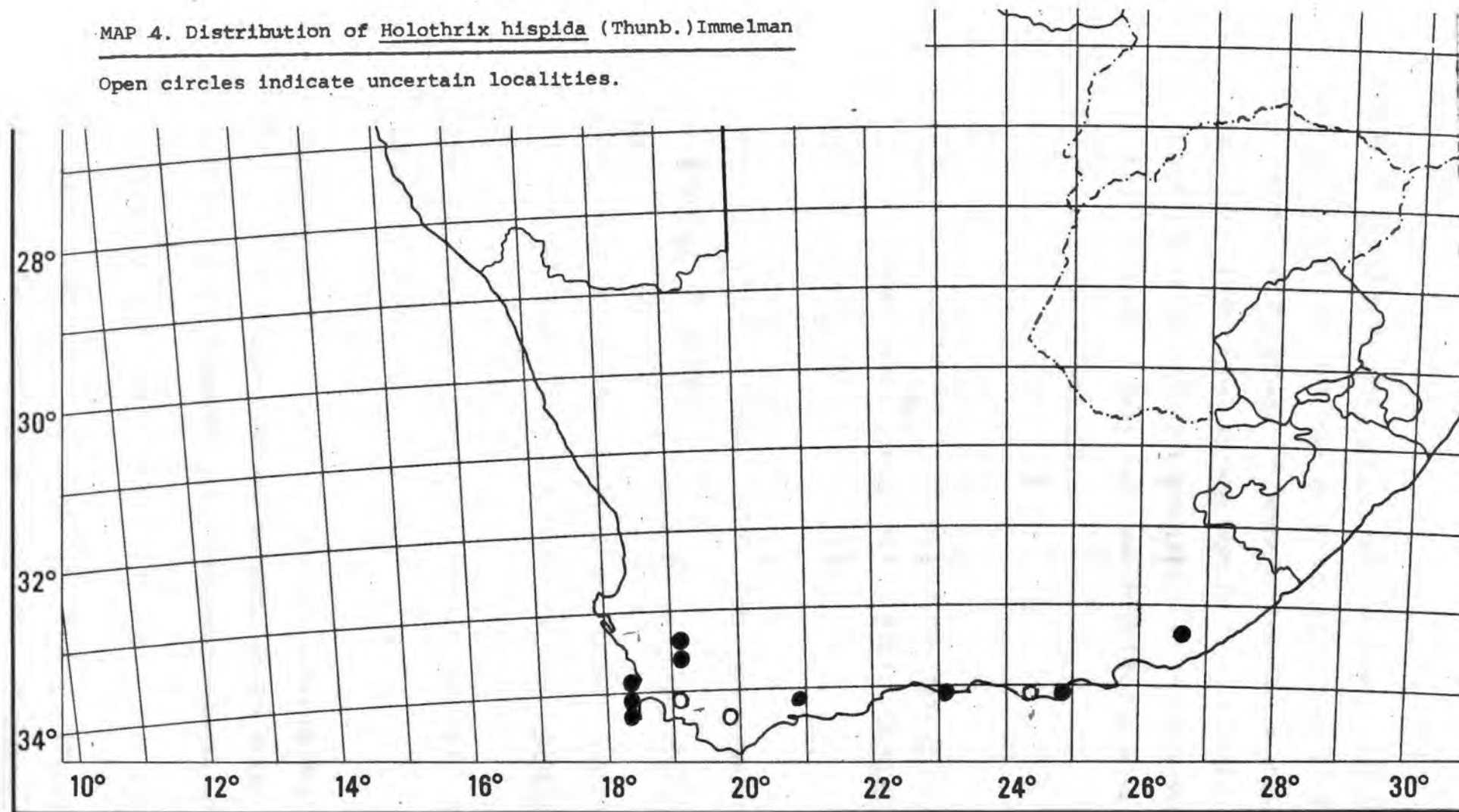
Both the description of Orchis hispidula Linn. f., and a photograph of the type (BOL) show what is undoubtedly conspecific with H.cernua. The lip-lobes are linear, not short and broad as in H.hispida. Orchis hispidula therefore becomes a synonym of H.cernua and not H.hispida as formerly. The name Holothrix parvifolia is used by Lindley in three places: Genera et Species Orchidacearum (Sept., 1835), where he gave both O.hispidula Linn.f. and O.hispida Thunb. as synonyms. H.parviflora Lindl. is therefore superfluous. Lindley also gave Thunberg's type despite having certainly never seen it, as he had no access to Thunberg's herbarium. He probably did see the younger Linnaeus' type however. In this case he would have had a confused concept of the exact limits of the species, as Thunberg's description combines elements of both H.hispida and H.villosa, while the younger Linnaeus' type was H.cernua. Nevertheless, Lindley's description in this publication seems to correspond with H.hispida, and so one presumes that Lindley had seen some specimen of that species. The only specimen of H.hispida in Herb. Lindley was acquired from Bentham. Lindley did not cite it, but did mention after citing Thunberg's specimen that the locality of the species was communicated to him by the "celebrated Bentham".

Lindley, in Hooker's Companion to the Botanical Magazine (Feb., 1836), corrected some characters in his description given in the preceding publication, and gave the scape as being "strigose". Otherwise his description is the same and is probably also of H.hispida.

The description by Lindley, accompanying the drawing in Hooker's Icones Plantarum (1837), could be of H.hispida or possibly of

MAP 4. Distribution of Holothrix hispida (Thunb.) Immelman

Open circles indicate uncertain localities.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km



the three-lobed form of H.cernua, but the drawing, which was sent to Lindley from the Cape by Harvey, is either of H.villosa or a three-lobed H.cernua. No scape or leaves are shown in the plate, nor is there a Harvey specimen in Herb. Lindley, so that confident identification is impossible. It is more than likely that only the drawings were sent, and that Lindley misidentified them as H.hispida (H.parvifolia).

5. Holothrix cernua (Burm.f.) Schelpe in Orch. Rev. 74 : 394 (1966)

Type : Cape of Good Hope, <sup>Herb.</sup> Burm. f. (G!). Orchis cernua  
Burm. f., Fl. Cap. Prodr. : 26 (1768).

O. hispidula Linn. f., Suppl. : 401 (1768) Type : Cape of Good Hope, Sparrman 34 (LINN).

H. hispidula (L.f.) Dav. & Schltr., Consp. Fl. Afr. S: 70 (1895).

H.monotris (Lindl.) Reichb. f., Otia Bot. Hamb. : 119 (1881)

Type : Between Mossel Bay and the Gouritz River, Burchell 6369 (K!)

Monotris secunda Lindl., Gen et Sp. Orch. : 303 (1835) non Orchis secunda Thunb. (1823).

H. parvifolia Lindl., in Hook. Ic. Pl. 2 : t.103 b (1836) non Lindl. (1836) Type : About Cape Town and Wynberg, in the driest and most barren hills and wastes in a stoney and gravelly soil, Harvey s.n. (TCD).

H.squamulosa Lindl., in Hook. Comp. Bot. Mag. 2 : 206 (1836) Type : Mountains near De Liefde, Drege 1235 c (K!). H.squamulosa var. typica Schltr., in Oest. Bot. Zeitschr. : 442 (1898).

H. squamulosa var. scabra Bol., in Trans. S. Afr. Phil. Soc.

5(1) : 114, tab. 23a (1888). Type : Moist sandy places on the Cape Flats, especially after burning, sometimes on old thatched roofs near Rondebosch, Bolus 7022a (BOL!).

H. squamulosa var. hirsuta Bol., ibid. tab. 23b, Type : Bolus 7022 b (BOL! K!).

H. squamulosa var. glabrata Bol. ibid. tab. 23 Type : Bolus 7022 c (K! BOL!).

Leaves with a dense covering of squamules or small, stiff hairs, rarely glabrous with hairs on the margins only, sometimes withered before flowering. Scape with long, hispid, deflexed hairs, without bracts, slender or stout, 90 - 240 mm long. Sepals densely hirsute, 1,5 - 3,0 x 0,5 - 1,5 mm. Petals undivided, carnose at the tips, 3,5 - 7,0 x 0,5 - 1,5 mm, cream to lime-green. Lip carnose with 3 - 5 - (6 - 7) lobes, central lobe longer than outer pairs in 5 - lobed flowers, lobes  $\frac{1}{3}$  -  $\frac{1}{2}$  the length of the whole lip, colour as for petals. Spur conical, curved, 1,5 - 4,0 mm. Anther-sacs chestnut-brown.

H. cernua is distributed mainly in the S.W. Cape, but also along the Southern Cape as far east as Grahamstown, and in the Western Cape to Giftberg. It grows in sandy or stony places, usually flowering after fire. Flowering time is from July to January.

Vouchers:

Hall 1107 (BOL), Bolus 11383 (BOL), Oliver 4760 (PRE), Galpin 4587 (PRE).

# TAXONOMIC NOTES

According to Lindley's description of Monotris secunda Lindl. the leaf was hispid and the scape had retrorse hispid hairs. This fits only two species from the Cape, H.cernua and H.hispida. The description of the lip as three-lobed with the lateral lobes "toothed" would almost certainly make it H.cernua. A drawing of the type shows a flower with broad connate sepals half as long as the petals, and a lip with three long, linear lobes in the centre and a short lobe on either side. The appearance is that of H.cernua rather than H.hispida.

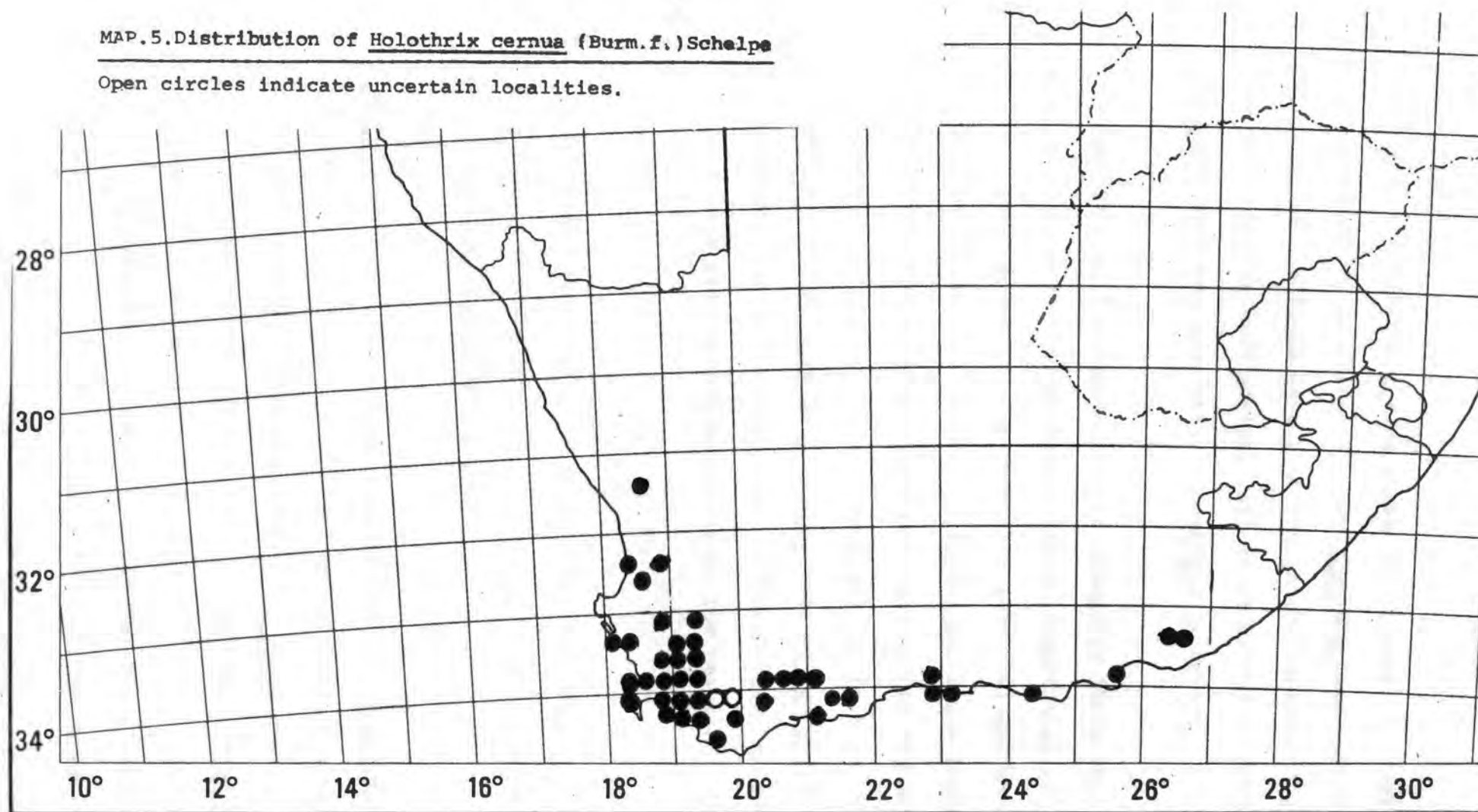
Orchis hispidula Linn. f. is given here as a synonym of H.cernua as both the description and a photograph (in BOL) of the type (Sparrman 34) correspond with that species rather than with H.hispida Burm. f. In both description and photograph the lip lobes are long and linear, and not short and broad, making the flower as a whole more elongated. This is clearly visible in the photograph.

Holothrix parvifolia Lindl. is difficult to identify from the description and a drawing (in Hook. Ic. Pl.), but the description could correspond with that form of H.cernua with a three-lobed lip, though the drawing has more the appearance of H.villosa. The earlier descriptions of H.parvifolia by Lindley are more likely to be H.hispida. Lindley gave no type (lecto-type at K?) but quoted O.hispidula Linn. f. and O.hispida Thunb.

The varieties cernua and hirsuta, as proposed by Bolus, seem to intergrade, the squamules grading from being as broad as long,

MAP.5.Distribution of Holothrix cernua (Burm.f.) Schelpe

Open circles indicate uncertain localities.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

through the length being five times the breadth, to their being more like short, stiff hairs. Var. glabrata seems uncommon and no intermediate forms were seen though the density of the squamules on the leaf varies. All three varieties were collected by Bolus from the same site in a single gathering.

Consequently it is proposed not to recognize three separate varieties as described by Bolus, but to regard them as forms of a very variable species. A form with a three-lobed lip is common, and a few plants with four, six and seven lobes to the lip were also encountered. This may vary within the spike as well as between plants. The three-lobed-lip form is often misidentified as H. villosa or H. villosa var. condensata but can be distinguished by its having rigid, reflexed hairs on the scape, and by its usually having squamules on the leaves.

6. Holothrix villosa Lindl., in Hook. Comp. Bot. Mag. 2 : 207 (1836).

Type : Groot Drakenstein and at the foot of Paarl Mountain, under 1000 ft., Drege 1235 a (K!).

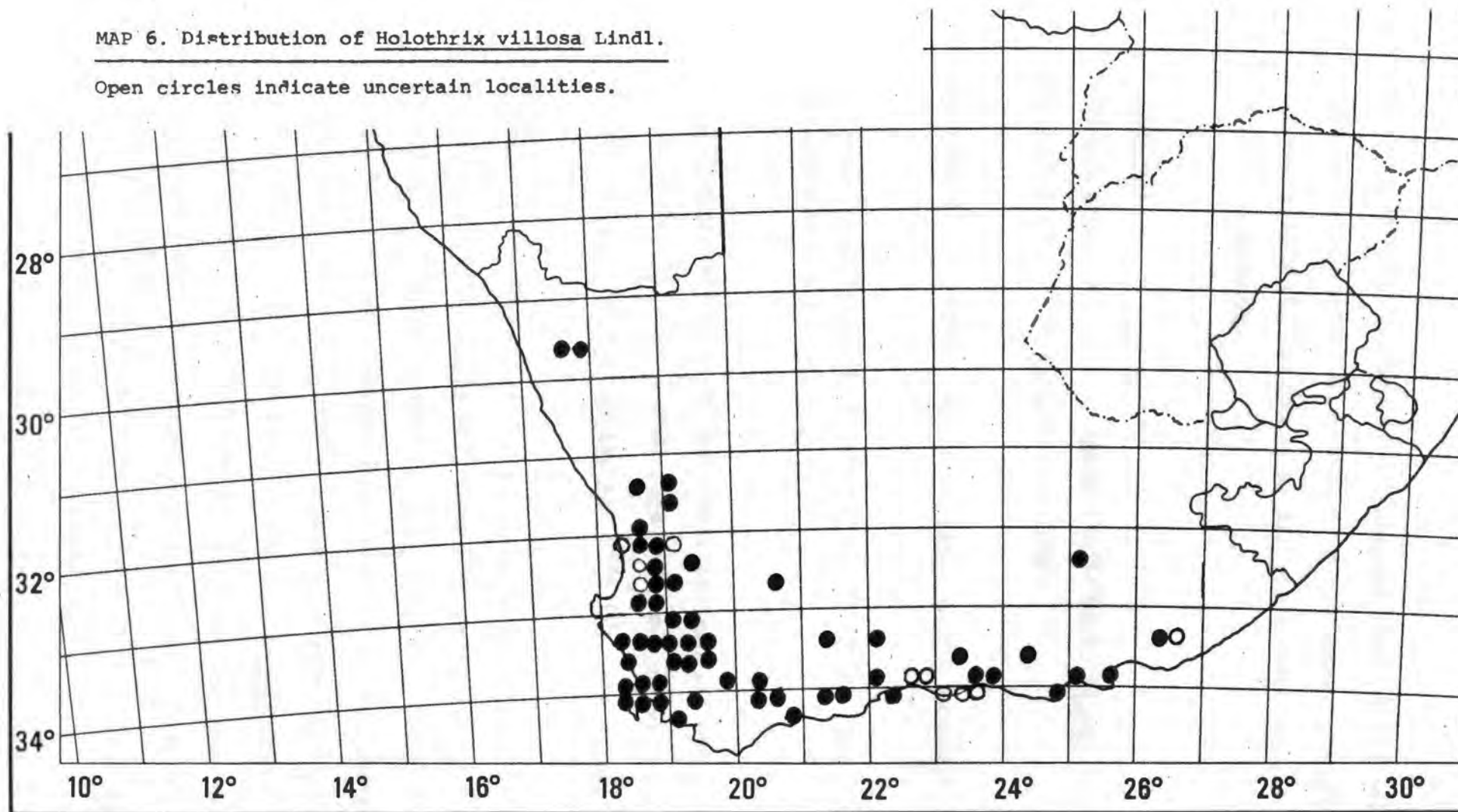
Leaves with few to many long, straight hairs. Scape densely to sparsely pilose with long, straight hairs at right angles to the scape, without bracts, 30 - 365 mm. Sepals with or without short, straight hairs, 1,0 - 2,5 x 0,5 - 1,5 mm. Petals undivided, carnose at the apices, 1,5 - 4,5 x 0,5 - 1,5 mm, cream to yellow-green. Lip carnose, divided into three sub-equal lobes, 1,4 - 4,0 x 0,5 - 3,0 mm. Column green. Anther-sacs yellow-green.

This species, one of the commonest of the genus in the Cape, occurs throughout the South Western Cape, in the Southern Cape as far



MAP 6. Distribution of Holothrix villosa Lindl.

Open circles indicate uncertain localities.



east as Humansdorp, and in the Western Cape as far north as Van Rhynsdorp with two records from Springbok. It grows in rock-crevices and in fynbos on hillsides, and flowers from August to December.

Vouchers:

Esterhuysen 22291 (BOL), Bolus 11638 (BOL), Oliver 5058 (PRE), Leistner 435 (PRE), Galpin s.n. (PRE).

6a. Holothrix villosa var. condensata (Sond.) Immelman  
comb. nov.

H. condensata Sond., in Linnaea 19 : 76 (1848) Type : Swellendam, in sanddunes, Mund s.n. (S, K!).

H. lithophila Schltr., in Dest. Bot. Zeitschr. : 446 (1898), Engl. Jahrb. 26 : 331 (1898) Type : In rock-crevices on mountain above Vogelgat lagoon, Schlechter 9556 (B†, one flower at K!).

Leaves often broader than long, slightly to densely pilose with long, fine hairs. Scape with long fine hairs at right angles to scape, without bracts, usually stout with the inflorescence dense, 85 - 240 mm. Sepals glabrous to moderately densely pilose with short, fine hairs, broad, often more than half the length of the petals, 1,5 - 3,5 x 1,0 - 2,5 mm. Petals undivided, carnose, 3,5 - 7,0 x 0,5 - 1,5 mm, green or yellowish-green. Lip carnose, with three broadly linear lobes, lobes 1/3 to 1/2 the length of the lip, lip 3,5 - 6,5 x 1,5 - 3,5 mm. Spur broadly conical, curved, 2,0 - 5,5 mm.

H.villosa var. condensata grows in the S.W. Cape, with records from George and Humansdorp in the Southern Cape. It grows in moist areas, and is either lithophytic or grows in shallow soil in rock-crevices. It flowers from October to January.

Vouchers:

Esterhuysen s.n. (BOL), Leighton 748 (BOL), Pillans 3508 (PRE)  
Andreae 843 (PRE).

TAXONOMIC NOTES

A number of characters appeared to separate H.condensata from H.villosa, i.e. denser spike, larger flowers and leaves, stouter scape, broader lip-lobes and longer, broader petals. However, when these are more closely examined it is seen that the two taxa intergrade.

A scatter diagram was drawn of petal length plotted against petal breadth, petal length being regarded as an index of overall flower size, and petal breadth being used because it appeared to differ in the two taxa. The scatter diagram shows complete overlapping, though H.condensata did tend to have longer petals. The breadth to length ratio of the petals in both taxa was about 1 : 4.

The distribution ranges of the two taxa overlap, with H.condensata tending to occupy the damper habitats, and occurring almost exclusively in rock-crevices and on cliffs. H.villosa is also often lithophytic but does occur frequently in other habitats, in fynbos, grassland, semi-arid areas, sandy areas under young wattles, and by roadsides. There is no difference in flowering time.

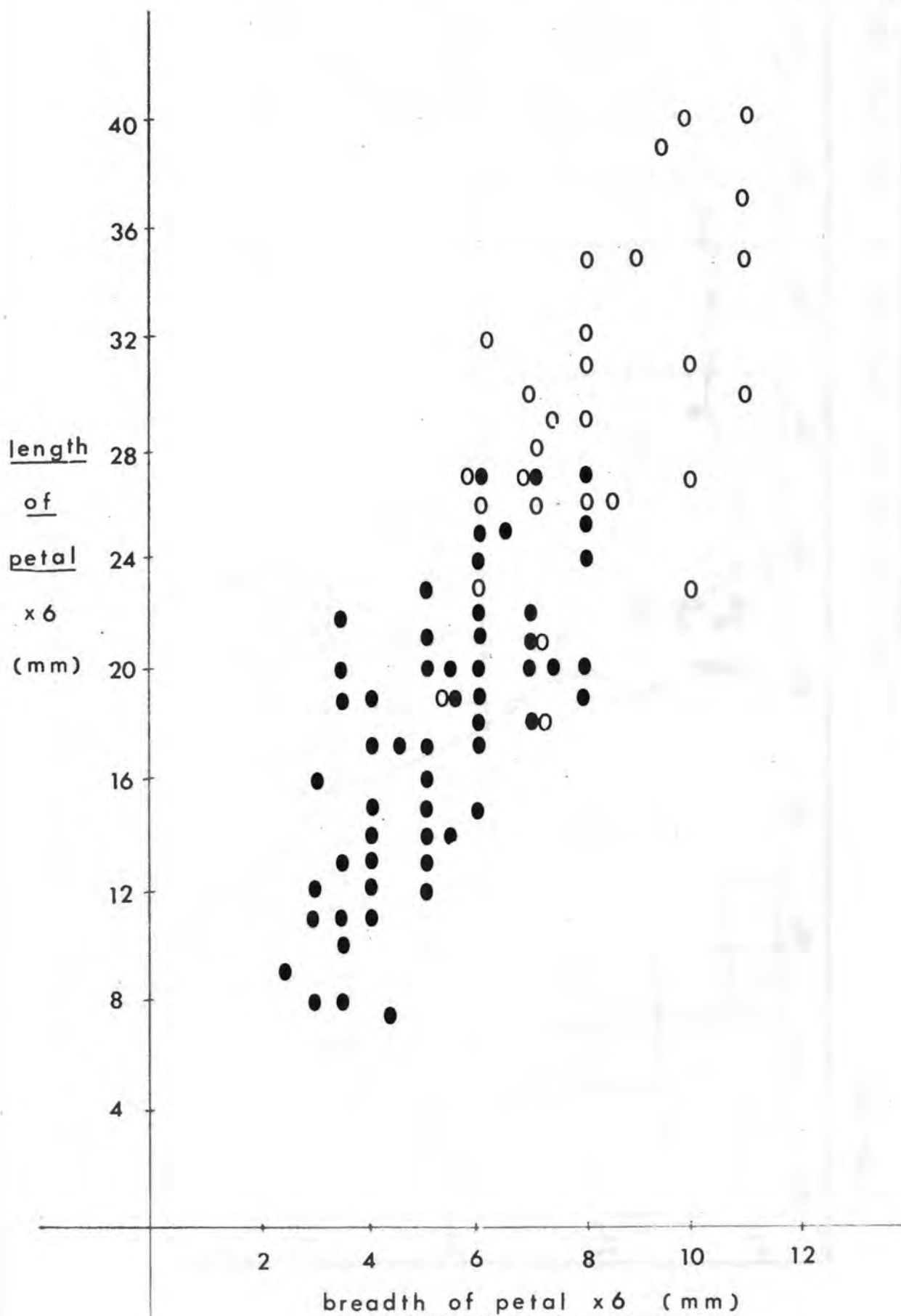


Plate 2 : Scatter diagram of petal length against

petal breadth (x 6)

H.villosa ----- ●

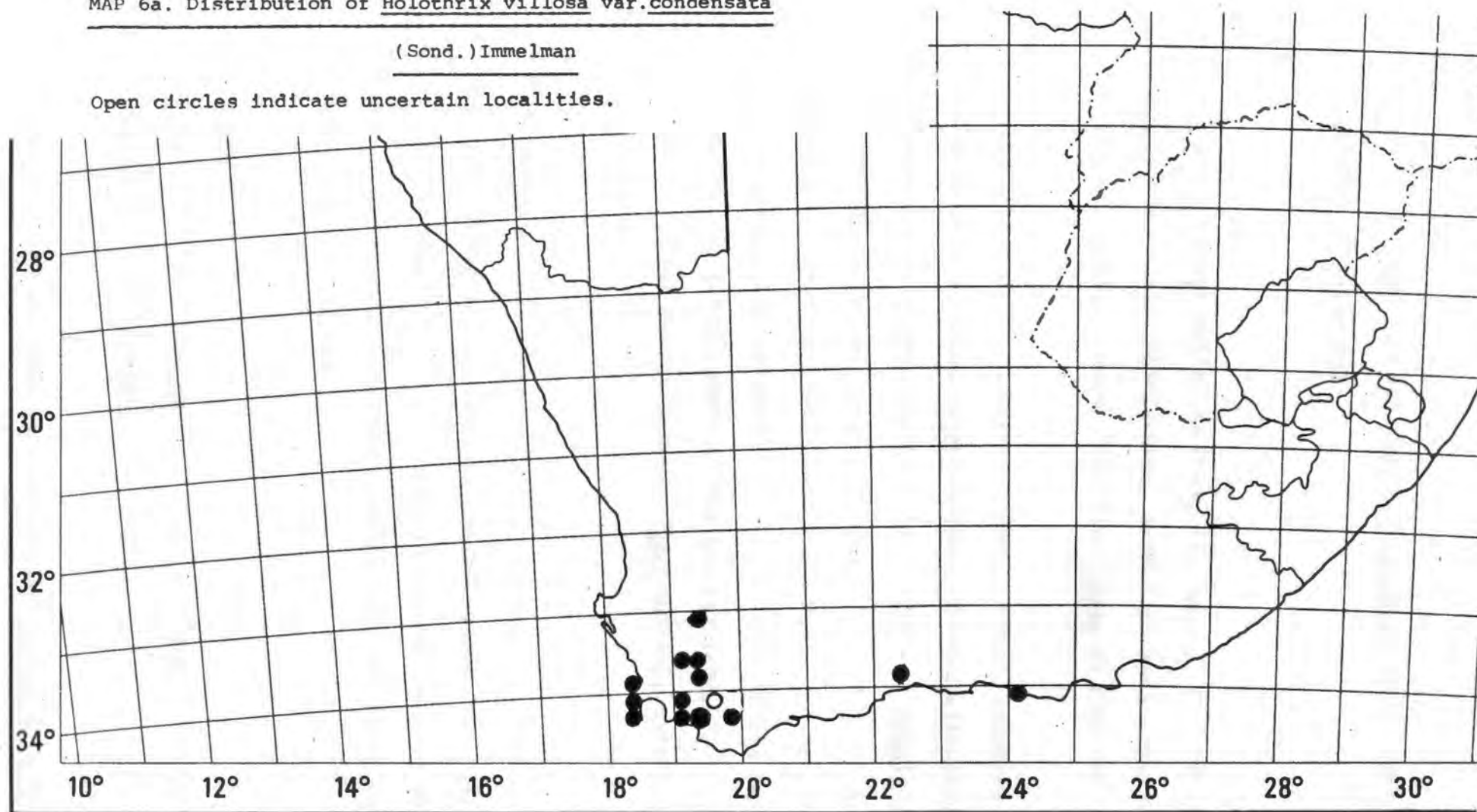
H.villosa var. condensata -- 0



MAP 6a. Distribution of Holothrix villosa var. condensata

(Sond.) Immelman

Open circles indicate uncertain localities.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

It is therefore proposed that H.condensata should be reduced to a variety of H.villosa.

7. Holothrix thodei Rolfe, in Dyer, Fl. Cap. 5 (3) : 100 (1912) Type : Orange Free State, Witsieshoek, summit of QuaQua Mountains in stoney and grassy places, 7500 ft., Thode 48 (BOL! K?).

Leaves with a dense covering of small, stout, squamous hairs, withered at flowering. Scape densely covered with stout, scabrid, reflexed hairs, without bracts, 100 - 240 mm. Sepals with numerous short hairs, usually connate, 1,5 - 3,5 x 0,5 - 1,0 mm. Petals undivided, carnose, 3,5 - 5,0 x 0,5 - 1,5 mm, yellow or yellow-green, Lip carnose, with three lobes, outer pair of lobes 1/5 - 1/2 the length of the central lobe, 2,5 - 4,5 x 1,5 - 3,5 mm, colour as for petals. Spur conical, slightly curved, 0,5 - 2,5 mm.

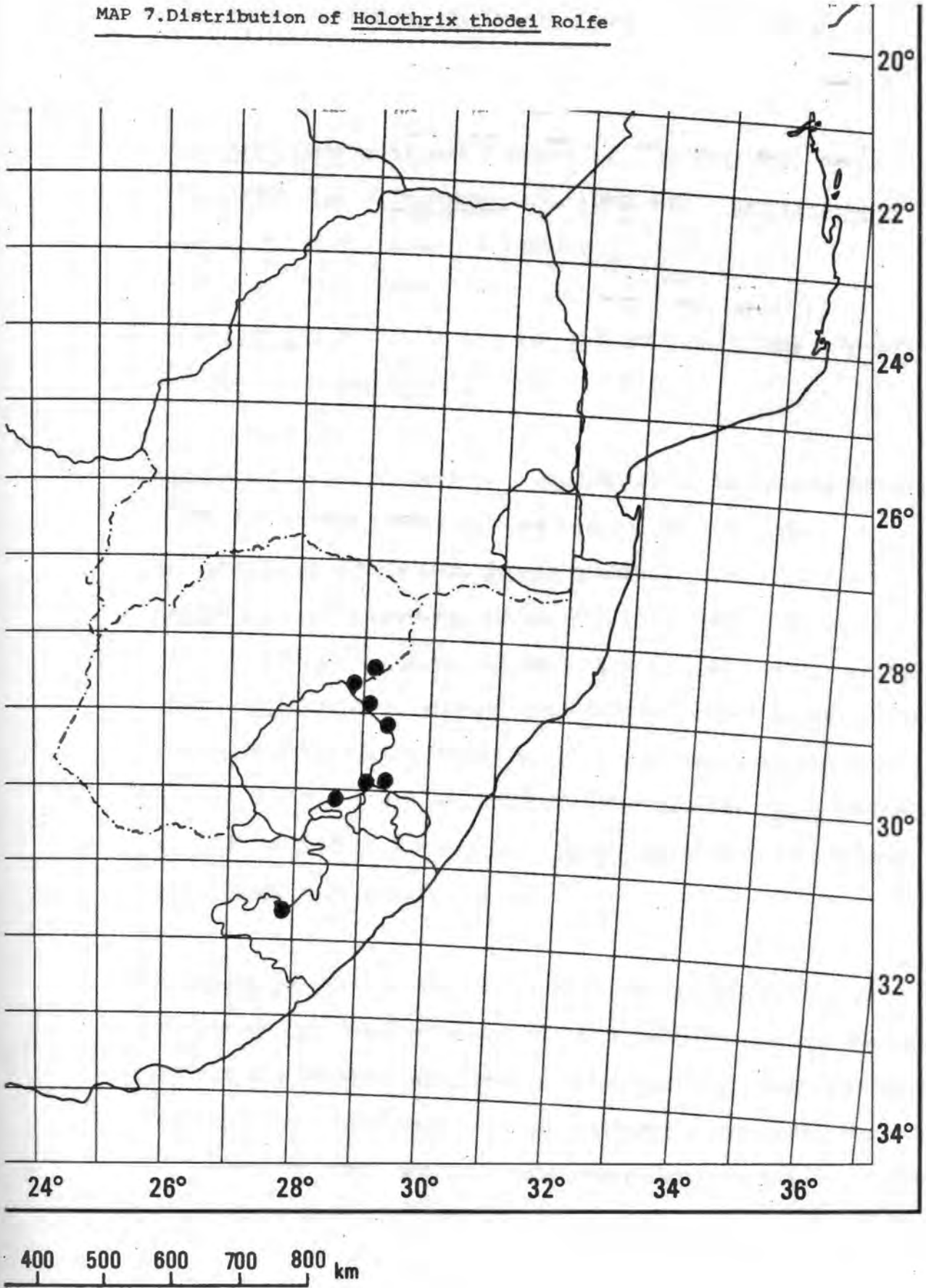
This montane species occurs in the Drakensberg of Lesotho the Orange Free State, and Natal, with one record from near Engcobo in the Transkei. It is recorded from basalt-derived soils in rocky grasslands or crevices in rocks, and can be found in flower in January and February.

Vouchers:

Schelte 297 (BOL), Jacobs s.n. (BOL), Killick 1304 (PRE), Trauseld 961 (NU), Burgell 7314 (NU).

Although it has a flower very similar to H.exilis, H.thodei has

MAP 7. Distribution of Holothrix thodei Rolfe



thick, scabrid hairs on the scape like those of H.cernua. It also has a completely different distribution range.

8. Holothrix secunda (Thunb.) Reichb. f., in Otia Bot. Hamb. 2 : 119 (1881) Type : Thunberg s.n. (UPS, K!). Orchis secunda Thunb., Prod. Pl. Cap. : 4 (1823).

Tryphia major Sond., in Linnaea 19 : 82 (1847) Type : Brakfontein, 2 - 4000 ft., Zeyher s.n. (K!).

Leaves glabrous, succulent. Scape slightly to densely pilose with short, fine hairs, without bracts, 45 - 300 mm.

Inflorescence sub-secund. Sepals glabrous, 1,5 - 3,5 x 1,0 - 2,0 mm.

Petals undivided, carnose, adnate to lip at their bases,

2,5 - 7,0 x 0,5 - 2,0 mm, creamy-white to yellowish to yellow-

green. Lip carnose, divided into five sub-equal lobes, lobes

linear, lip with a few papillae at the entrance to the spur,

3,5 - 8,5 x 1,5 - 4,0 mm, colour as for petals. Spur conical,

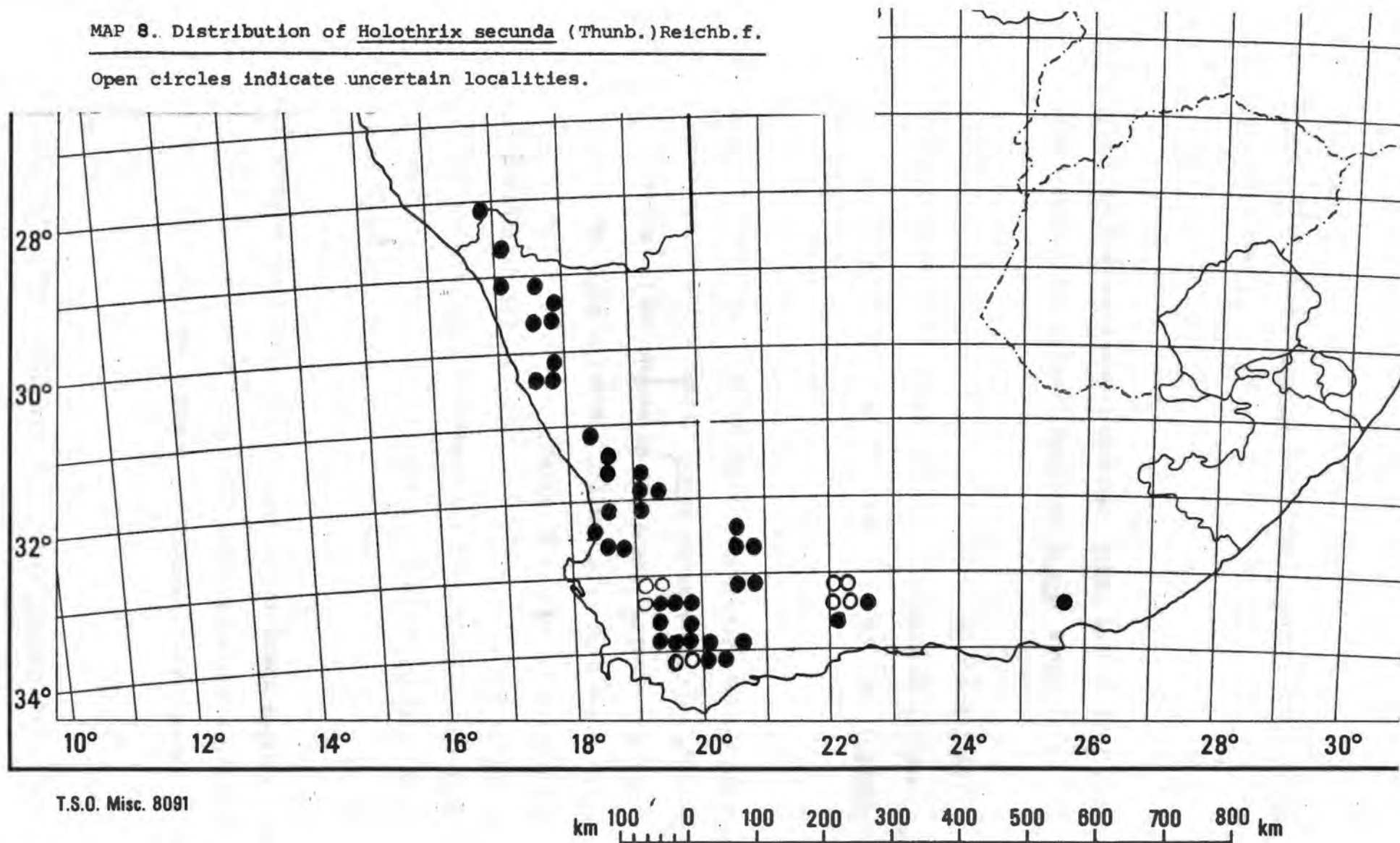
slightly curved, 1,5 - 4,5 mm. Column cream and lime-green.

Anther-sacs deep reddish-mauve.

H.secunda is distributed from Oudtshoorn and Bredasdorp to Oranjemund, but does not occur on the Cape Peninsula or the western part of the Western Cape, and has also been recorded from Suurberg Pass near Port Elizabeth. It grows in dry areas under the shade of bushes, on stony soil, in rock-cracks and on ledges. Flowering occurs from June to October.

MAP 8. Distribution of Holothrix secunda (Thunb.) Reichb.f.

Open circles indicate uncertain localities.





Vouchers:

Bruyns 1132 (BOL), Compton 4329 (BOL), Acocks 17725 (PRE),  
Muir 2764 (PRE).

9. Holothrix incurva Lindl., in Hook. Comp. Bot. Mag. 2 : 207 (1836)

Type : Stockenstrom Div., Katberg, Drege 8275a (K!).

H.rupicola Schltr., in Engl. Bot. Jahrb. 24 : 419 (1897)

Syntypes : Mont-aux-Sources, summit, in fissures of rocks, Thode  
 6 ( ), Slopes of Mont-aux-Sources, 8 - 9000 ft., Flanagan  
 11981 (BOL!)

Leaves glabrous or with a few short, scattered hairs, margins with  
 a dense rim of short hairs. Scape densely villous with short,  
 fine hairs at right angles to the scape, without bracts,  
 72 - 170 mm. Sepals densely villous with fine short hairs,  
 2,0 - 4,5 x 1,5 - 2,0 mm. Petals undivided, with carnose,  
 much-attenuated apices, 5,0 - 9,5 x 1,5 - 1,0 mm, yellow or  
 greenish-yellow. Lip carnose, with 5 narrowly-linear lobes,  
 3,5 - 4,5 x 1,5 - 2,0 mm, yellow or greenish-yellow. Spur  
 broadly conical, curved, 1,0 - 1,5 mm.

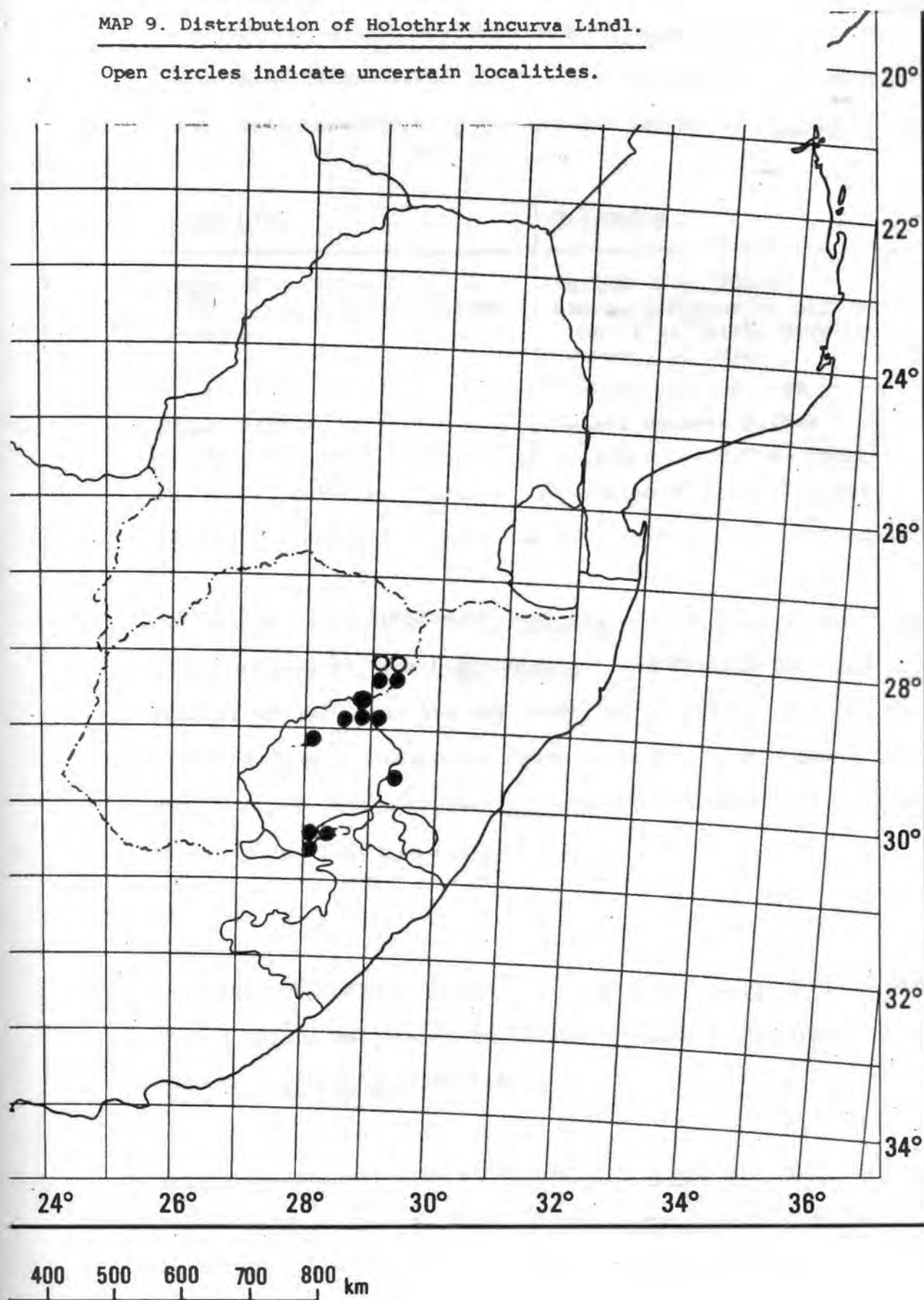
This montane species is distributed on the Drakensberg of the  
 Cape, Natal, the Orange Free State and Lesotho, and grows on  
 basalt ledges and rock-cracks. It flowers from December to April.

Vouchers:

Prescott s.n. (BOL), Schelte 7677 (BOL), Stewart 1947 (NU),  
Hilliard and Burt 9803 (NU).

MAP 9. Distribution of Holothrix incurva Lindl.

Open circles indicate uncertain localities.



TAXONOMIC NOTES

In Schlechter's type description of H.rupicola he gave the characters listed below. Contrasted with this is the range of these characters found by the present author in H.incurva

<u>H.rupicola</u>	<u>H.incurva</u>
Height 70 - 120 mm	Height 70 - 170 mm
Leaves glabrous with ciliate margins	Leaves glabrous or with a few scattered hairs, margins densely ciliate
Scape pilose	Scape densely pilose
Sepals pilose	Sepals densely pilose
Petals 7 mm long	Petals 5,0 - 9,5 mm long
Lip with 5 subequal lobes	Lip with 5 subequal lobes

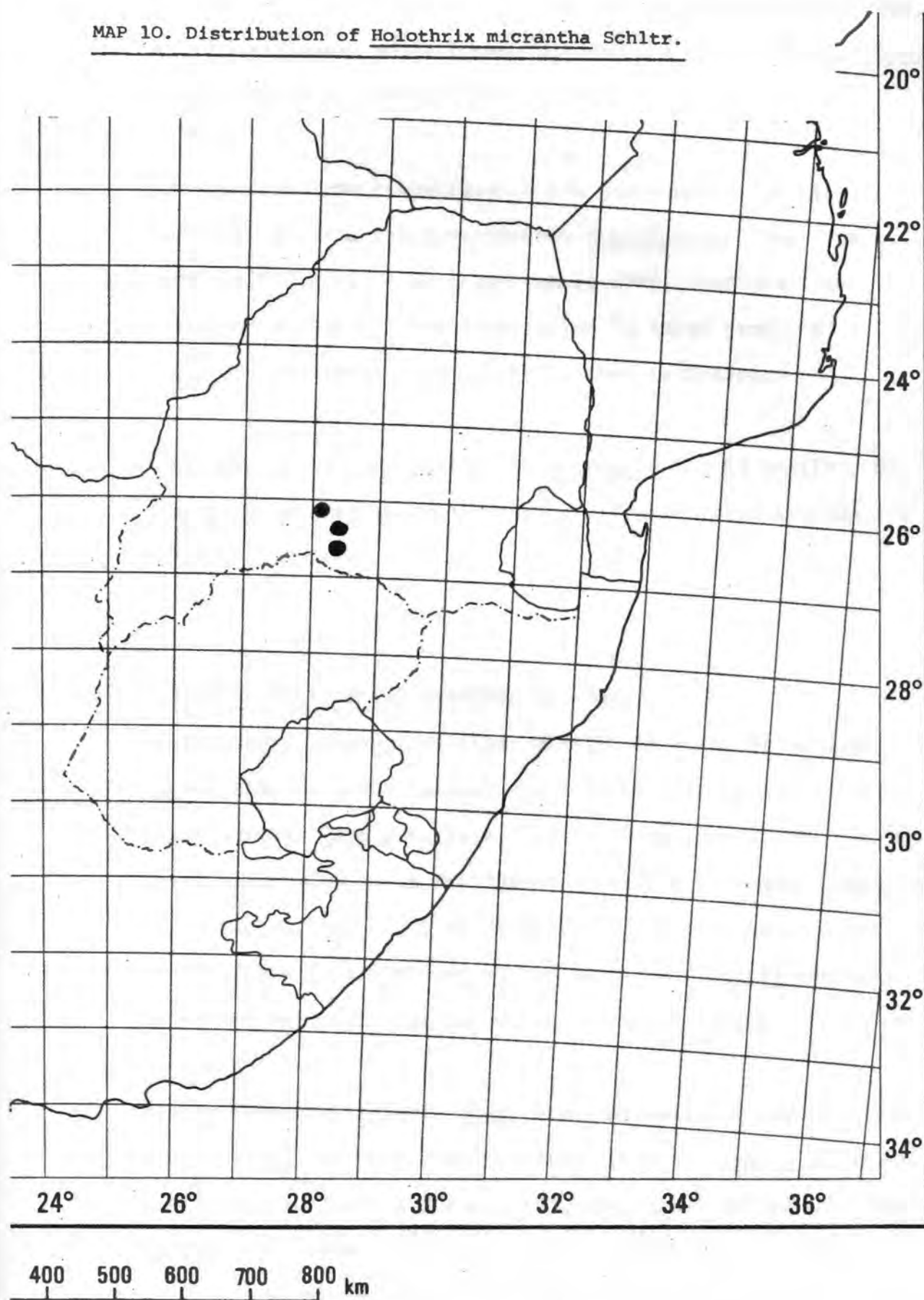
Schlechter never compared H.rupicola with H.incurva, but rather distinguished it from H.condensata. The distribution and habitat of both taxa are the same; for instance, both can be found at Mont-aux-Sources. From inspection of the above data, and of one of the syntypes (Flanagan 1981 (BOL!)), it is clear that the two taxa are conspecific.

10. Holothrix micrantha Schltr., in Engl. Bot. Jahrb. 2- : 31 (1895).

Type : Transvaal, mountains above Heidelberg, on grassy cliffs 5400 ft., Schlechter 3522 (B†).

Leaves pilose, withered at flowering. Scape with long, straight hairs, without bracts, 72 - 170 mm. Sepals with a few hairs at the tips, 1,5 - 2,0 x 0,5 - 1,0 mm. Petals undivided, with

MAP 10. Distribution of Holothrix micrantha Schltr.



carnose tips, 3,0 - 4,5 x 0,5 - 1,0 mm. Lip carnose, divided into five linear, acute lobes, 3,5 - 4,5 x 1,5 - 2,0 mm. Spur broadly conical, curved, 1,0 - 1,5 mm.

The type was from Heidelberg in the Transvaal. Two other specimens exist which are probably H.micrantha: one from a marsh at Killarney near Johannesburg (PRE!) and one from Modderfontein (K!). The description is taken from the Killarney specimen. The flowering time is October.

This species is very similar to H.incurva but is smaller, has a slightly denser spike, and has a different distribution and flowering time.

11. Holothrix filicornis Immelman sp. nov.

Folia glabra. Scapus gracilis, glaber, 65 - 260 mm longus.

Sepala glabra, ovata, acuta, 1,5 - 2,0 mm longa, 0,5 - 1,0 mm lata, viridi-rubra. Petala triloba, 3,0 - 8,0 mm longa, 0,5 - 1,0 mm lata, viridi-alba, lobis filiformibus, paulum carnosus. Labellum quinquelobum, 4,5 - 9,0 mm longum, 1,5 - 2,5 mm latum, viridi-album, lobis filiformibus, paulum carnosus. Calcar conicum, dependens vel leviter incurvatum, 7 - 11 mm longum.

Leaves glabrous, large. Scape glabrous, without bracts, 65 - 260 mm long. Ovary twisted, green tinged with red. Sepals glabrous, ovate, acute, 1,5 - 2,0 x 0,5 - 1,0 mm, green tinged with red. Petals with three filiform, slightly carnose lobes comprising 1/2 - 2/3 of the petal's length, petal 3,0 - 8,0 x 0,5 - 1,0 mm,

white tinted with green. Lip slightly carnose, divided into five filiform lobes, lobes comprising  $2/3 - 3/4$  of the total lip length, lip 4,5 - 9,0 x 1,5 - 2,5 mm, greenish-white.

Spur conical, slightly curved and pendulous, 1,25 - 2,0 times the length of the lip, 7 - 11 mm long.

This species occurs in southern South West Africa and in Namaqualand. It grows in semi-arid areas, in rock cracks and on stony slopes, and flowers in July and August, with one record in October.

Type : 14 miles west of Springbok, rhenosterveld of shale and quartzite hills, under bushes, common very locally, c. 2000 ft.,  
8 : 6 : 57, Acocks 19269 (BOL)

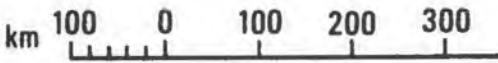
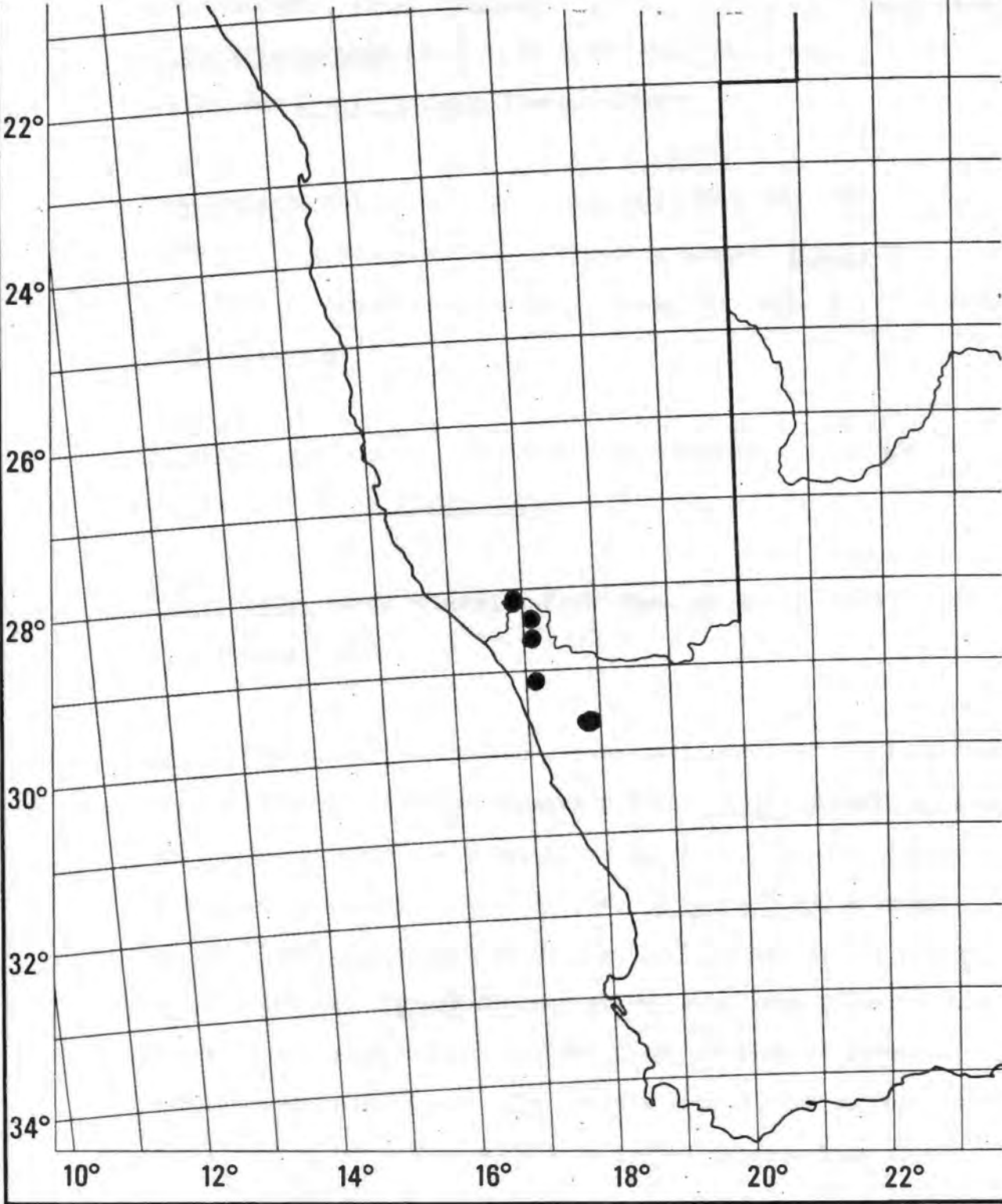
Vouchers:

Williamson 2562 (BOL), Williamson 2565 (BOL), Tolken 3293 (BOL),  
Oliver, Tolken and Venter 702, 823, 652 (PRE), van der Westhuizen  
s.n. (grown in UCT greenhouse, in liquid preservative in BOL,  
labelled H.M.F. 20 and 21).

This species, together with the montane H.scopularia, is unusual among the species of South African Holothrix in having the petals divided, but no bracts on the scape. They also have the petals always three-lobed, instead of having the variable number of petal lobes of the other species with divided petals. The extremely long spur, the different distribution and habitat, and the less strongly secund spike, however, make it easy to distinguish H.filicornis from H.scopularia.



MAP 11. Distribution of Holothrix filicornis Immelman sp.nov.



12. Holothrix scopularia (Lindl.) Reichb. f., in Otia Bot. Hamb.  
2 : 119 (1881). Type : Witbergen summit, 6-8000 ft., Drege 8275b (K).  
Scopularia secunda Lindl., in Hook. Comp. Bot. Mag. 2 : 207  
 (1836) non Orchis secunda Thunb., (1823).

H. multisecta Bol., in Journ. Linn. Soc. 25 : 170, 190, Fig. 7  
 (1890) Type : Stockenstrom, Elandsberg summit, Scully 391  
 (K!, BOL!). Durand and Schinz in Consp. Fl. Afr. 5 : 71 (1895)  
 as H. multiseta.

H. Scopularia Schltr., in Oest. Bot. Zeitschr. : 21 (1899)  
 partly excl. H. pleistodactyla.

H. burchellii sensu Kraenzl., Orch. Gen. et Sp. 1 : 589 (1899)  
 non Lindley (1835).

Leaves moderately to densely pilose with long, straight, slender hairs, often withered at flowering time. Scape densely pilose with long, straight, slender hairs at right angles to scape, scape without bracts, 110 - 340 mm. Inflorescence strongly secund. Sepals glabrous or with a few long hairs, 1,5 - 4,0 x 1,0 - 2,0 mm. Petals divided at the apex into three carnose lobes, 3,0 - 11,0 x 0,5 - 2,5 mm, cream or pinkish-cream, sometimes wine-coloured. Lip divided into 5 - 12 carnose lobes, 3,0 - 13,0 x 1,5 - 4,5 mm, colour as for petals. Spur curved, 1,0 - 4,5 mm.

H.scopularia occurs in the high mountain areas of the Eastern Cape, Transkei, Natal and Lesotho, and also at Barberton in the Transvaal. It grows on grassy slopes and rocky outcrops, and flowers from September to January.

Vouchers:

Schelte 7159 (BOL), Galpin s.n. (BOL), Dieterlen 1301 (PRE), Sim 1267 (PRE), Stewart 1825 (NU).

TAXONOMIC NOTES

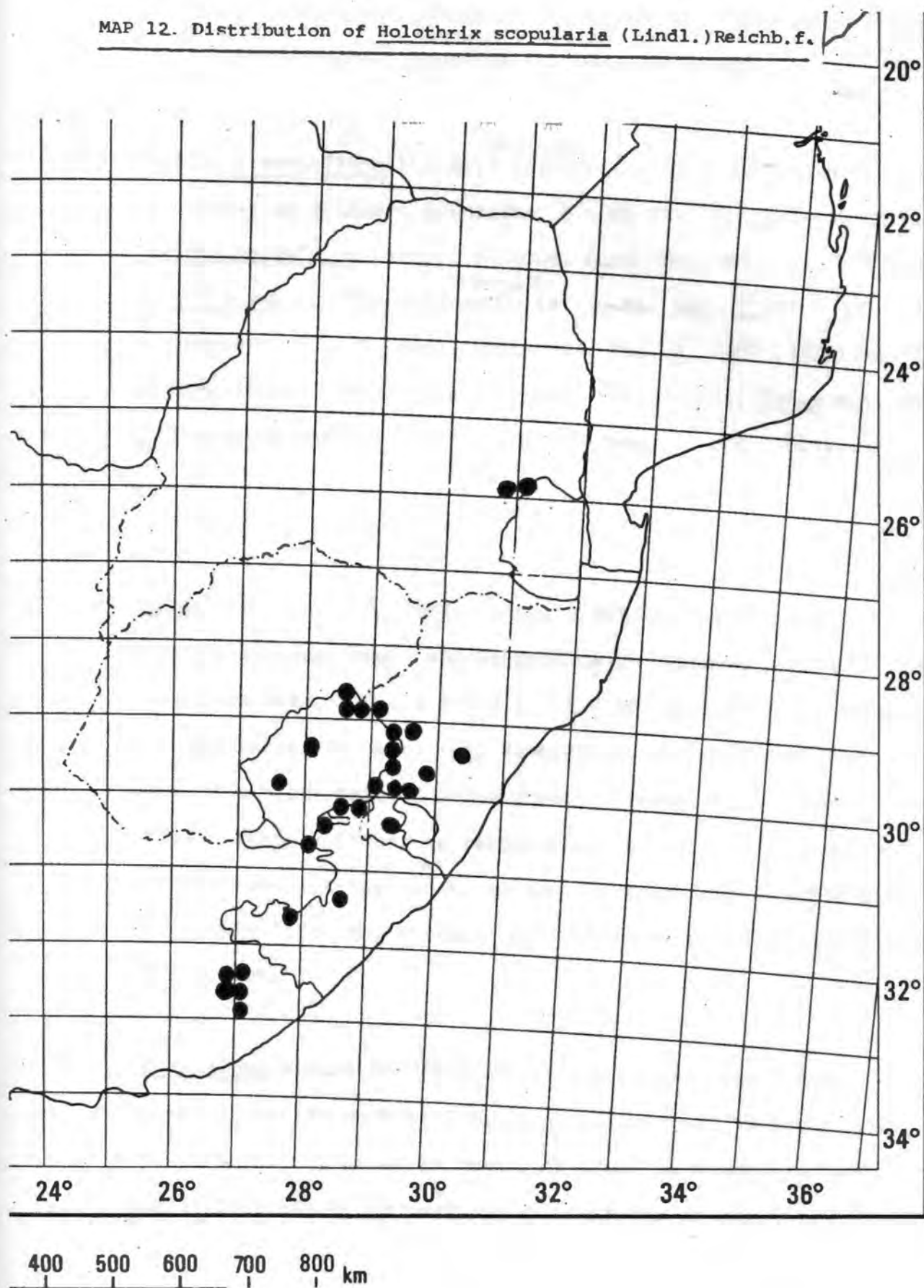
Holothrix multisecta, described by Bolus in 1890, was regarded as synonymous with H.scopularia by Schlechter (1899).

Examination of the type of Bolus' description, and of the drawing accompanying the description, leave no doubt that H.multisecta is a small-flowered form of H.scopularia. Bolus' description of H.multisecta is contrasted with the range of the corresponding characters in H.scopularia as ascertained by the present author.

<u>H.multisecta</u>	<u>H.scopularia</u>
Sepals pilose	Sepals glabrous to moderately pilose
Petals 3-lobed	Petals 3-lobed
Lip 7-lobed	Lip 5 - 12 lobed
Spur short, obtuse, curved, broadly conical	Spur short, obtuse, curved, broadly conical

Bolus also mentions in his description that the tip of the spur was slightly inflated. However, examination of the type failed

MAP 12. Distribution of Holothrix scopularia (Lindl.) Reichb.f.



to support this. Any distinction between the two species based on flower size or the number of lip-lobes is untenable in view of the observed intergradation in these characters.

13. Holothrix parviflora (Lindl.) Reichb. f., Otia Bot. Hamb. : 119 (1881)

Type : Swanepoelspoort Mountains, 3-4000 ft., Drege 8276a (K!).

Tryphia parviflora Lindl., in Hook. Comp. Bot. Mag. 2 : 209 (1836).

H. lindleyana var. parviflora <sup>(Reichb. f.)</sup> Rolfe, in Fl. Cap. 5 (3) : 106 (1912).

T. secunda Lindl., in Hook. Comp. Bot. Mag. 2 : 209 (1836) non Orchis secunda Thunb. (1823) Type : Koratra (Karatará?), Drege s.n. (K!)

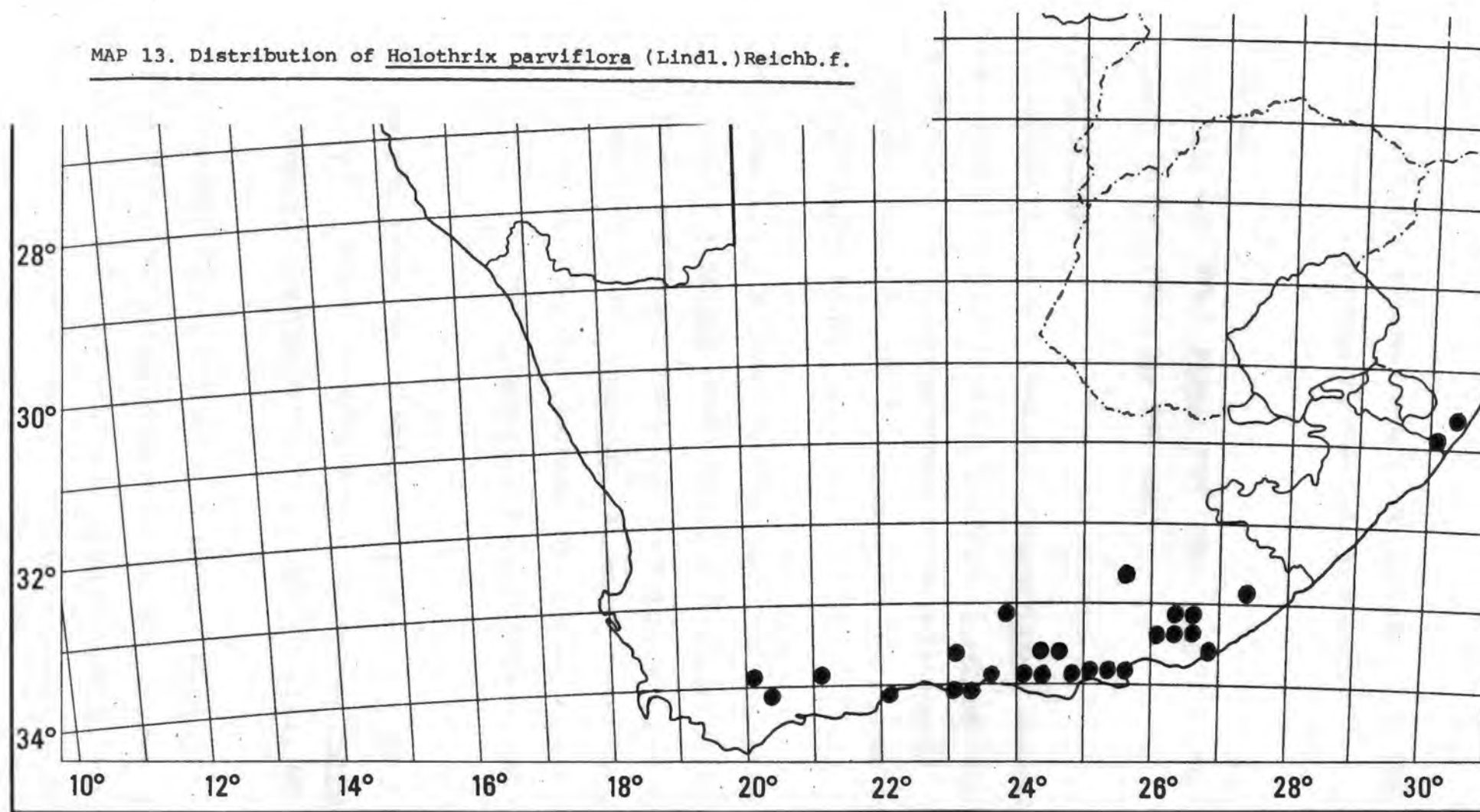
H. lindleyana Reichb. f., in Otia Bot. Hamb. : 119 (1881).

Leaves glabrous, succulent. Scape glabrous, 1,5 - 3,5 x 0,5 - 1,5 mm.

Petals undivided, broad and membranous in texture, adnate to the lip at the base, 3,0 - 6,5 x 0,5 - 1,5 mm, pure white or flushed with purple at the base. Lip membranous, divided into five lobes, the outer pair of lobes broadly linear, inner three shorter, broadly linear or rectangular, lip 3,5 - 9,0 x 0,5 - 1,5 mm, (breadth taken at base of three central lobes), pure white or with pale purple lines and throat. Spur narrowly conical, circinnate, 1,5 - 5,5 mm.

H. parviflora occurs in the Southern and Eastern Cape, from Bredasdorp as far as Port Shepstone, but not yet recorded from the Transkei. It grows in damp places and on mossy boulders, usually in a sheltered position or under bushes and trees, but

MAP 13. Distribution of Holothrix parviflora (Lindl.) Reichb.f.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km



it has also been recorded from rocks just above high tide (at Knysna). Flowering time is from July to November.

Vouchers:

McLoughlin s.n. (BOL), Parker 1059 (BOL), Long 1018 (PRE),  
Bayliss 35/1562 (PRE), Sim 950 (NU).

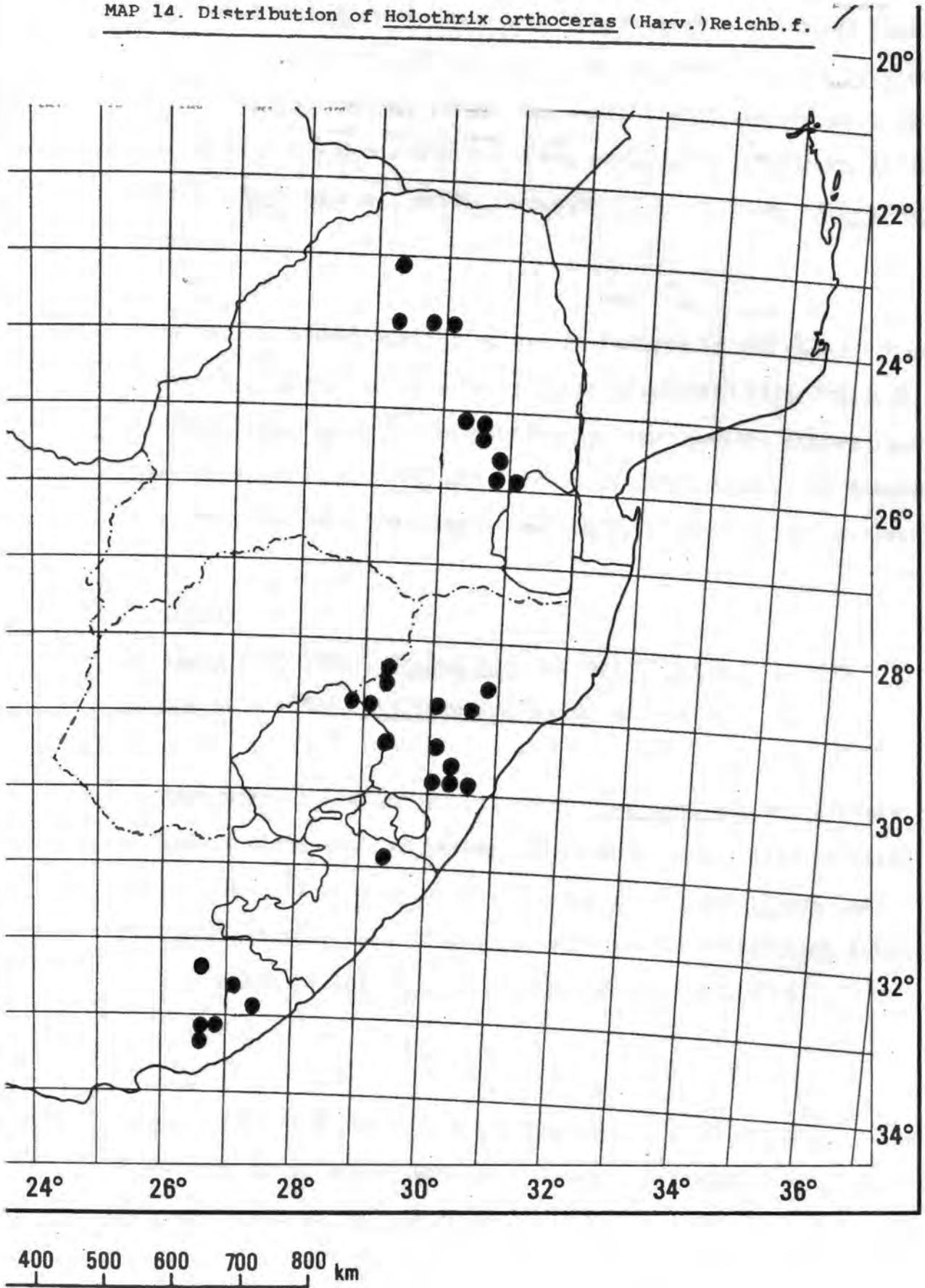
TAXONOMIC NOTES

The younger Reichenbach considered T.parviflora a separate species, and transferred it to Holothrix. T.secunda could not be transferred to Holothrix because of the existence of H.secunda (Thunb.) Reichb. f. Consequently he proposed the new name H.lindleyana Reichb. f.

Tryphia parviflora is described by Lindley from a specimen said to differ from T.secunda Lindl. mainly with respect to the size of the plant and flower, being half the height and with flowers one quarter the size of T.secunda. A drawing of the flower of the type (Drege 8276a (K!)) confirms that the two taxa are conspecific. The name H.lindleyana Reichb. f. is therefore unnecessary.

14. Holothrix orthoceras (Harv.) Reichb. f., Otia Bot. Hamb : 119  
(1881) Type : Howieson's Poort, and on the Katberg, Hutton s.n.  
(K!). Tryphia orthoceras Harv., Thes. Cap. 4 : 4, pl. 105 (1863).

Leaves glabrous, veined with white or silver. Scape with a dense cover of fine, short hairs, without bracts, 60 - 280 mm. Sepals glabrous, 1,5 - 3,5 x 0,5 - 1,0 mm. Petals undivided, membranous, each petal rolled into a tube with its edges overlapping that of

MAP 14. Distribution of Holothrix orthoceras (Harv.) Reichb.f.

the other petal, apices attenuate, 3,5 - 7,5 x 1,0 - 2,0 mm, white. Lip membranous, divided into five to ~~many~~ lobes, the outer pair of lobes broadly linear and acute, two or more times as long as the triangular central lobes, lip papillate at the entrance to the spur, 4,0 - 8,5 x 2,0 - 5,5 mm, white with or without purple veins. Spur conical, acute, straight, 2,5 - 6,5 mm. Anther-sacs purple.

This fairly common species occurs in forests in the Eastern Cape Province (Grahamstown and Stutterheim districts), the Transkei at Tabankulu, Natal (Pietermaritzburg, Harriesmith, Dundee) and the Transvaal (Lydenberg and Pietersburg districts). It flowers from March to May, but also occasionally in October and November.

Vouchers:

Bokelman s.n. (BOL), McLoughlin 626 (BOL), Botha s.n. (PRE), Allsop s.n. (PRE), Hilliard and Burt 6519 (NU).

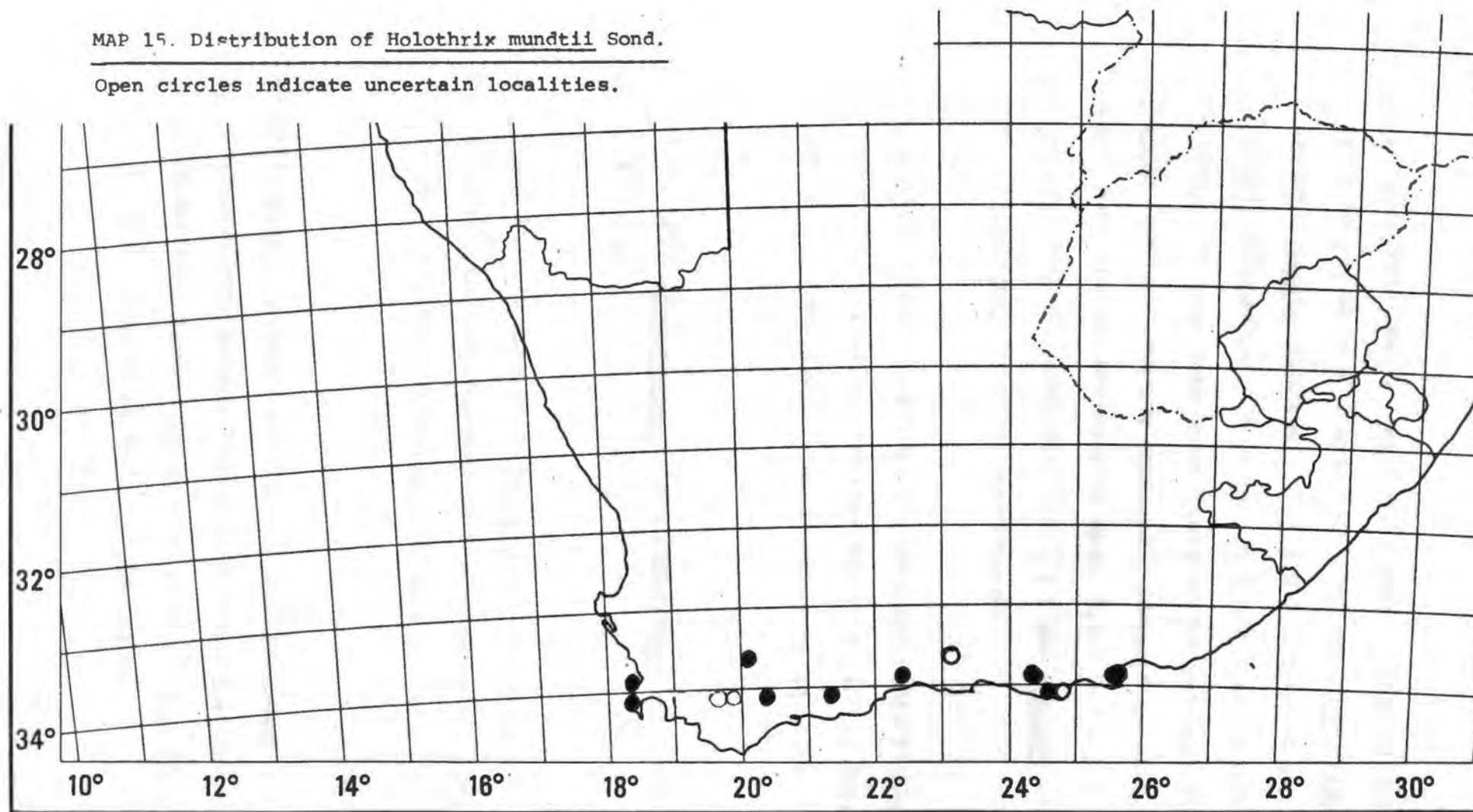
H.orthoceras is similar to the rarer H.macowaniana but differs in having silver-veined leaves and a longer outer pair of lobes on the lip. It is also often confused with H.parviflora, but its straight spur, and triangular rather than rectangular lobes in the centre of the lip, will serve to distinguish it.

15. Holothrix mundtii Sond. in Linnaea 19 : 77 (1847) Type :

Swellendam area, and in Worcester area, Winterhoekberge, 4 - 5000 ft., among ericas, Mund s.n. (K!).

MAP 15. Distribution of Holothrix mundtii Sond.

Open circles indicate uncertain localities.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

Leaves glabrous, small. Scape with short, fine, slightly reflexed hairs, without bracts, 40 - 160 mm. Inflorescence condensed. Sepals glabrous, 1,0 - 2,0 x 0,3 - 0,5 mm. Petals undivided, membranous, 1,5 - 2,5 x 0,3 - 0,5 mm, white. Lip membranous, divided into seven lobes on the same pattern as H.aspera (central lobe and outer pair longer than other four lobes), papillate at entrance to spur, 1,5 - 3,5 x 0,5 - 2,0 mm, white. Spur conical, straight, 0,5 - 1,5 mm. Column very short, green. Anther-sacs bright pinkish-mauve.

H. mundtii is distributed from the Cape Peninsula through the South Western and Southern Cape as far east as Port Elizabeth, and can be found in flower from September to November.

Vouchers:

Fair s.n. (BOL), Esterhuysen 19033 (BOL), Muir s.n. (PRE), Bolus 4971 (PRE).

H. mundtii is very similar to H.aspera in the shape of its lip, but can easily be distinguished by the condensed inflorescence, as well as by the smaller flowers and straight spur.

16. Holothrix aspera (Lindl.) Reichb. f., Otia Bot. Hamb : 119 (1881)

Type : Namaqualand, between Mierenkasteel and Zwartdoornrivier. (13 miles south of Garies) Drege 8276 b (K!). Bucculina aspera Lindl., in Hook. Comp. Bot. Mag. 2 : 209 (1836).

Holothrix confusa Rolfe, in Dyer, Fl. Cap. 5 (3) : 105 (1913).

Syntypes : Mountainsides about Clanwilliam, Leipoldt in MacDwan and Bolus s.n. (Herb.Norm. Aust. 1757); stony places on Blaauwberg, Schlechter 8465 (K! BOL!); near Oliphant's River Mountains, Schlechter 5036 (K!); near Piekenierskloof and near Modderfontein, Schlechter 5077 (?); Hex River Valley, Wolley Dod 4054 (K! BOL!).

Leaves glabrous. Scape nearly glabrous to moderately pubescent with short, fine hairs, without tracts, 30 - 250 mm. Sepals glabrous, 1,0 - 3,5 x 0,8 - 2,5 mm. Petals undivided, broad, texture membranous, 3,5 - 6,5 x 1,0 - 4,0 mm, white with bright green bases and two maroon or purple stripes. Lip membranous in texture, divided into seven unequal lobes, may or may not be papillate at the throat, 3,0 - 8,5 x 1,0 - 6,0 mm (breadth taken at base of lobes), colour as for petals. Spur very broad, strongly curved, bent forward, 2,0 - 5,0 mm. Column arched over entrance to spur, lime-green. Anther-sacs purple or maroon.

A species of semi-arid areas, H.aspera occurs in the Western Cape and Namaqualand, with a possible record from the Sutherland district. It is found in sandy or rocky ground or in rock-cracks, and flowers from June to October.

Vouchers:

Bolus s.n. (BOL), Esterhuysen 3394 a (BOL), Acocks 17032 (PRE), Esterhuysen 5567 (PRE).



### TAXONOMIC NOTES

When Rolfe described H.confusa he wrote, "This has been confused with H.aspera Reichb. f., but is quite distinct in the shape of the petals as well as in the shape and smooth disc of the lip". Of the specimens he had seen, he retained only the type (Drege 8276 b) in H.aspera, removing all other specimens to H.confusa. In the descriptions, Rolfe gives the following characters as differing between the two species.

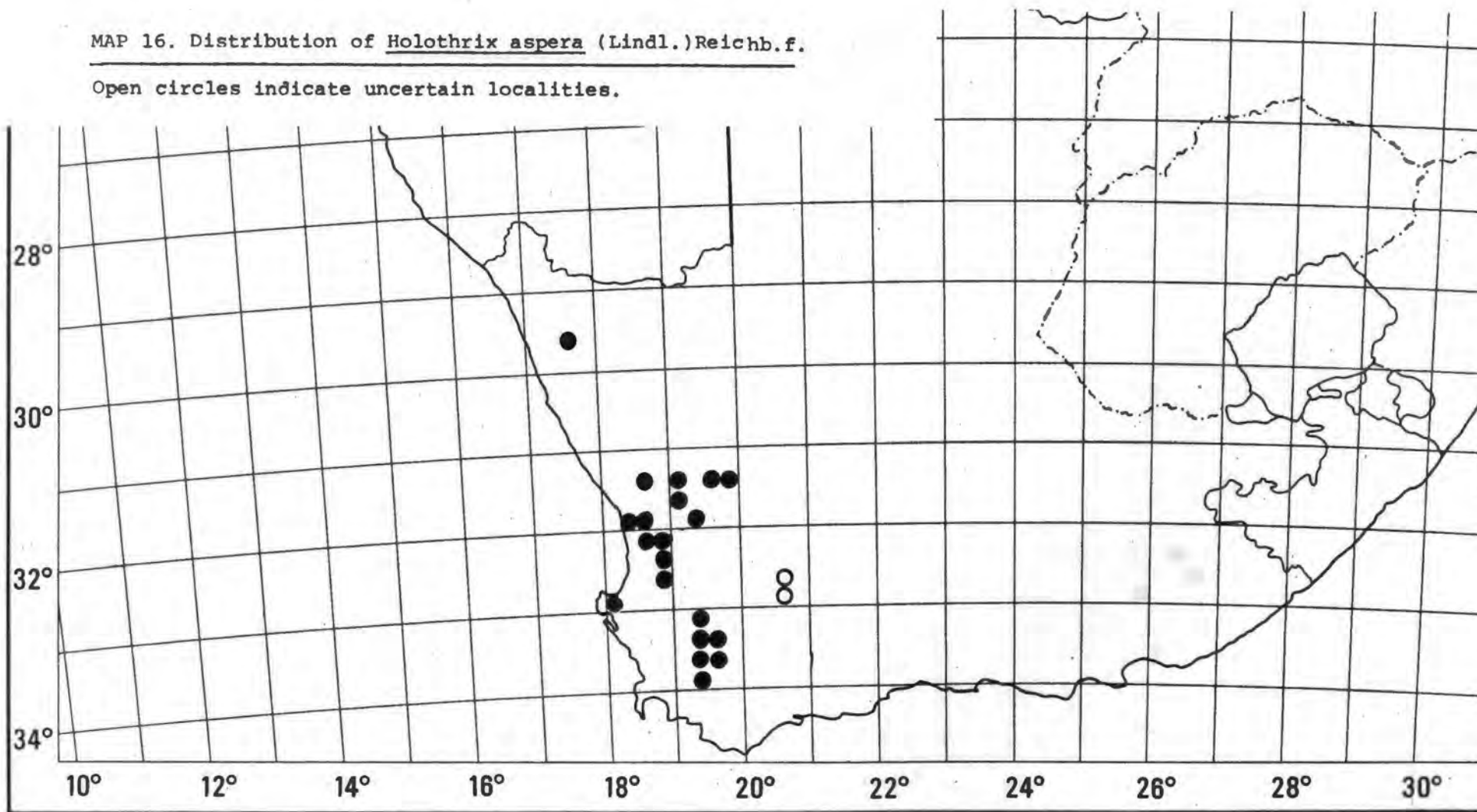
<u>H.aspera</u>	<u>H.confusa</u>
Petals broadly triangular-ovate with a broad basal tooth in front, subacute	Petals ovate-oblong, obtuse
Lip unequally 5-lobed	Lip broadly flabellate, 7-lobed
Disc covered with crystalline papillae	Disc smooth

All these characters intergrade however, as does the flower size which Rolfe used in his key (in Fl. Cap.).

In the case of the 5-lobed lip, the two shorter lobes on either side are so short as to give the appearance of a single lobe with a broadened, emarginate tip. No geographical disjunctions or difference in flowering time between the two taxa could be observed. H.aspera and H.confusa are therefore regarded as conspecific.

MAP 16. Distribution of Holothrix aspera (Lindl.) Reichb.f.

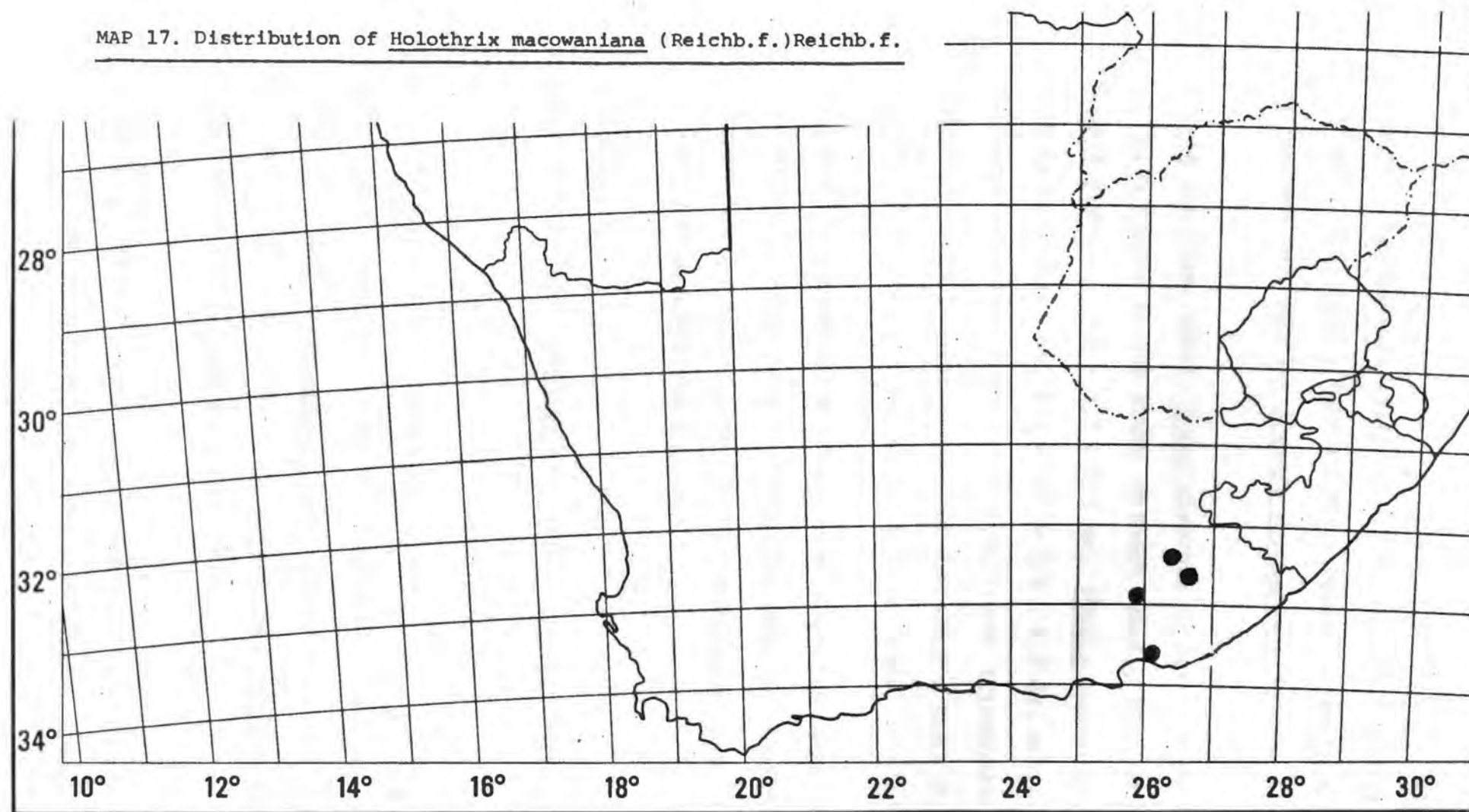
Open circles indicate uncertain localities.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

MAP 17. Distribution of Holothrix macowaniana (Reichb.f.)Reichb.f.



T.S.O. Misc. 8091

km 100 0 100 200 300 400 500 600 700 800 km

17. Holothrix macowaniana (Reichb. f.) Reichb. f., in Otia Bot. Hamb. 2 : 108 (1881) Type : Bedford div., Kagaberg, Weale s.n., sent by MacOwan (K!, BOL!). Tryphia macowaniana Reichb. f.

Leaves glabrous, small. Scape glabrous or with short, fine hairs at right angles to the scape, without bracts, 50 - 60 mm.

Sepals glabrous, 1,5 - 3,0 x 0,5 mm. Petals undivided, membranous, with attenuate apices, 3,0 - 4,5 x 0,5 - 1,5 mm, white. Lip membranous, divided into very short, broad, triangular lobes, number of lobes indeterminate, lip 5,5 - 6,5 x 2,5 - 5,5 mm, white. Spur narrowly conical, straight, 3,5 - 6,5 mm.

This small and probably not very common species has a restricted distribution, and occurs in the Eastern Cape in the Grahamstown district, at the Katberg and at Stockenstrom, always in forests. It flowers from August to October.

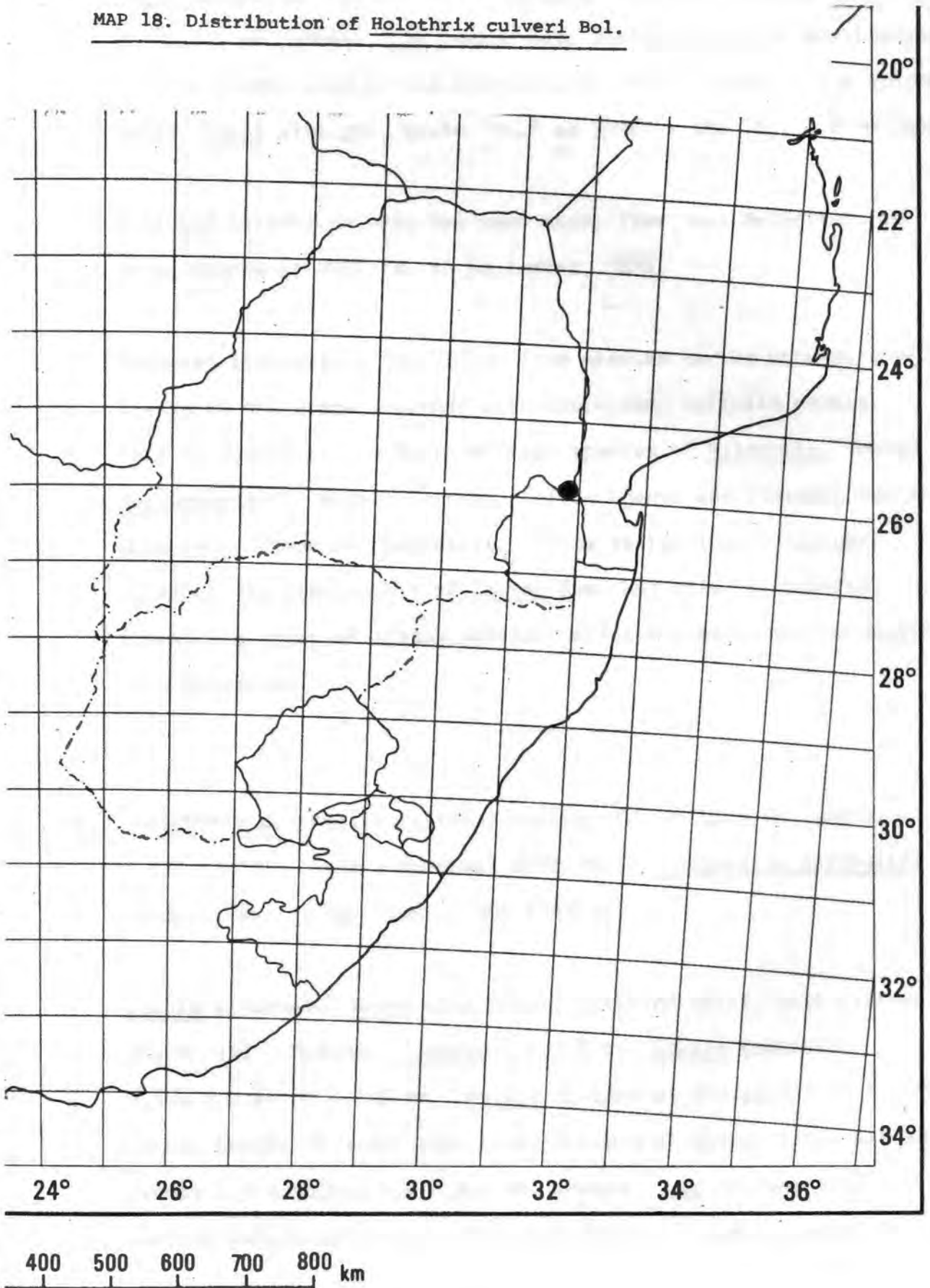
Vouchers:

Glass 6204 b (BOL), MacOwan s.n. (BOL), Scully (SAM).

18. Holothrix culveri Bol., in Trans. S. Afr. Phil. Soc. 16 : 147 (1905) Type : Near Barberton, Fig Tree Creek, on rocky slopes, Culver 84 (BOL!). Deroemera culveri (Bol.) Schltr., in Engl. Bot. Jahrb. 38 : 144 (1907). H.culveri var. integra Bol, Ibid. Type : Barberton, Culver 84 a (BOL! K!).

Leaves withered at flowering, apparently only one present. Scape with a few short hairs at the base, with bracts, slender, 140 mm.

MAP 18. Distribution of Holothrix culveri Bol.



Sepals glabrous, 2,5 x 0,8 mm. Petals undivided, membranous, oblong, 4,0 x 1,5 mm, white. Lip membranous, entire or with a small acute lobe on either side of the broadly oval central lobe, 3,5 x 3,0 mm, white. Spur straight, acute, half as long as the lip, 1,5 mm long.

A single collection only has been made, from near Barberton, on rocky slopes at 2000 ft. in September, 1890.

The most interesting feature of this species is the occurrence of bracts on the scape together with undivided, delicate petals.

This is unique in the South African species of Holothrix, though H. squammata (A. Rich.) Reichb. f. from Uganda and Ethiopia has the same combination of characters. Bolus stated that there were spurs on the side-sepals of Culver 84a, but this is doubtful; probably a strip of tissue was torn off the ovary when the sepals were dissected.

19. Holothrix burchellii (Lindl.) Reichb. f., in Otia Bot. Hamb.

: 119 (1881). Type : Burchell 6709 (K!). Scopularia burchellii Lindl., Gen. et Sp. Orch. : 304 (1835).

Leaves glabrous. Scape with short, deflexed hairs, with bracts, stout, 150 - 500 mm. Flowers dimorphic. Sepals glabrous, 2,5 - 5,0 x 1,0 - 2,5 mm. Petals divided at the apex into 5 - 10 lobes, longer on upper than lower flowers of spike, lobes carnose, petals 3,5 - 18,0 x 1,0 - 3,5 mm, creamy. Lip divided into 5 - 13 carnose lobes, lobes longer on upper than on lower flowers of



spike, lip 3,0 - 9,0 x 1,5 - 4,0 mm, creamy. Spur conical, curved, smaller on upper than lower flowers, 3,0 - 6,0 mm. Anther-sacs pale chestnut to tan in colour.

This species occurs at Piketberg, then in the Southern and Eastern Cape from Bredasdorp to the Queenstown and Stutterheim districts. It flowers from August to November.

Vouchers:

Schelte 7133 (BOL), Bolus 11382 (BOL), Schlieben and Ellis 12387 (PRE), Sidey 1255 (PRE).

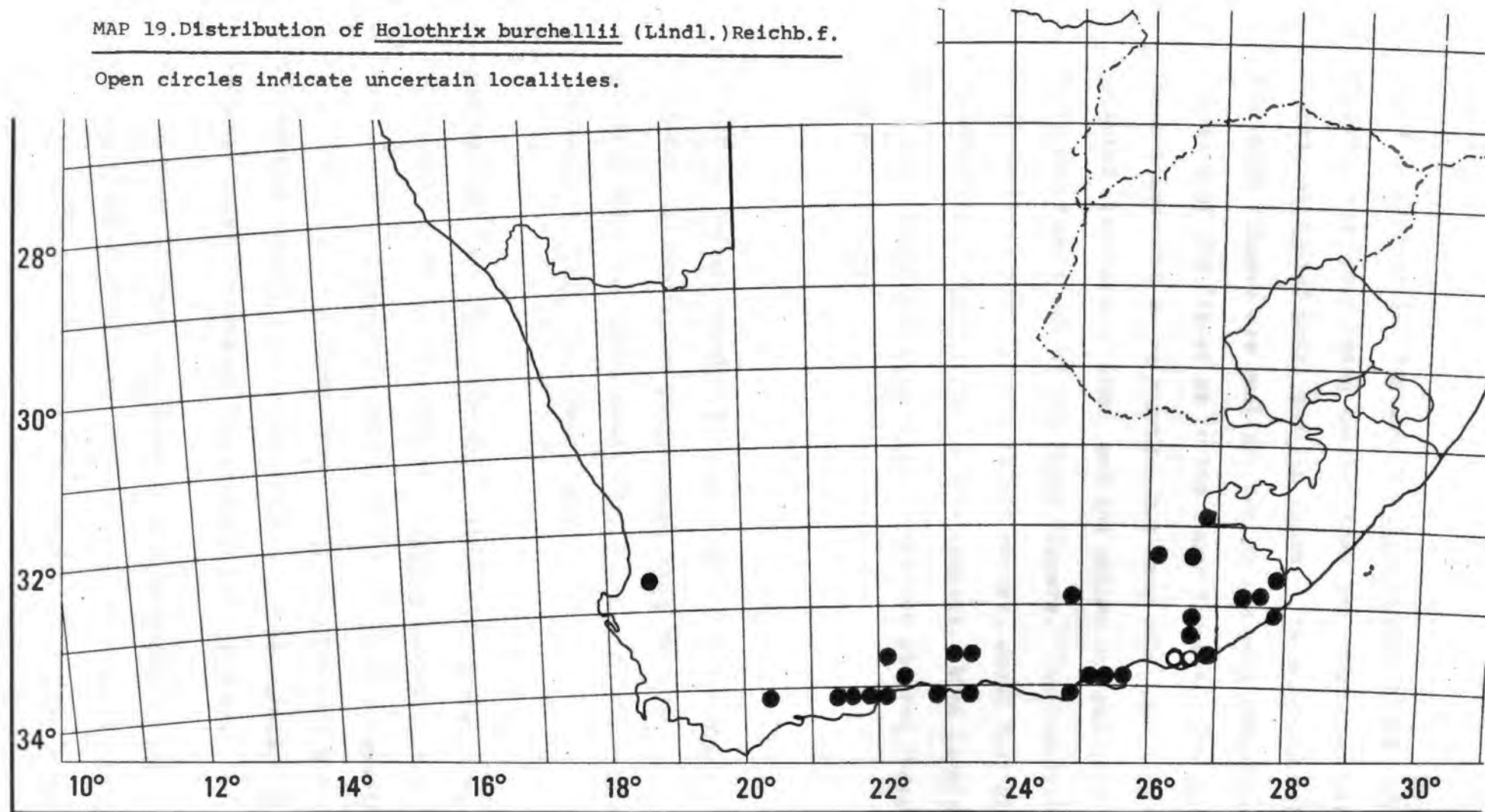
TAXONOMIC NOTES

The location of the type of H.burchellii (Burchell 6709) is given as "In a walk to the white clay pit or cliff, bearing true north-east from our station at Zoetmelksrivier, 17 : 11 : 1814".

Using Burchell's map the grid reference was established as 3421 AB (Riversdale). On the 1:500 000 topographical map the precise locality proved difficult to pinpoint. There were two possibilities, firstly, bearing north from Soetmelksrivier to Witkleigat ( $\pm$  950 m), or secondly, bearing west to Witkleikop (995 m). The second is apparently a steep koppie standing out in the landscape. Both localities lie between the Riversdale-Herbertsdale and Riversdale-Albertinia roads.

However, if white-coloured clay is common in the area, it may well be that there are numerous possible localities, especially as neither possibility mentioned is "true north-east" from Soetmalksrivier.

Open circles indicate uncertain localities.



The most interesting feature of H.burchellii is the dimorphic flowers, the upper being smaller than the lower, but with greatly elongated petal and lip lobes. The spur and column of the upper flowers are smaller, but in the same proportion to the size of the flower as in the lower flowers. The upper flowers are said to be sterile, but have been seen to produce capsules with seed in them, and the column and pollinia are no different from those of the lower flowers. The transition from short to long-lobed flowers is not abrupt, about four or five flowers being intermediate in this respect. When Lindley described Scopularia burchellii he did not observe these dimorphic flowers.

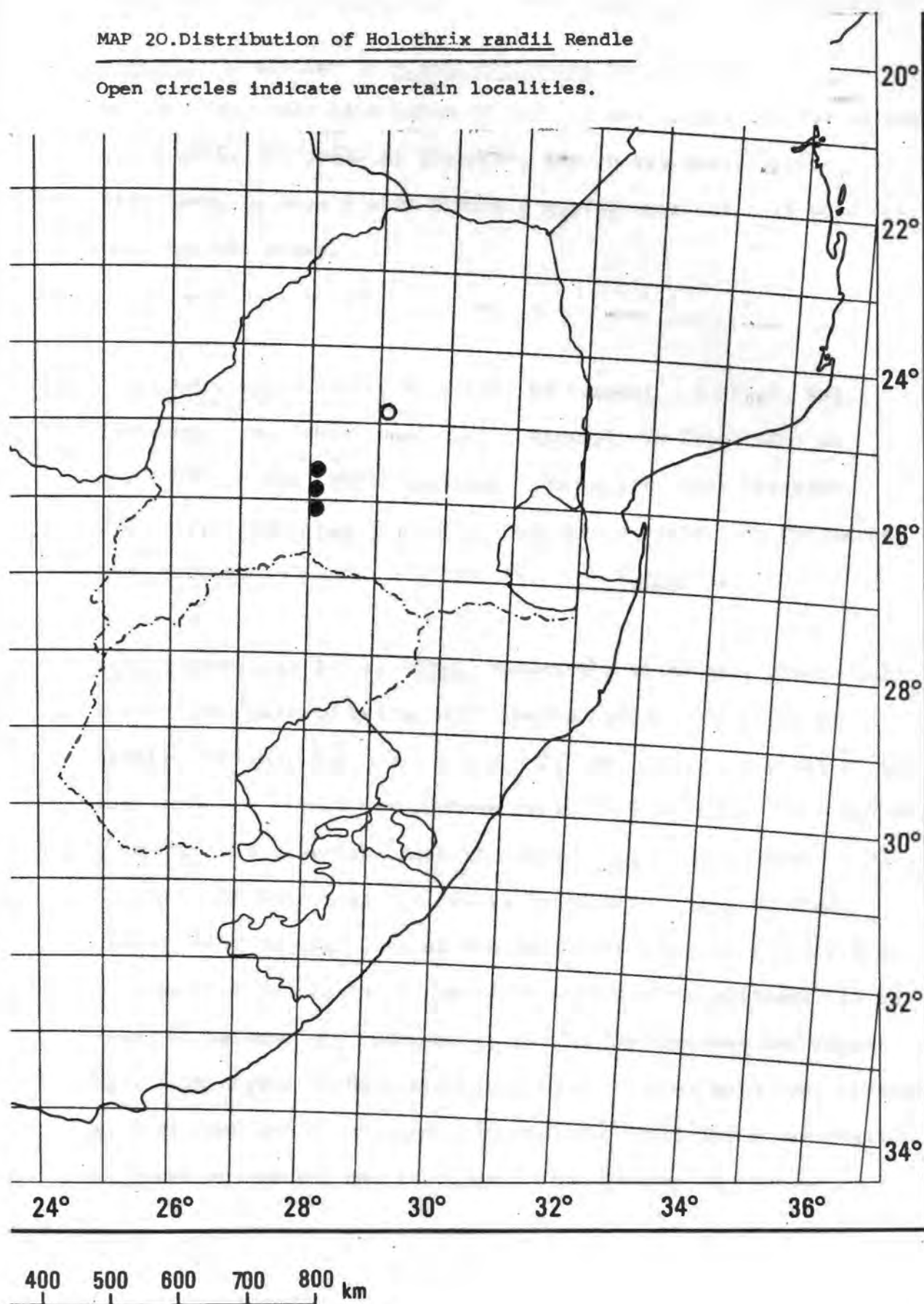
20. Holothrix randii Rendle, in Journ. Bot. : 208 (1899). Type : Rhodesia, Salisbury, in shady woods, Rand 596 (BM).  
H.reckii Bol., Ic. Orch. Aust. Afr. 3 : t. 21 (1913) Type : Koedoespoort, Reck 1003 (PRE!, BOL!).

Leaves glabrous. Scape minutely pilose with short, fine, sinous hairs, with bracts, 170 - 420 mm. Sepals glabrous, 2,5 - 4,5 x 1,5 - 2,0 mm. Petals divided into 7 - 11 fine, filamentous lobes, 6,0 - 13,5 x 1,5 - 4,0 mm, white. Lip divided into 8 - 15 fine, filamentous lobes, 10,0 - 13,5 x 2,8 - 5,0 mm, white. Spur conical, curved to nearly circinnate, 3,5 - 8,0 mm.

This species is found in Tanzania, Rhodesia and in the Transvaal in the divisions of Pretoria, Johannesburg and possibly Zebediela. It grows on grassy slopes and rocky ledges, flowering from September to December.

MAP 20. Distribution of Holothrix randii Rendle

Open circles indicate uncertain localities.



Vouchers:

Bolus 14082 (BOL), McLoughlin 144 (BOL), Howlett s.n. (PRE), Codd 6162 (PRE).

H. randii is similar to H. schlechteriana but differs in the fine, hair-like lobes of the lip and petals, in its colour being white not cream or greenish, and in its distribution. It also tends to have a more strongly curved spur but this does not hold for all cases.

21. Holothrix schlechteriana Schltr. ex Kraenzl., in Oest. Bot.

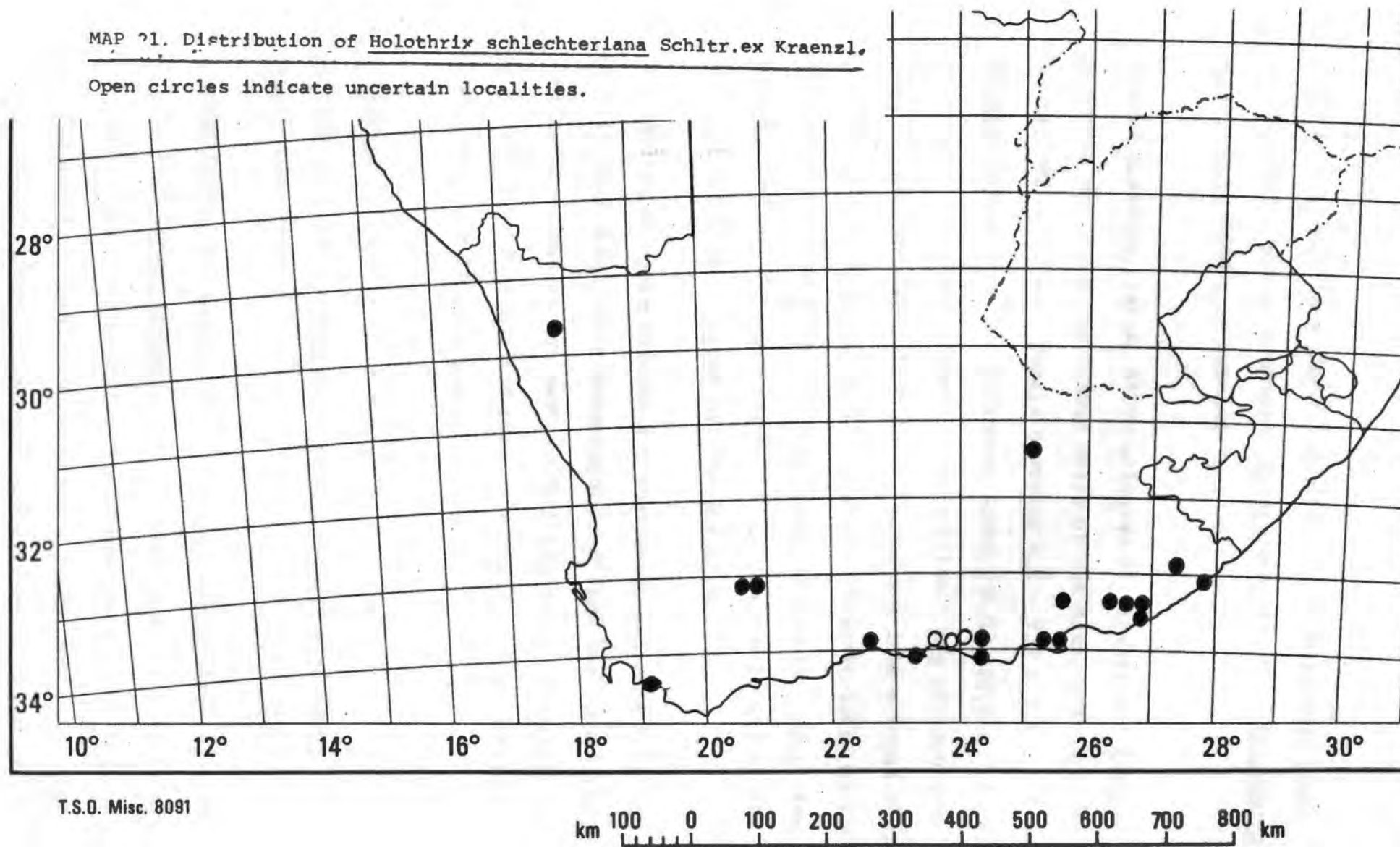
Zeitschr. : 14 (1899) nom. nud. ; Kraenzl. in Orch. Gen. et Sp. (1910) : 588 (1899) Syntypes : Rocky area near Clarkson, 5000 ft., Schlechter 6015 (K!), Queenstown distr., in mountains near Howieson's Poort, 2 - 3000 ft, Barber s.n. (?).

Leaves glabrous, large. Scape moderately to densely pilose with short fine, velvety hairs, with bracts, stout, 135 - 700 mm. Sepals glabrous, 2,0 - 6,0 x 0,5 - 2,5 mm. Petals divided at the apex into 4 - 9 filiform carnose lobes, 2,5 - 10,0 x 1,0 - 2,5 mm, green to pale greenish-cream to ochre. Lip divided into 5 - 11 filiform carnose lobes, colour as for petals. Spur conical, curved, half to nearly equal the length of the lip, 2,5 - 5,5 mm. This species occurs in a number of scattered localities. It is found at Caledon and Laingsburg, and in the Southern and Eastern Cape from Knysna to King William's Town. It has also been recorded at Springbok and Steynsburg. The habitat is in dry areas shaded by rocks or bushes, and it flowers from October to February.



MAP 21. Distribution of Holothrix schlechteriana Schltr.ex Kraenzl.

Open circles indicate uncertain localities.



T.S.O. Misc. 8091



22. Holothrix grandiflora (Sond.) Reichb. f., in Otia Bot. Hamb.

: 119 (1881) Type : Uitenhage, Sonder s.n. (S, K). Scopularia grandiflora Sond., in Linnaea 19 : 79 (1847).

Leaves glabrous, large, often withered at flowering. Scape glabrous or with a few minute hairs at the base, with bracts, stout, 190 - 510 mm. Sepals glabrous 4,5 - 9,0 x 1,5 - 4,5 mm. Petals divided into 5 - 9 carnose lobes, 10,0 - 22,0 x 1,5 mm, white with their bases green or pale lilac. Lip divided into 13 - 26 carnose lobes, limb often flared out into a broad distal section, lip 12,5 - 25,5 x 3,5 - 6,5 mm, (breadth taken at the base of the flared section), colour as for petals. Spur very broadly conical, slightly curved, 1/5 - 1/4 the length of the lip, 3,0 - 4,5 mm. Column with an apiculus.

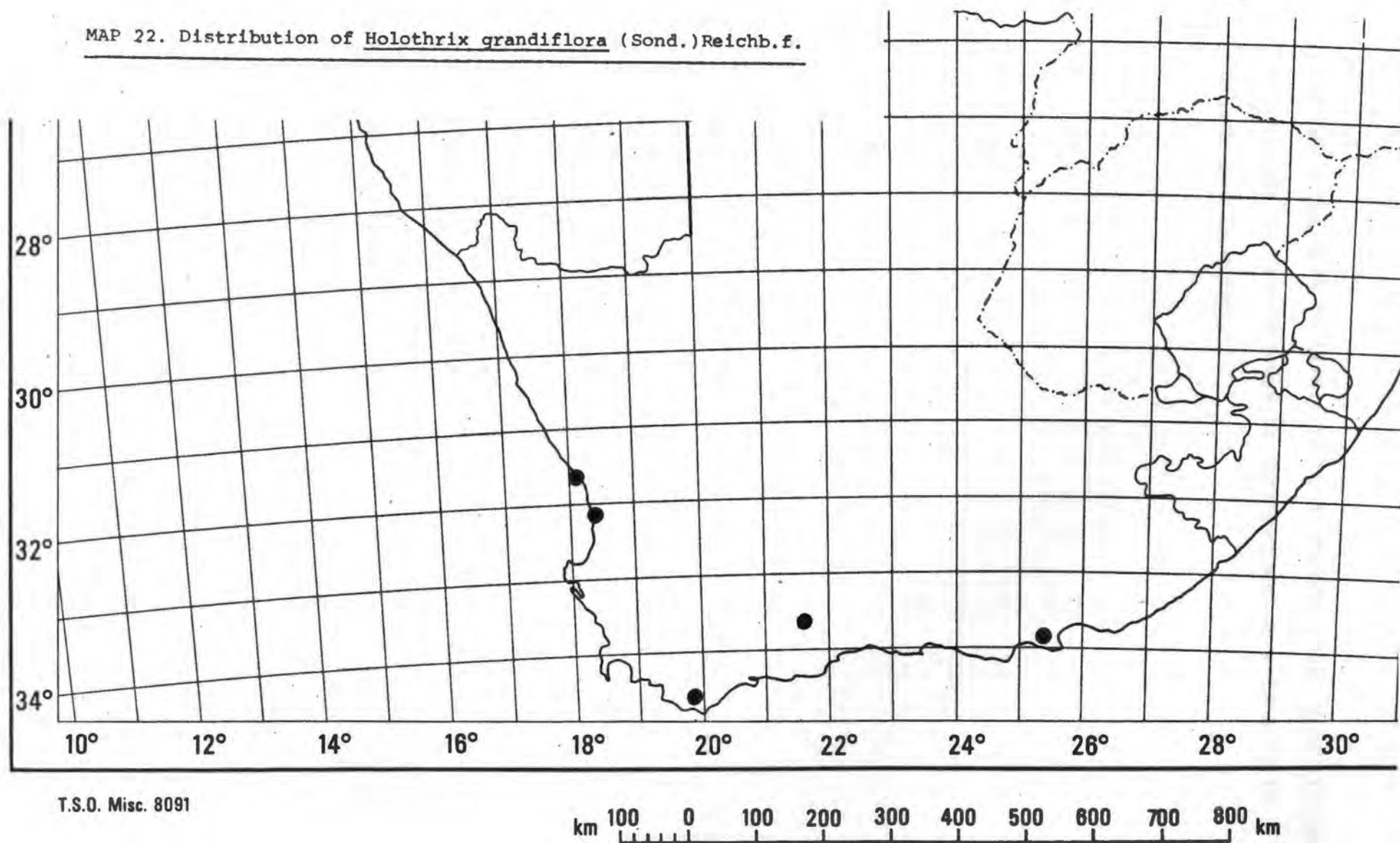
The records for this species are scattered, and come from the Western Cape coast, from Bredasdorp, and from two localities in the Southern Cape as far east as Port Elizabeth (the type). It grows in hollows and crevices in rocks, under semi-arid conditions, and flowers in March.

Vouchers:

Schelte 7663 (BOL), Hall 3521c (BOL), Guthrie s.n. (BOL), Bruyns 1282 (NBG).

H.grandiflora, the largest of the genus in South Africa, is fairly similar to H.schlechteriana. It can usually be distinguished by the shorter spur to lip ratio, the longer petals, and the nearly glabrous scape; it also generally has a larger number of lip lobes which are often situated on a flared distal part of the lip.

MAP 22. Distribution of Holothrix grandiflora (Sond.) Reichb.f.



T.S.O. Misc. 8091

The flowering time is later, being in March, while H.schlechteriana flowers mainly from October to December and occasionally in January and February.

Plate 3

1. Holothrix aspera (Lindl.) Reichb.f.

a) Whole plant, b) flower from the side, c) flower from the front, d) column from the front; Spektakelberg, Schelte s.n., grown at U.C.T.

2. Holothrix burchellii (Lindl.) Reichb.b.

a) Whole plant; Keurbooms Nature Reserve, at Wadrif, coastal plain, Mrs A. Bean 142, grown at U.C.T., b) flower from the base of the spike; Grahamstown, October, Seagrief s.n., in liquid preservative in BOL, c) flower from  $\frac{1}{4}$  way up the spike; Seagrief s.n., d) column of (b) from the front.

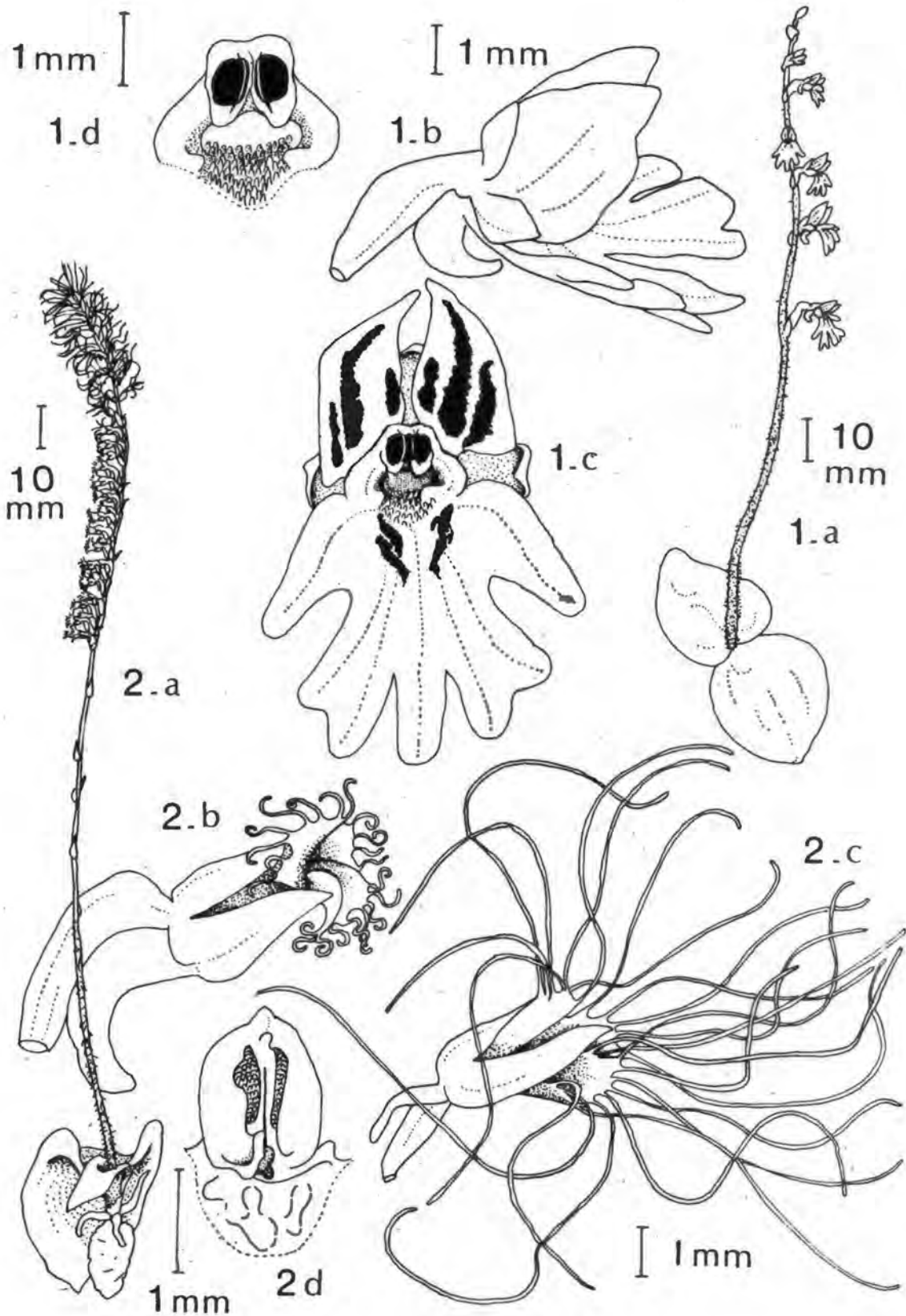


Plate 4

1. Holothrix pilosa (Burch. ex Lindl.) Reichb.f.

a) Whole plant, b) leaves before shrivelling, c) flower from the side, d) flower from the front, e) column; Wagenboomskraal, 24:12:78, Schelte s.n., grown at U.C.T.

2. Holothrix villosa var. villosa Lindl.

a) Whole plant, b) flower from the side, c) flower from the front, d) lip from above, e) column; grown at U.C.T.



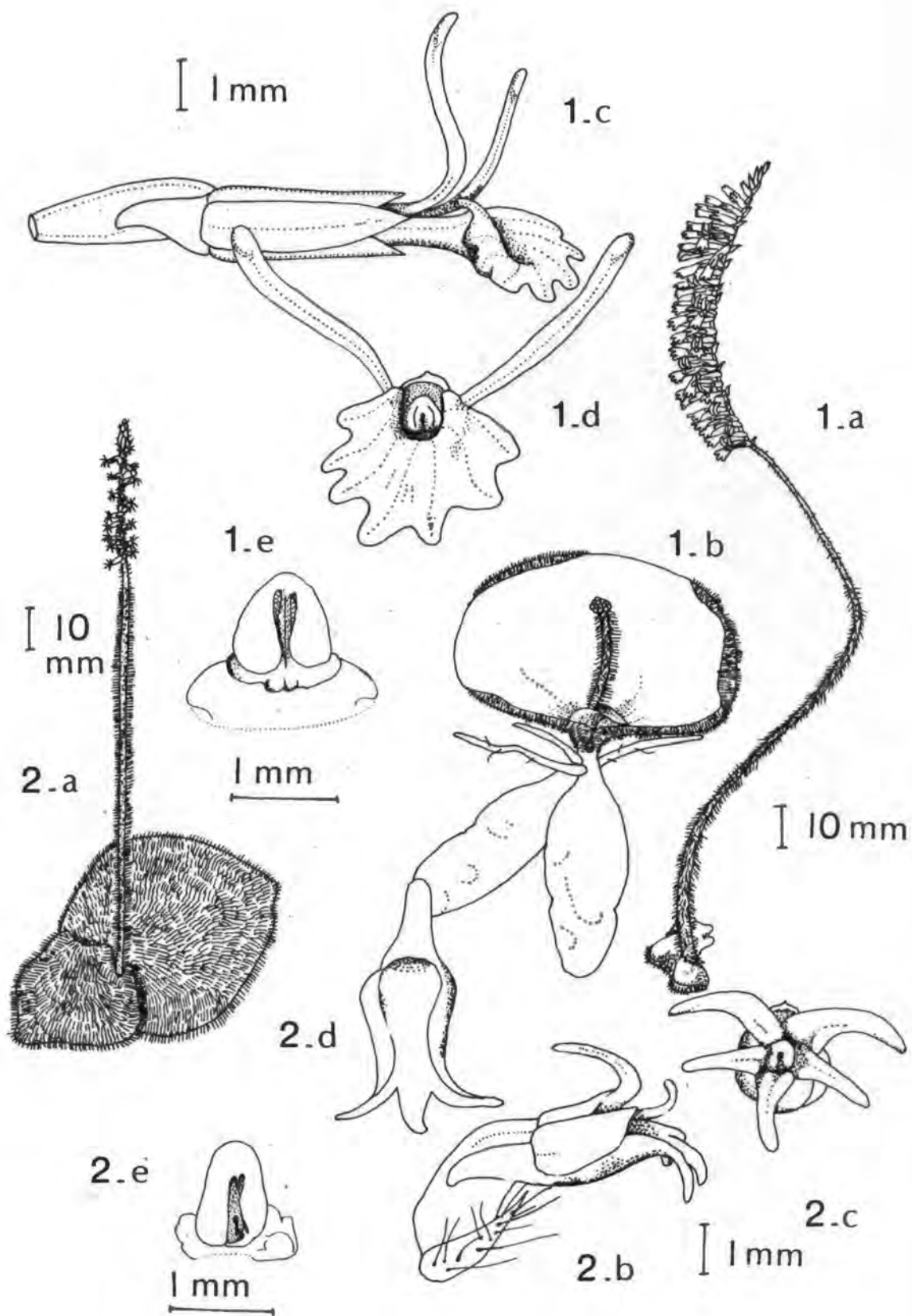


Plate 51. Holothrix exilis Lindl.

a) Whole plant, b) flower from the side, c) flower from the front; Kamanassieberge, 18:10:78, grown at U.C.T., d) lip with short side lobes, Esterhuysen 21205, e) lip without side lobes; Esterhuysen 18356, f) column.

2. Holothrix secunda (Thunb.) Reichb.f.

a) Whole plant, b) flower from the side, c) flower from the front, d) column; Perdekop, west of Barrydale, Oct., 1978, Schelte 7900, grown at U.C.T.

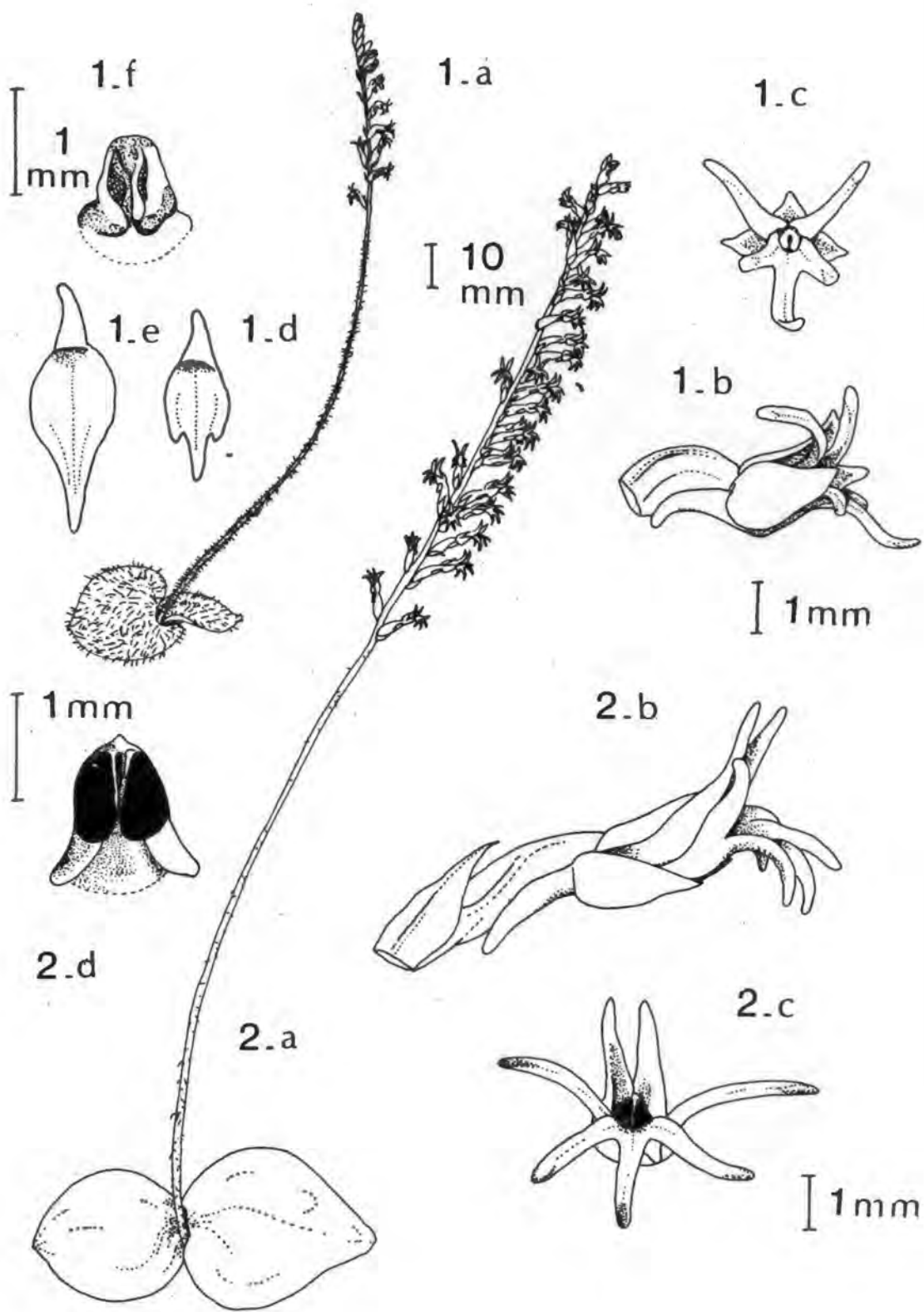


Plate 61. Holothrix cernua (Burm.f.) Schelpe

a) Whole plant, b) flower from the side, c) flower from the front, d) column; Piquetberg, 31:10:78, Linder 1792  
See also Plate 8.

2. Holothrix orthoceras (Harv.) Reichb.f.

a) Whole plant, b) flower from the side, c) flower from the front; Royal Natal National Park, 1:3:1979, grown at Kirstenbosch, in preservative in BOL.

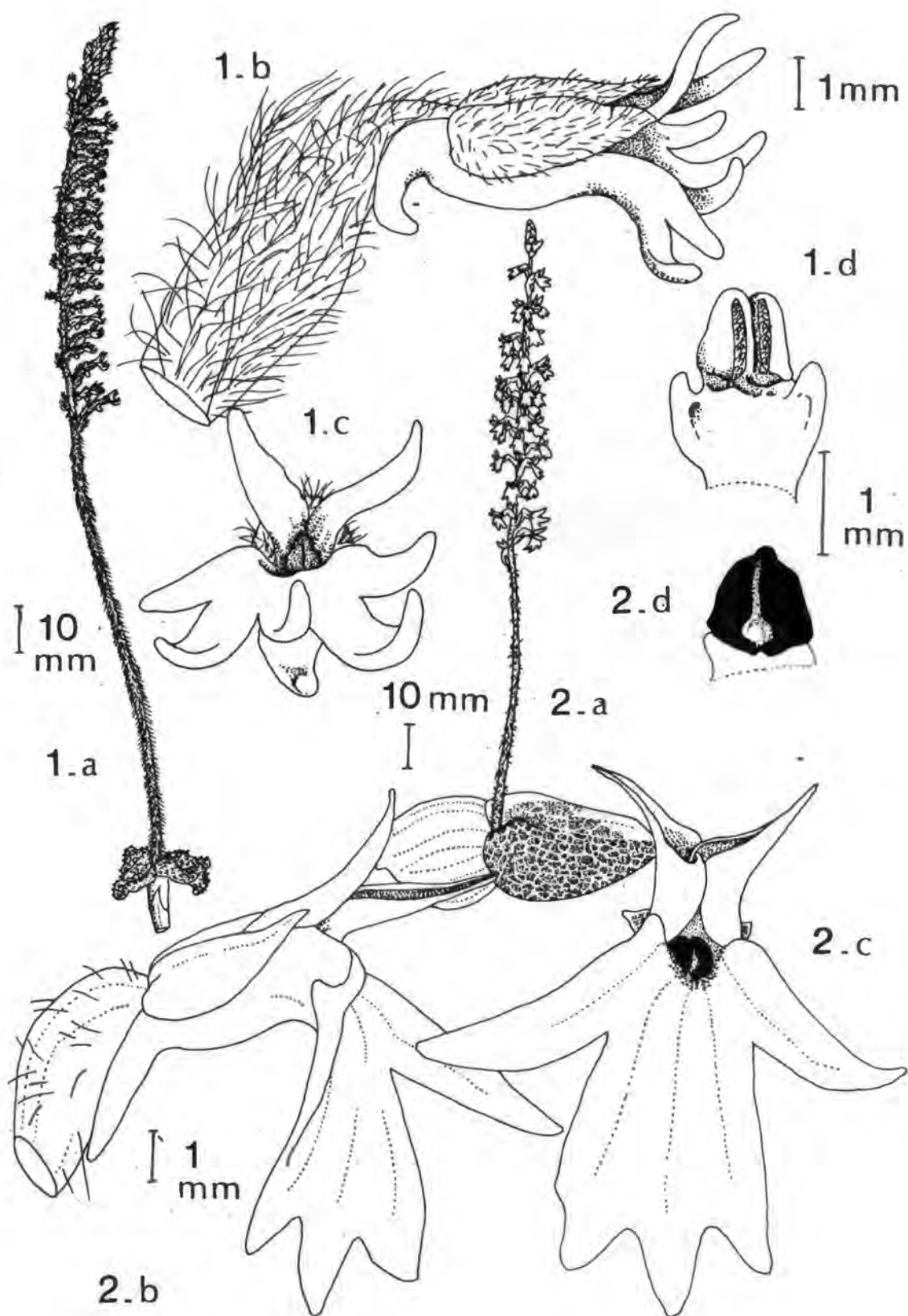


Plate 71. Holothrix mundtii Sond.

a) Whole plant, b) flower from the side, c) flower from the front, d) column; Riversdale, white dry bank, 25:9:78, Mrs A. Bean s.n. grown at U.C.T.

2. Holothrix filicornis Immelman sp.nov.

a) Leaf and tuber, b) flower from the side, c) lip from above, d) petal, e) column from the side, f) column from above, g) pollinium; Kopje near Springbok, 16:6:78, van der Westhuizen, s.n. (H.M.F. 20) in preservative in BOL.



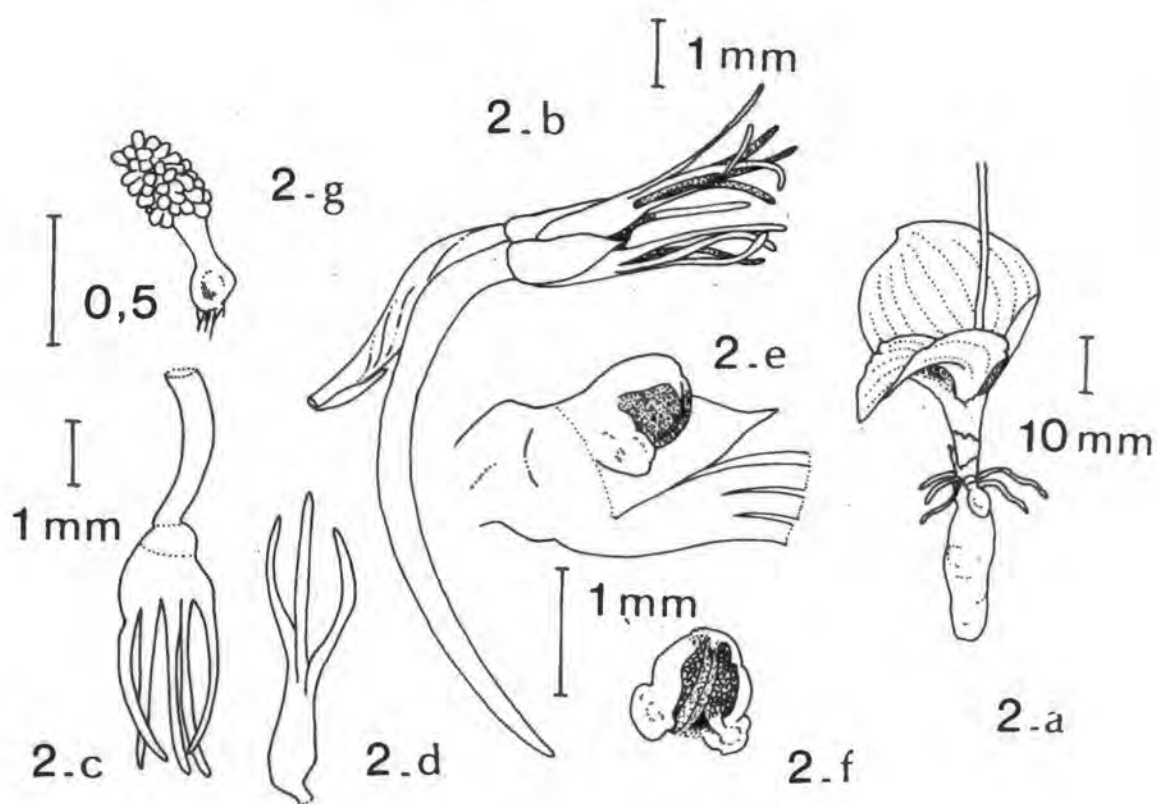
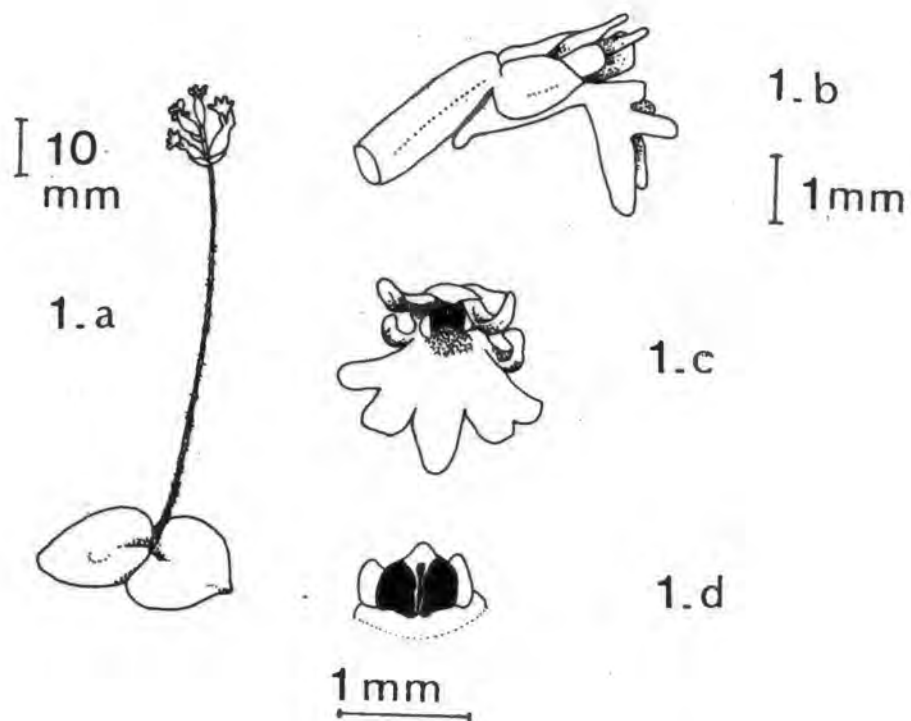


Plate 81. Holothrix cernua (Burm.f.) Schelpe

a) Flower with short spur, b) lip, 5-lobed, lobes unequal, c) petals, d) sepals, adnate; Bainskloof, ridge above camp-site running up towards Limietberg, 4.11.78, Esterhuysen 35093 (BOL). See also Plate 6.

2. Holothrix cernua

a) Lip, 3-lobed, lobes equal, b) petal, c) sepal, not adnate; Hall 1107 (BOL)

3. Holothrix cernua

Lip, 5-lobed, with longer spur; Hercules Pillar, 16:9:56, Schelpe s.n. (BOL).

4. H.cernua

Lip, 7-lobed; Bolus 7022  $\beta$

5. H.cernua

a) Upper surface of leaf, with squamules, b) scape, showing hispid, recurved hairs.

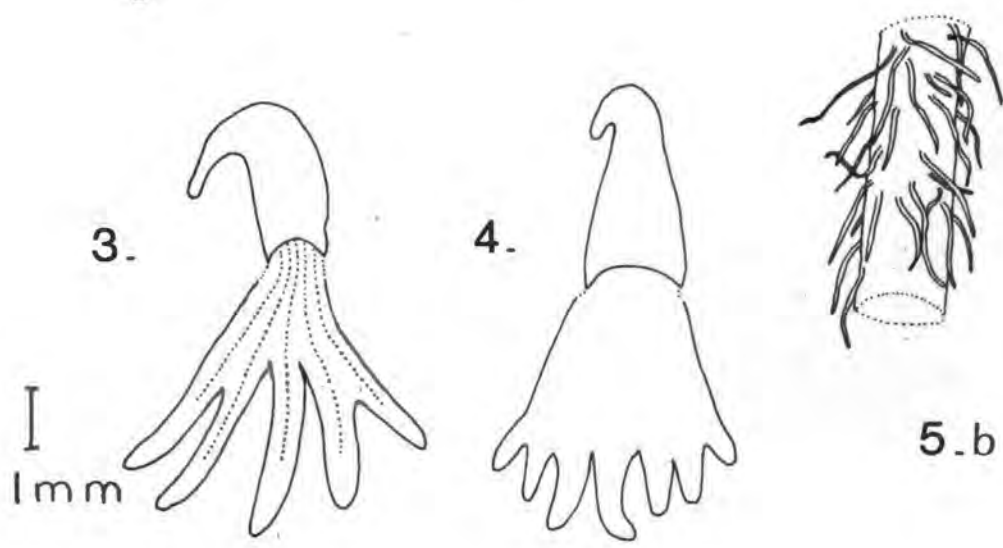
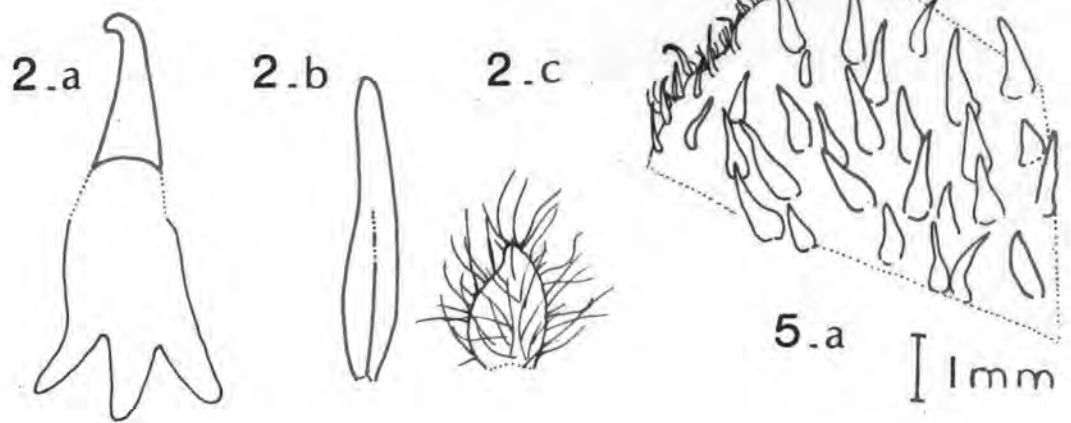
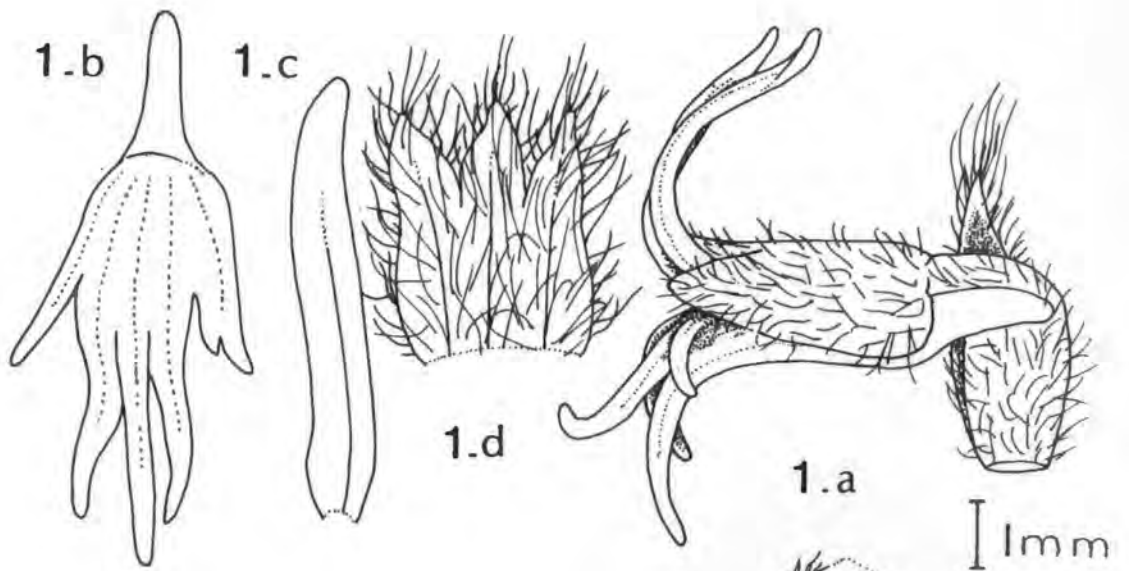


Plate 91. Holothrix grandiflora (Sond.) Reichb.f.

a) Whole flower from the side, b) flower from the front,  
c) lip, d) petal, e) sepal, f) column from the side,  
g) column from the front; Bruyns 34/76 (P. Bruyns'  
preservative collection).

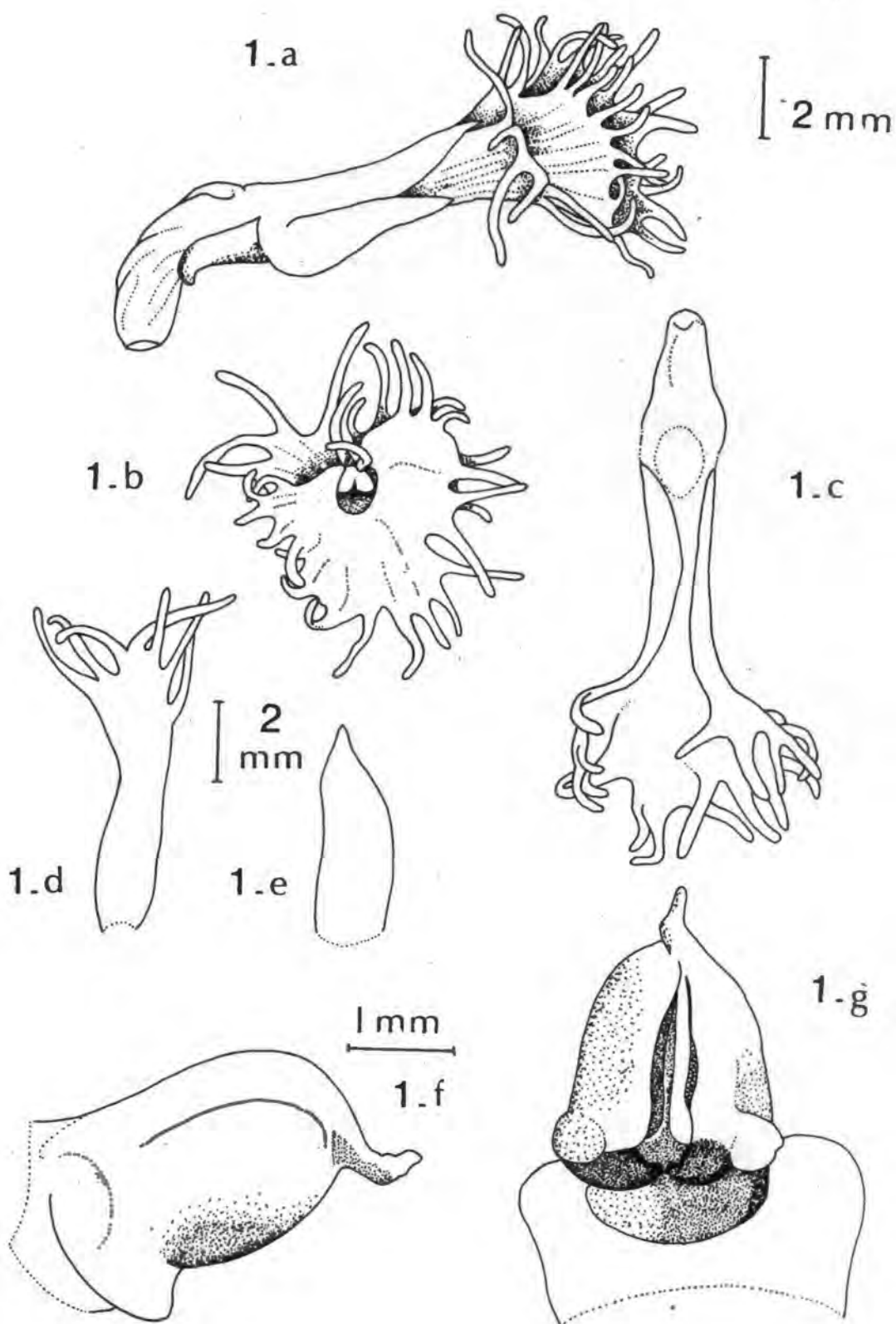


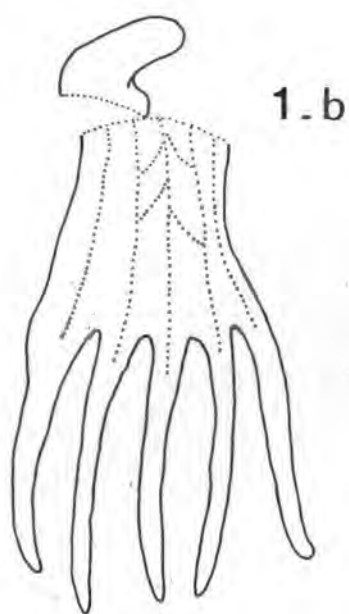
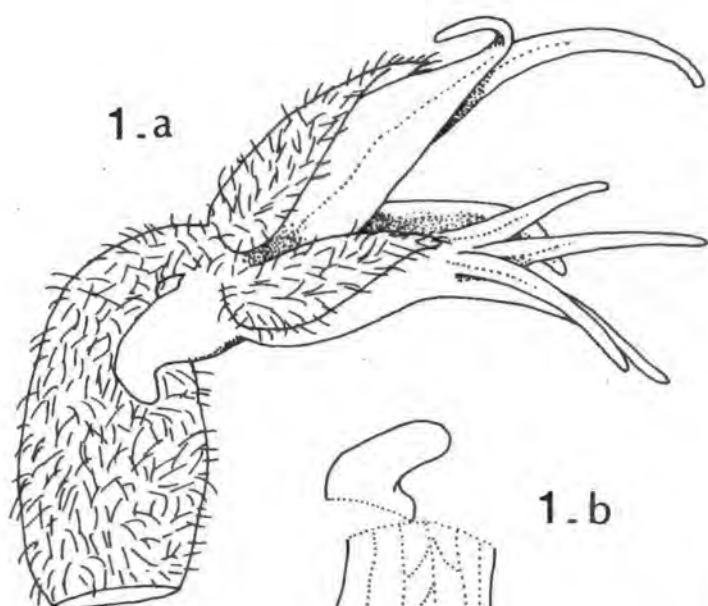
Plate 101. Holothrix incurva Lindl.

a) Flower, b) lip, c) petal, d) sepal; Naude's Nek,  
10:2:77, Linder 1048, in preservative in BOL.

2. H.rupicola Schltr. (= H.incurva)

a) lip, b) petal, c) sepal; Compton 21434





1mm

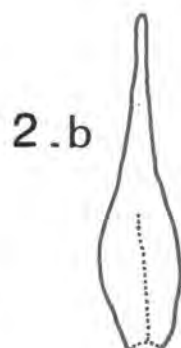
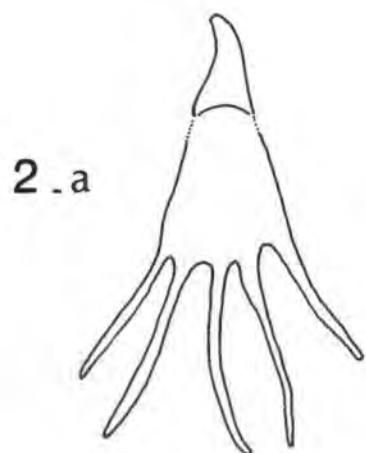


Plate 111. Holothrix thodei Rolfe

a) Flower, b) lip, c) petal, d) sepal; Haygarth s.n. (Wood 5574).

2. Holothrix parviflora (Lindl.) Reichb.f.

a) Flower; Grahamstown, cliffs at Lands End, 2:10:61, A.V. Hall 734, in preservative in BOL, b) lip, showing deeply cleft central lobes; Gordon s.n. (PRE), c) lip, showing shallowly cleft central lobes; Daly 10777 (PRE).

3. ?

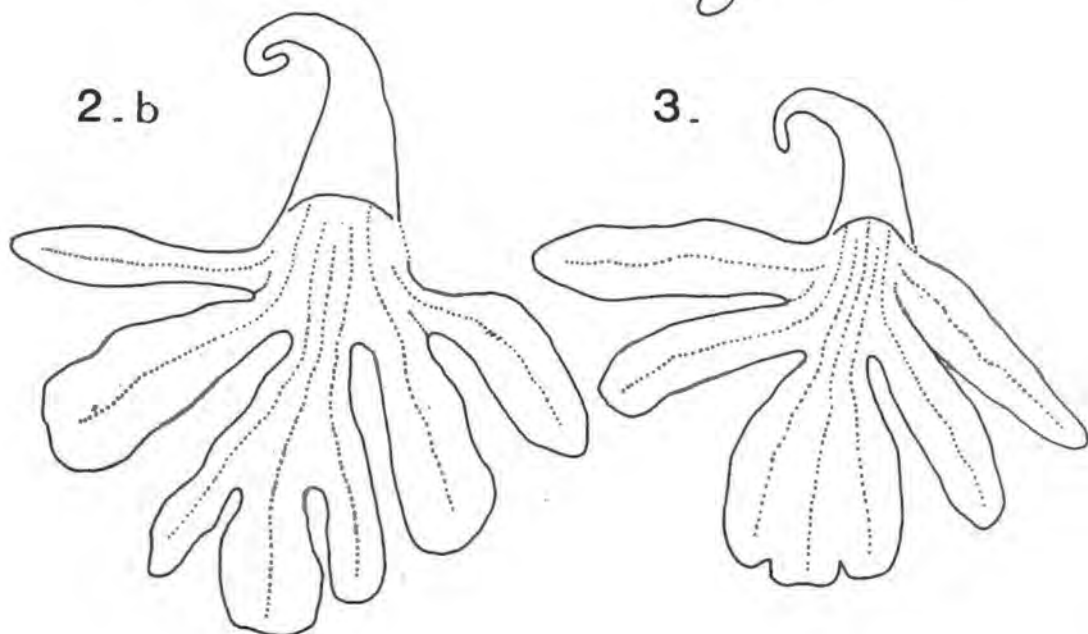
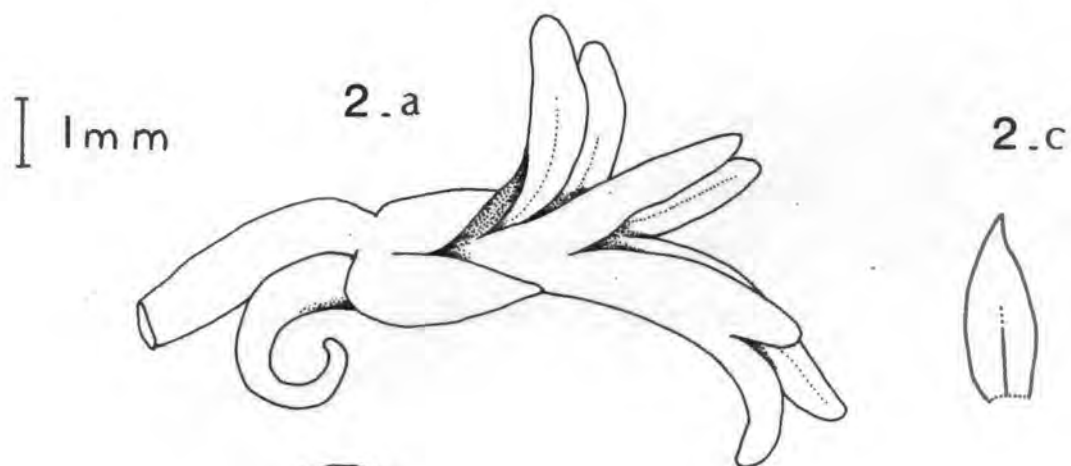
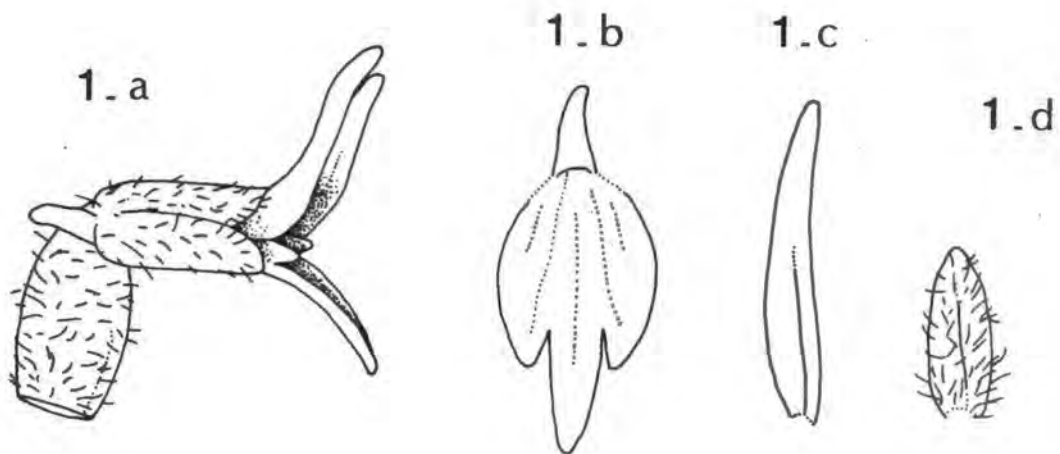


Plate 12

1. Holothrix lon gicornu Lewis  
a) Flower, b) lip, c) petal, d) sepal; Cutting 69.
2. H.culveri Bol.  
a) Lip, b) petal, c) sepal; Culver 84
3. H.macowaniana (Reichb.f.) Reichb.f.  
a) Lip, b) petal, c) sepal; Scully 6204

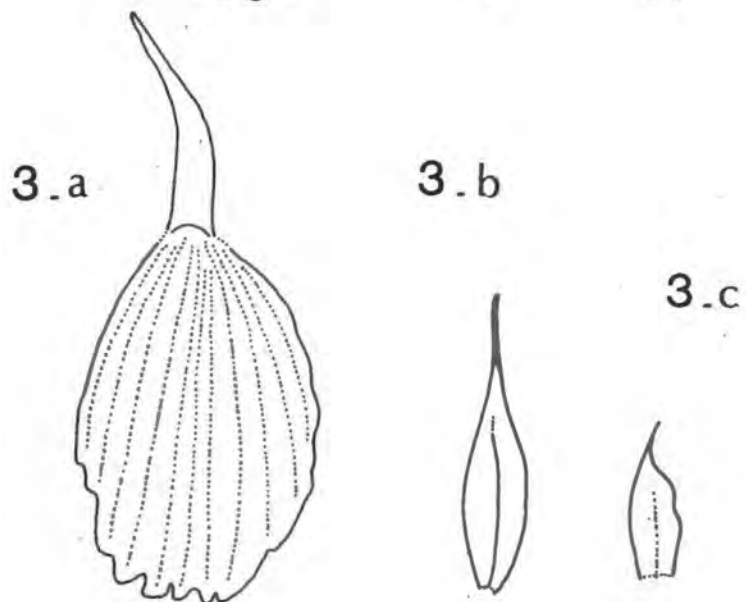
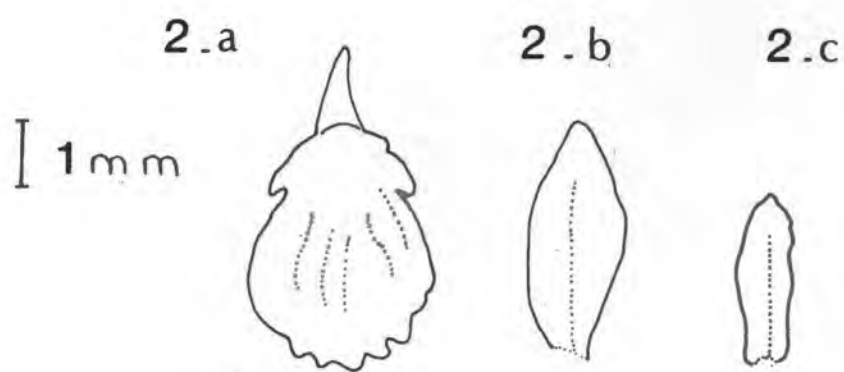
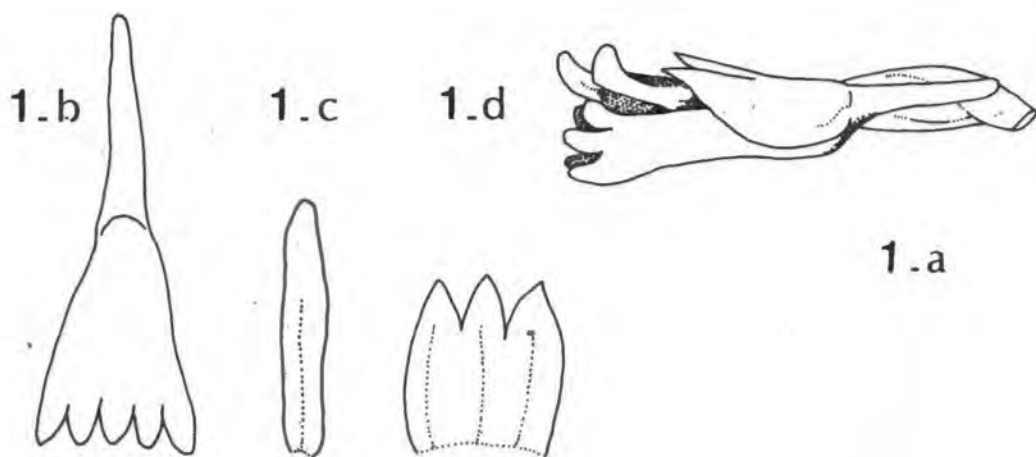
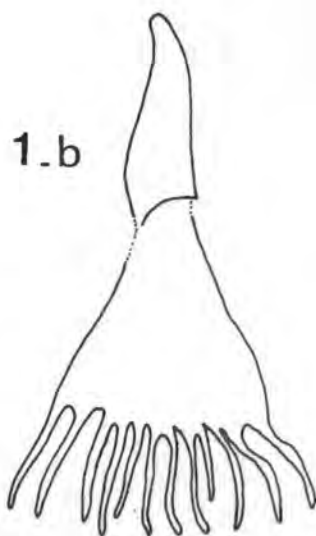
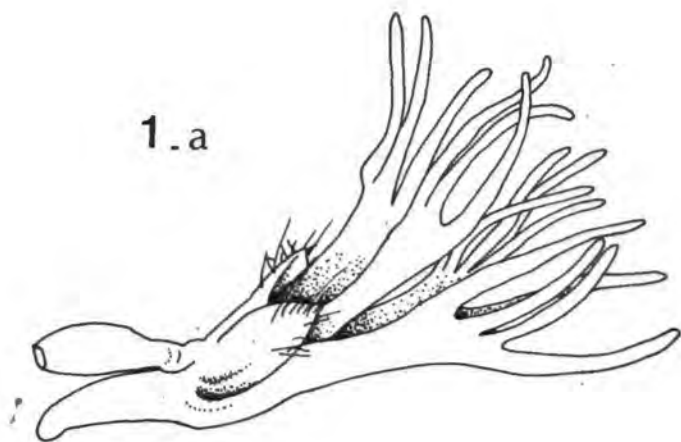


Plate 13

1. Holothrix scopularia (Lindl.) Reichb.f.  
a) Flower, b) lip, Ongeluksekk, 7:2:77; Linder 1031, in preservative in BOL.
2. H.scopularia  
a) Lip, b) petal, c) sepal; Linder 1031
3. H.multisecta Bol. (=H.scopularia)  
a) Lip, b) petal, c) sepal; Galpin s.n.

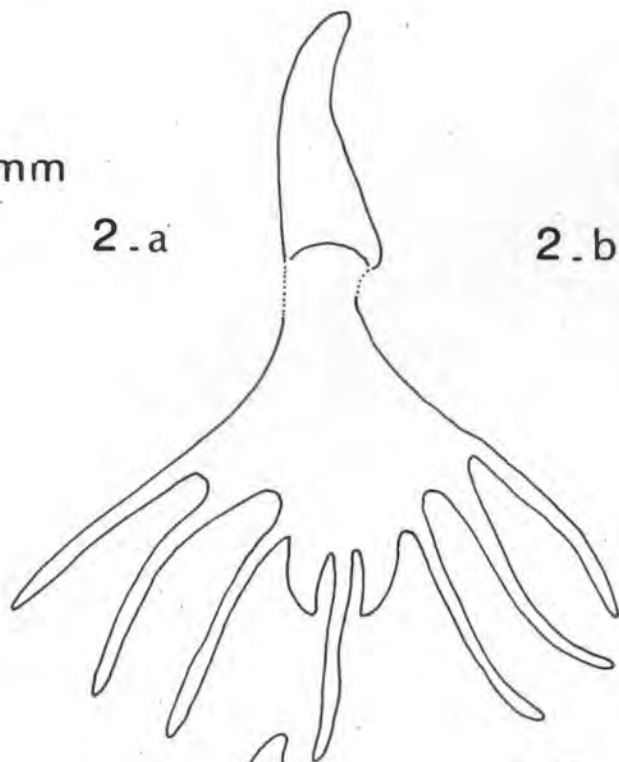




1mm



2.a



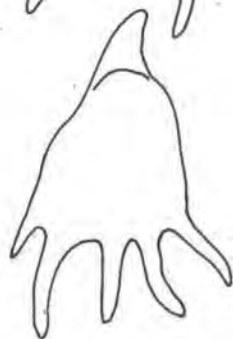
2.b



2.c



3.a



3.b



3.c



Plate 14

1. Holothrix villosa var. condensata (Sond.) Immelman  
a) Lip, b) petal, c) sepal; Leighton 748
2. H.villosa var condensata  
a) Lip, b) petal, c) sepal; Esterhuysen 29418
3. H.hispida (Thunb.) Immelman  
a) Flower, b) lip, 5-lobed, c) petal, d) sepal; Cape Point Nature Reserve, 19:1:68, Schelte s.n., in preservative in BQL.
4. H.hispida  
Lip, obscurely 5-lobed; Compton 8284.
5. H.hispida  
Lip, 3-lobed; Wolley Dod 2339

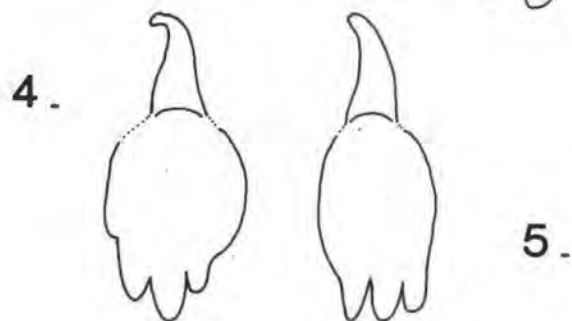
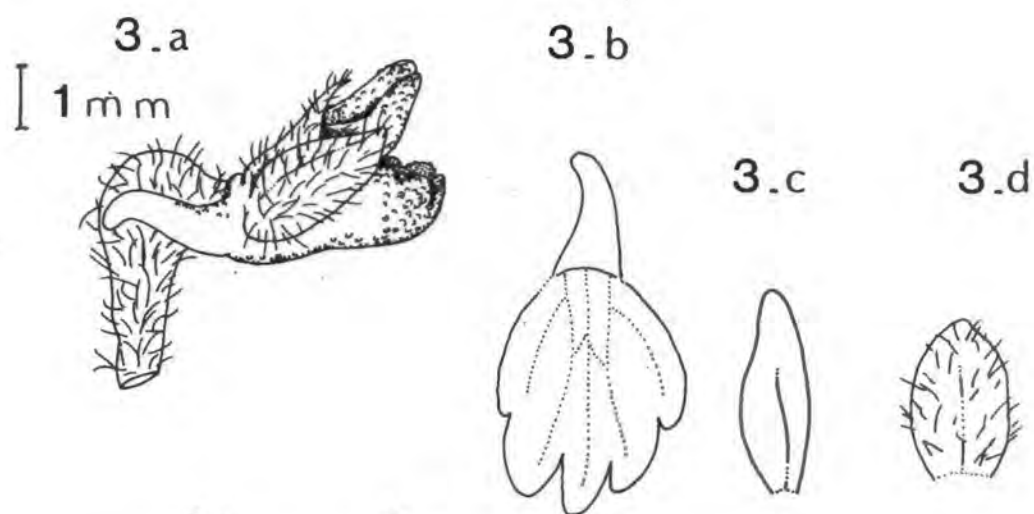
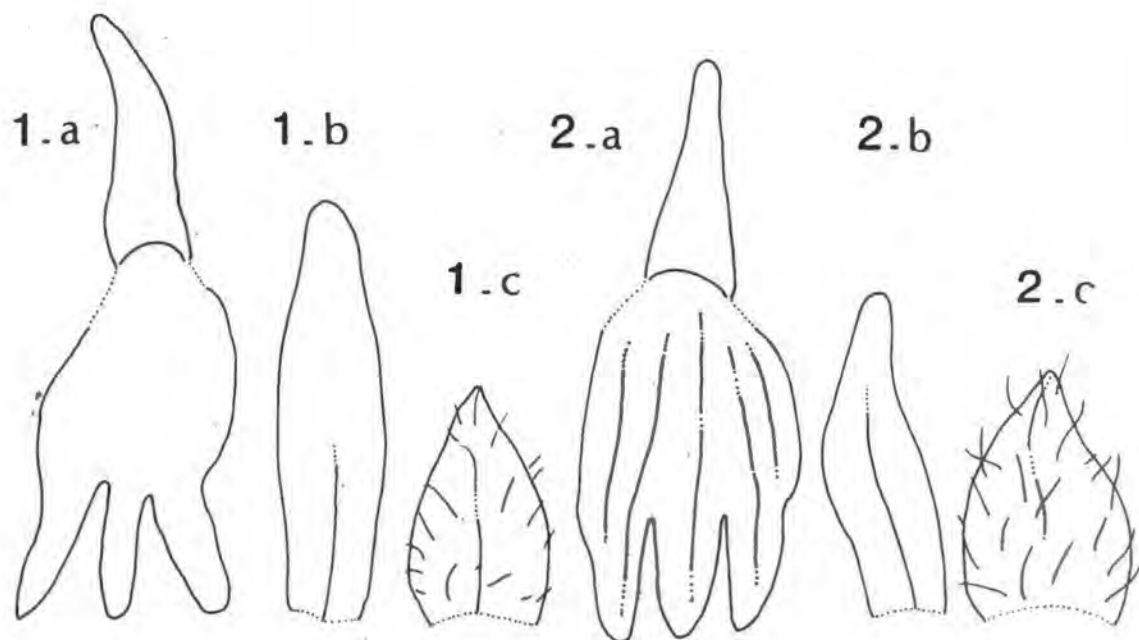
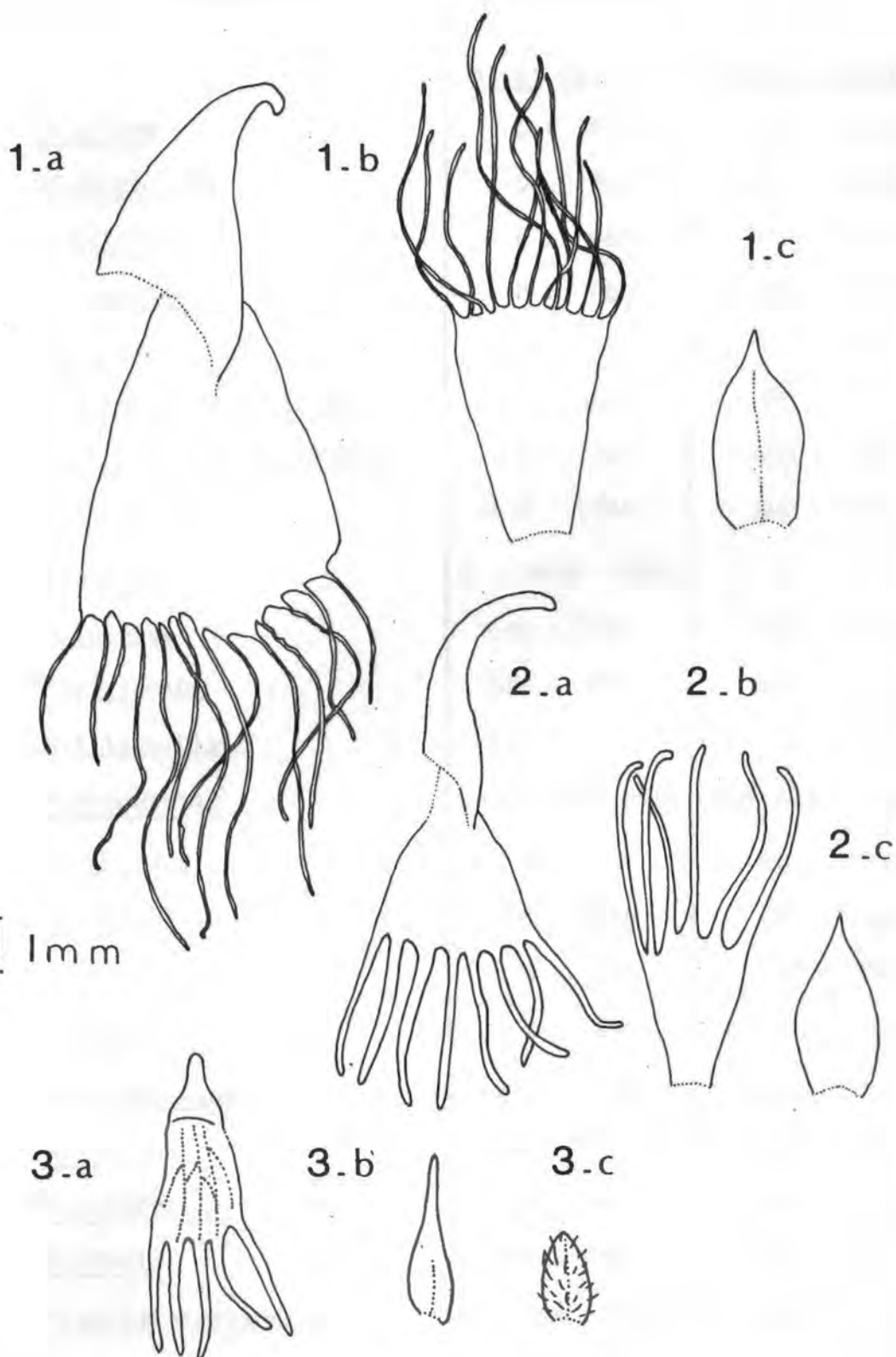


Plate 15

1. Holothrix randii Rendle  
a) Lip, b) petal, c) sepal; McLoughlin s.n.
2. H.schlechteriana Schltr. ex Kraenzl.  
a) Lip, b) petal, c) sepal; Glass 423
3. H.micrantha Schltr.  
a) Lip, b) petal, c) sepal; Mottley 2051



APPENDIX I : HABITATS OF THE SPECIES OF HOLOTHRIX

	<u>Altitude (m)</u>	<u>Rainfall (mm/yr.)</u>
1. <u>H.pilosa</u>	0 - 915	100 - 500
2. <u>H.longicornu</u>	0 - 153	400 - 600
3. <u>H.exilis</u>	0 - 1065	400 - 1000
4. <u>H.hispida</u>	0 - 1065	200 - 900
5. <u>H.cernua</u>	0 - 915	100 - 800
6. <u>H.villosa</u> var. <u>villosa</u>	0 - 1830	100 - 900
6a. <u>H.villosa</u> var. <u>condensata</u>	0 - 760	400 - 1000
7. <u>H.thodei</u>	1525 - 2285	600 - 1200
8. <u>H.secunda</u>	0 - 1220(-1830)	0 - 400
9. <u>H.incurva</u>	1525 - 2895	800 - 1200
10. <u>H.micrantha</u>	1525 - 1830	600 - 800
11. <u>H.filicornis</u>	153 - 915	0 - 200
12. <u>H.scopularia</u>	(610-)915 - 2745	(500-)800 - 1200
13. <u>H.parviflora</u>	0 - 915	200 - 1000
14. <u>H.orthoceras</u>	153 - 2285	400 - 1000
15. <u>H.mundtii</u>	0 - 915	200 - 700
16. <u>H.aspera</u>	153 - 915	100 - 400 (-600)
17. <u>H.macowaniana</u>	305 - 760	200 - 700
18. <u>H.culveri</u>	1370	600 - 800
19. <u>H.burchellii</u>	0 - 1370	200 - 600
20. <u>H.randii</u>	915 - 1380	400 - 800
21. <u>H.schlechteriana</u>	0 - 915(-1525)	0 - 800(-1000)
22. <u>H.grandiflora</u>	0 - 760	0 - 500



## APPENDIX II : SPECIMENS EXAMINED

### 1. Holothrix pilosa

- 3321 (Ladismith) AD Ladismith, 2000 ft., 15:1:68, Bayliss 4135 (NBG); CC Garcia's Pass, summit of peak west of "Sleeping Beauty", on summit of ridge, T.M.S., 1300 m, single plant, 14:12:77, Linder 1704 (BOL).
- 3322 (Oudtshoorn) CC Ruitersbos, on farm about 1 mile south of village, in fynbos on rocky ledges, 6:12:75, Bruyns 190/75 (NBG).
- 3323 (Willowmore) DD Rocky hill north of Joubertina, 2000 ft., 1:24, Fourcade 2929 (BOL, PRE, FOUR in BOL).
- 3325 (Port Elizabeth) DC Green Bushes, exposed situation, 16:3:33, Long 938 (BOL, PRE), P.E., Cutting s.n. (SAM).
- 3420 (Bredasdorp) AB Swellendam, 1-3:30, Thode A 26392 (PRE).
- 3421 (Riversdale) BA Near Albertinia, Oude Tuin, in pockets and crevices in rocks, also among stones, 35 m, Nov - Dec., Muir 1225 (BOL, PRE).

### 2. Holothrix longicornu

- 3325 (Port Elizabeth) DC Port Elizabeth, 30:10:37, Cutting 69 (BOL) mixed with H.villosa.

### 3. Holothrix exilis

- 3227 (Stutterheim) DB Near Komgha, grassy hill, 2000 ft., 11:1892, Flanagan 1298 (PRE).
- 3228 (Butterworth) CB Near Kei Mouth, rocky slope, 50 ft., 10:1893, Hay s.n. (2229 in Flanagan, Herb. Austr. Afr., PRE, BOL).
- 3318 (Cape Town) AD Michelheyn's Kraal, 30:7:77, Esterhuysen s.n. (BOL) mixed with H.villosa, Darling, Riverlands, sandy flat area near railway line, 2:11:78, Esterhuysen s.n. (BOL); CD Table Mountain summit, Maclear's Beacon, sandy slope, 3500 ft., 2:1892, Schlechter 482 (BOL); DC Beyond Visser's Hok on the Malmesbury road, 4:11:44, Leighton 835 (BOL) on same sheet as H.cernua; DD Stellenbosch, the Platklip, in shallow mossy depressions in granite boulders, locally frequent, 21:10:54, Schelte s.n. (67315 in SAM).

- 3322 (Dudtshoorn) DC George, 3 miles east of Wilderness, in sandy soil, locally common, 150 ft., 2:1:66, A.V. Hall 1162 (BOL); DD Karatara River, 300 ft., 7:11:1894, Schlechter 5885 (BOL, GRA, PRE).
- 3323 (Willowmore) DC Tsitsikamma, Ratel's Bosch, flats, 650 ft., 2:10, Fourcade 582 (BOL, FOUR in BOL); DD Northern foot of Tsitsikamma Mountains near Joubertina, hard soil, 7:3:51, Esterhuysen 18356 (BOL), Northern foot of Tsitsikamma Mountains near Joubertina, stony lower slopes, 10:2:52, Esterhuysen 19942 (BOL), Uniondale, Die Hoek, northern foot of Tsitsikamma Mountains near Joubertina, bank above stream and other bare patches of soil, 2:53, Esterhuysen 21205 (BOL), rocky hill north of Joubertina, 2000 ft., 12:25, Fourcade 3140 (FOUR in BOL).
- 3324 (Steytlerville) CD Karreedouw, Jeppe s.n. (FOUR in BOL, PRE); DB Groot Winterhoek Mountains, ridge west of farm "Kammievlei" in burnt grassland near stream, soil deep, black, 700 m, occasional, 25:3:77, Linder 1080 (BOL).
- 3325 (Port Elizabeth) DC P.E., Cutting 9 (BOL), P.E., 10:28, Cory 56 (GRA), Redhouse, 12:11, Paterson s.n. (BOL).
- 3326 (Grahamstown) AD Coldspring 2:17, Gane s.n. (GRA, PRE), Coldspring, in hills 2200 ft., 2:1892, Glass 482 (BOL, PRE, NH); BC Grahamstown, 2:1891, Bolus (740 in Guthrie, NBG), near Grahamstown, mountain slopes 2500 ft., 2:1892, Glass s.n. (BOL, SAM).
- 3418 (Simonstown) AB Chapman's Peak, in damp kloof, 12:44, Linley s.n. (56127 in SAM), Muizenberg Vlei, by railway, 14:11:1897, Wolley Dod 3651 (BOL).
- 3421 (Riversdale) AB Riversdale, Nesbit 102 (BOL).
- 3423 (Knysna) AA Knysna, Karatara, Schlechter 5885 (NH).

Uncertain localities:

- 3423 (Knysna) AA Knysna, Buffel's Nek, 2500 ft., 3:22, Fourcade 2050 (BOL, FOUR in BOL).
- No locality, Ecklon and Zeyher s.n. (20484 in SAM).

4. Holothrix hiepida

- 3318 (Cape Town) CD Table Mountain summit, near Klaassenbosch, among restios, 2400 ft., 1:1887, Bolus and Scully s.n. (7034 in BOL, SAM), Top of Nursery Buttress in small sandy patches among large rocks, 10:8:75, Bruyns 141/75 (NBG),

Table Mountain, Echo Valley, 28:12:39, 3000 ft., Compton 8284 (NBG), Table Mountain, between Skeleton and Window Gorge, 7:12:44, Leighton 750 (BOL), Table Mountain, summit, rock-cracks, 3500 ft., 13:3:1892, Schlechter 464 (BOL).

- 3319 (Worcester) AC Near Elgin, between Grabouw and Paardeberg, 12:47, Stokoe s.n. (59693 in SAM), CA Paarl, Slanghoek Mountains, Witteberg, N-W side, 21:11:43, Wasservaal 605 (NBG).
- 3326 (Grahamstown) BC Coldstream, c. 2300 ft., 11:1892, Glass s.n. (34895 in PRE).
- 3418 (Simonstown) AB Constantiaberg, 200 ft., 16:12:43, Compton 15466 (NBG); AD Cape Point, Smith's Farm, rocky ridge, 16:1:36, Compton 6067 (NBG), Mountain above Smitewinkelbaai, rock fissures, 400 ft., 18:4:1892, Schlechter 667 (BOL).
- 3420 (Bredasdorp) BB Heidelberg, Naauwpoort Peak, 4000 ft., 11:27, Thorne s.n. (44507 in SAM).
- 3423 (Knysna) AA Knysna, Dec., Duthie s.n. (BOL).
- 3424 (Humansdorp) BB Humansdorp, kopjie above Oudebos, N-E facing grassy slope and S-W stony ridge, 2:35, Jeppe s.n. (33391 in PRE).

#### Uncertain localities:

- 3419 (Caledon) AA or BD Caledon, Palmiet Rivier Mountains, 3:1:53, Stokoe s.n. (67313 in SAM).
- 3424 (Humansdorp) AB? Tsitsikamma, Ratel's Bosch, flats below road, 700 ft., 2:10, Fourcade 583 (GRA).
- 3318 (Cape Town) Waai Vlei, 20:12:1896, Wolley Dod 2339 (BOL)

#### 5. Holothrix cernua

- 3118 (Van Rhynsdorp) BC Giftberg, moist sandy slope near stream on rocky plateau, 2500 ft., 14:10:53, Esterhuysen 21977 (BOL)
- 3218 (Clanwilliam) AD Piketberg on mountain, 9:41, Stokoe s.n. (55887 in SAM); BD Clanwilliam, Eland's Kloof, 26:9:36, Lewis s.n. (BOL); DA Piketberg, Kaptein's Kloof, 9:41, Stokoe 8468 (BOL). ; DC Piquetberg, between farm Sandleege and Avonteur, frequent on well-drained T.M.S. slope, 1 year after fire, also seen in wet area with plants of Drosera, 20:10:78, Linder 1792 (BOL).
- 3318 (Cape Town) AC Top of Table Mountain, in sand, 11:39, Esterhuysen s.n. (54327 in SAM), Table Mountain, slopes of Groot Kop, 11:46, Lewis 4775 (SAM); AD Michelheyn's Kraal, 30:9:77, Esterhuysen s.n. (BOL), Flats between

Kommetjie and Witsands, 10:45, Linley s.n. (56885 in SAM), Near Cape Town, Platteklip station, 300 m, 26:10:24, no collector's name (34970 in PRE); BB Twenty-four River Mountains, near Porterville, stony ridge, 22:10:49, Esterhuysen 16169 (BOL); CD Rondebosch, in sand, 60 ft., 10:1885, Bolus s.n. (410 in BOL, NH, SAM), near Rondebosch in sand, 100 ft., 10:1885, Bolus 7022 (BOL), Table Mountain, southern plateau near Reservoir, 12:12:1898, Froembling 476 (NBG) mixed with H.villosa, Table Mountain, southern slopes towards Orange Kloof, 28:11:1897, Froembling 384 (NBG), Mountain slopes above Camps Bay, 10:44, Lewis 784 (SAM), Near path between Kloof Nek and Platteklip, 10:20, Page s.n. 16752 in BOL), Between Wynberg and Kirstenbosch, shady patches in bush, I.B.S. 4677 (BOL), Kirstenbosch, October, Zeyher s.n. (20490 in SAM); DB Paarl, Haalsneeuwkop, 4500 ft., 12:44, Stokoe s.n. (56445 in SAM); DC Cape Flats 100 ft., 10:1880, Bolus 3929 (BOL), Bloemendal, October, Zeyher 1581 (BOL); DD Stellenbosch, Jonkershoek, 7:11:43, Compton 15350 (NBG), Jonkershoek, 10:26 Primos 13317 (PRE) Jonkershoek, belt 13E at Jakkalsvlei, burnt 4-yearly, northern side of valley with steepish slope, 1300 - 2300 ft. 15:10:62, Taylor 4143a (PRE), Jonkershoek, 1:10:58, Wiedemann and Oberdiek 354 (PRE).

3319

(Worcester) AB Ceres, Gydouw, 3:10:42, Leipoldt 4076 (BOL) Koue Bokkeveld, on farm "Hexriver", on sand, T.M.S., 900 m 2:10:77, frequent Linder 1469 (BOL); AC Tulbagh, Roode Zand Mountains, summit, also in the plains, 100 - 400 m, 10:20, Andreae 612 (PRE), Clanwilliam, Eland's Kloof Mountains, 4000 ft., 25:9:36, Compton 6449 (NBG), Wolsely near Romans-river station, on deep moist sand, level, 200 m, 23:9:77, frequent, Linder 1240 (BOL), mountains near Tulbagh Kloof, 9:57, Stokoe s.n. (63754 in SAM); AD Ceres, Mitchell's Pass, 6:10:41, Compton 11936 (NBG), Worcester, flats between Prince Alfred's Hamlet and Gydo Pass, sandy and stony, recently burnt, single group of plants, 1800 ft., 4:10:73, Oliver 4760 (PRE), flats N-W of Prince Alfred's Hamlet, sandy, open clay ground, 1750 ft., 9:10:74, Oliver 5059 (PRE); BD Caledon, head of the Palmiet River, 11:9:38 Gillett 4273 (BOL); CA Baviaanskloof, off Barrie's Kloof, Linley s.n. (56225 in SAM), Paarl, Hercules Pillar, occasional in open scrub, c. 700 ft., 16:9:56, Schelte s.n. (BOL), bottom of Bain's Kloof, 1 mile south of Darling Bridge, 16:10:70, Strauss 51 (NBG); CB Worcester, Goudini Baths, sandstone hills, 300 m, 3:9:27, Marloth 13095 (PRE); CC French Hoek, 6:10:46, Barker 4171 (NBG), Franchhoek, by Oliphant's Pass, 27:10:78, Gillett 1864 (BOL), French Hoek, 10:13, Phillips 1327 (SAM), French Hoek Peak, 10:46, Stokoe s.n. (49577 in SAM); CD Worcester, Louwshoek Mountain, in sand, 11:46, Stokoe s.n. (49578 in SAM).

3320

(Montague) CD Swellendam, Clock Peaks, north slopes of 11.30 peak among boulders, 1300 m, rare, Linder 1635 (BOL) mixed with H.villosa; DC South side of Tradouw Pass, on recently burnt slope, 1200 ft., 23:9:65, two plants seen, A.V. Hall 1083 (BOL); DD Grootvadersbosch, 10:1817, Zeyher 1581 (SAM).



- 3321 (Ladismith) CC Riversdale, on the plain, partway along the path between Garcia's Pass and Muiskraal, 1600 ft., 10:04, Bolus 11383 (BOL, PRE).
- 3322 (Dudtshoorn) DD George, Ruigte Vlei, near Zwartrivier, sandy hills, 150 ft., 10:21, Fourcade 1535 (FOUR in BOL).
- 3325 (Port Elizabeth) DC P.E., 17:11:37, Cutting 15 (BOL), flats near P.E., 24:10:36, Cutting s.n. (BOL), P.E. 17:11:37, Cutting 14 (BOL) mixed with *H.villosa*, Fairview sandy plateau, marshy in winter, vegetation 30 - 40 cm high, 23:10:78, Hosten 127, 128 (BOL).
- 3326 (Grahamstown) AD Coldspring, 11:18, Hilner 137 a (PRE); BC Featherstone's Kloof, 11:1893, South s.n. (34896 in PRE).
- 3418 (Simonstown) AB Schuster's Kraal, 10:10:45, Barker 3901 (NBG); Kalk Bay Mountain, 16:10:46, Barker 4226 (NBG); Vlakkenberg, 17:10:47, Compton 20199 (NBG); Redhill Plateau, on clearing, common, 25:10:64, Esterhuysen 30822 (BOL); Redhill, in sand on a firebelt, 17:11:74, Esterhuysen s.n. (BOL); Steenberg dam, banks of stream up to dam, 10:13, Kensit s.n. (PRE); Klaasjagters, in sandy burnt area, 14:11:45, Leighton 1500 (BOL); slopes of Chapman's Peak, 11:38, Lewis 475 (SAM); flats between Redhill and Witsands, Lewis 1087 (SAM); Hout Bay Mountains, east side, 6:11:43, Linley s.n. (56719 in NBG); Vlakkenberg, 20:11:44, Schur s.n. (56730 in NBG); Lakeside Mountains, (Lakeside Ridge off Steenberg? - K.I.), 6:10:43, Seltzer s.n. (56729 in NBG); Wynberg, 11:13, Whiteside 3 (GRA); Muizenberg Mountains, 19:1:1896, Wolley Dod s.n. (BOL); 88 Sir Lowry's Pass, west side, frequent on outcrops in burnt veld, 700 ft., 18:9:54, Schelppe 4896 (BOL); 80 Rooi Els, 2:10:45 Leipoldt 4154 (BOL).
- 3419 (Caledon) AA Caledon, Viljoen's Pass, 7:10:46, Compton 18574 (NBG); Houw Hoek Pass, east side, in burnt veld around rock outcrops, rare, 900 ft., 18:9:54, Schelppe 4880 (BOL); Houwhoek Mountains, Schlechter 1325 s.n. (5486 in Herb. Austr. Afr., PRE); Houwhoek Mountains, 2500 ft., 15:10:1894, Schlechter 5486 (GRA); Caledon, flats east of Viljoen's Pass, 9:49, Stokoe s.n. (34981 in PRE); AB Caledon, near Baths, in sandstone, 9:19, Marloth 9245 (PRE); Caledon, 10:1894, Schlechter 5486 (NH); AC between Hawston and Karwyderskraal, on flats on recently burnt patch, 29:9:67, Barker 10511 (NBG); AD base of Babylon's Tower, south side, in sand places, T.M.S. 400 m, occasional, 18:10:77, Linder 1534 (BOL); BD Betty's Bay, slopes of mountains at north end of town, firebreak, west aspect on gentle slope and level ground, in sand, 10:10:77, frequent, Linder 1511 (BOL); Caledon, Platberg, 10:52, Stokoe s.n. (65619 in SAM); DA between Elim and Gansbaai, Baardscheerdersbosch, Stokoe s.n. (59692 in SAM).

- 3421 (Riversdale) AB Zuurbraak, on mountainside, 1000 ft., 12:10:1897, Galpin 4587 (PRE); AC 17 miles south of Riversdale, coastal fynbos of kalk "duine", fairly frequent, c. 500 ft., 5:10:68, Acocks 24113 (PRE); BA Near Albertinia, Botteliersfontein, 200 ft., 10:14; Muir 1797 (PRE)
- 3422 (Mossel Bay) BB Knysna, high dunes between road to Rheenendal and the Goukamma River, west slope, damp, first year after fire, c. 150 m, rare, 24:10:77, Linder 1585 (BOL).
- 3423 (Knysna) AA 14 Miles east of Knysna, highlands, 10:10:28, Gillett 1350 (BOL).
- 3424 (Humansdorp) AB 5 miles S-E of Clarkson, on stony south-facing slope above Tsitsikamma River gorge, recently burnt, 500 ft., occasional, 27:10:65, A.V. Hall 1107 (BOL).

#### Uncertain localities:

- 3419 (Caledon) BA or BB Riviersonderend Mountains, 10:50, Stokoe s.n. (58334 in SAM).
- 3418 (Simonstown) AB? Groot Kop, 2500 ft., 28:11:46, Compton 19414 (NBG).
- 3419 (Caledon) BD? Caledon, Aries Kraal, stony hills, 2:1:45, Compton 16884 (NBG).
- 3421 (Riversdale) AB? Riversdale, Lapjes Baai, fixed dunes 200 ft., 9:24, Muir s.n. (GRA).
- 3423 (Knysna) AA? Knysna, Kirby, 770 ft., 29:10:43, Fourcade 6211 (FOUR in BOL).
- Cape of Good Hope, Zeyher 1581 (PRE).

#### 6. Holothrix villosa

- 2917 (Springbok) DA Spektakel Hill, 4:9:51, Maguire 1008 (NBG).
- 3118 (Van Rhynsdorp) BC Giftberg, 1-2000 ft., 9:11, Phillips s.n. (7625 in Percy Sladen Mem. Exp., SAM); DC Klaver, 8:32, Bolus s.n. (BOL).
- 3119 (Calvinia) AC Near Nieuwoudtville, about 10 miles along the Calvinia road, then 1 mile south, van Wyk's Farm, under bushes, 9:30, Bolus s.n. (BOL), Bokkeveld, Eland's Kraal, 840 m, 13:10:27, Mostert s.n. (13483 in Marloth, Fl. Afr. Austr., PRE); CA Lokenburg, Stinkfontein hills, T.M.S. plateau, fynbos, under cover of bushes and stones, c. 2600 ft., 25:9:55, Leistner 453 (PRE).



- 3218 (Clanwilliam) BA Klipfonteinrand, Barker 4730 (NBG); BB Clanwilliam, 1895, Leipoldt s.n. (20479 in SAM), Piketberg, Bosch Kloof, 20:9:43, Barker 2647 (NBG); BD upper reaches of Witelakloof, steep bank, west aspect, 6:10:53, Esterhuysen 21809 (BOL); DB Olifant's River Valley, 9:9:49, Barker 6067 (NBG), between Tulbagh Kloof and Piekenierskloof, c. 400 ft., Sept., Bolus s.n. (BOL); DC Piketberg, near Sauer, 10:9:49 Steyn 563 (NBG); DD Piketberg, de Hoek, 28:9:43, Barker 2557 (NBG), bottom of Verveld Pass, east aspect, 5:11:34, Pillans 7147 (BOL).
- 3219 (Wupperthal) AD Cederberg, Matjiesrivier, 21:10:43, Wagener 246 (NBG); CA Bain's Kloof, Wolwekloof Forest Reserve, 20:10:46, Barker 4242, 4280 (NBG).
- 3220 (Sutherland) DA Klein Roggeveld, 48 miles S. of Sutherland under shrublet in karoid scrub, rare, 3700 ft., 10:10:54, Schelte 4923 (BOL).
- 3225 (Somerset East) AC Pearston, Buffelshoek Pass, crevices in kranz in Karoo Bushveld, on upper S.W. slopes, c. 4500 ft. 27:10:45, rare, Acocks 11982 (PRE).
- 3318 (Cape Town) AD near Darling, 9:05, Bolus s.n. (BOL); BA Swartberg, S-W of Moorreesburg, coastal Rhenosterveld, S. slopes, c. 700 ft., 12:10:59, locally abundant, Acocks 20647 (PRE); BC Giftberg, 1-2000 ft., 9:11, Phillips s.n. (7625 in Percy Sladen Mem. Exp., BOL); BD Malmesbury, Riebeek Kasteel, 14:9:41, Compton 11725 (NBG), Riebeek Kasteel, hillside above Botman's Pass, 24:9:52, Esterhuysen 20415 (BOL); CB Mamre Hills, 7:9:41, Barker 1495 (NBG), Mamre Hills, rocks, 24:11:45, Compton 1744 (NBG), foot of Mamre Hills, granite rocks, 22:9:43, Henderson 1851 (NBG); CD Rondebosch, sanddunes, c. 100 ft., 10:1899, mixed with H.cernua, Bolus 3929 (BOL), Table Mountain, above Klaassenbosch, on rocks, c. 2400 ft., 11:1880, Bolus 4655 (BOL), Camps Bay, occasional in shady places, 14:10:56, Cassidy 61 (NBG), Camp Ground (Rondebosch Common - K.I.), 16:10:42, Compton 13906 (NBG), Table Mountain, southern slopes towards Orange Kloof, 28:11:1897, mixed with H.cernua, Froembling 384 (NBG), Table Mountain, Fernwood Buttress, in cracks on rocks, 7:12:44, 2500 ft., Leighton 749 (BOL), Kenilworth Race Course, among ericas, 1:11:03, Pearson s.n. (BOL), Rondebosch Flats, 17:10:43, Seltzer s.n. (56671 in NBG), Kirstenbosch, The Aloes, very plentiful on bare rocks, 4:11:43, Wasservall 581 (NBG); DC Tygerberg hills, 20:9:47, Barker 4811 (NBG), beyond Visser's Hok on Malmesbury road, 4:11:44, Compton 16910 (NBG), Blackheath flats S-E of Leykor factory, sandy flats over-run by wattles, 200 ft., 24:10:72, occasional, Oliver 4058 (PRE); DD Stellenbosch, Platklip, among mosses in shallow depressions on granite outcrop, locally frequent, 21:10:54, Schelte 4981, (BOL).

- 3319 (Worcester) AA Tulbagh, Winterhoeksberg, 10:1896, A. Bolus s.n. (BOL), slopes of Groot Winterhoek Mountains, near Saron, 11:41, Stokoe 8467 (BOL), Great Winterhoek, Sneeuwgat Valley, c. 4000 ft., 11:16, Phillips 1856 (SAM); AB Koue Bokkeveld, on farm "Hexriver", in cracks in boulders, T.M.S. 900 m, 20:10:77, common, Linder 1470 (BOL); AC Ceres, 1 mile south of Roman's Bush, 23:9:54, E.P. Immelman 254 (BOL), Witsenberg, December, Zeyher s.n. (20486 in SAM); AD Ceres, lower slopes of Schurftberg, 12:44, Lewis 867 (SAM), Prince Alfred's Hamlet, 20:9:52, Lewis 2676 (SAM), flats N-W of Prince Alfred's Hamlet, sandy open clay ground, 1750 ft., occasional, 9:10:74, Oliver 5058 (PRE), Mitchell's Pass, 5:10:41, Walgate 374 (NBG), Mitchell's Pass, valley, 1200 ft., 11:1879, no collector's name (BOL); BC Near De Doorns c. 1700 ft., 3:07, Bolus s.n. (13190 in BOL); CA Slanghoek Mountains, Witteberg, scree at foot of cliffs on south side, 3000 ft., 15:11:53, Esterhuysen 22291 (BOL, PRE), bottom of Bainskloof 1 mile south of Darling Bridge, T.M.S. gravelly soil, east facing side, 16:10:70, Rowe 32 (NBG); CB 2 km on road to Wolseley from Worcester, Hartbeesrivier, disturbed rhenosterveld, stony ground, 800 ft., 10:10:74, locally fairly frequent, Thompson 2135 (PRE), Worcester Nature Reserve, south slope, rare, 8:63, Oliver 181, mixed with H.secunda (PRE); DA Hex River East, 10:1893, MacDwan s.n. (20488 in SAM), Worcester, Scherpenheuvel, hillside above vlei, 29:9:51, Martin 892, (NBG); DD Robertson Karoo, 24:9:35, Compton 5776 b (BOL), Robertson, 21:9:46, Compton 18338 (NBG), Robertson Karoo, 9:46, Lewis 4777 (SAM), Robertson, near aerodrome, in Carissa-Euclea veld, under bushes, 700 ft., 24:8:65, van Breda and Joubert 1917 (PRE).
- 3320 (Montague) CD Swellendam, Clock Peaks, north slopes of 11.30 peak, among boulders, 1300 m, rare, mixed with H.cernua, Linder 1695 (BOL), Ruggens, Zuurbraak, c. 800 ft., 11:10:1897, Galpin s.n. (4588 in Herb.Galpin, PRE).
- 3321 (Ladismith) AD Seven Weeks Poort Mountain, on damp rocks, occasional 6700 ft., 30:12:28, Andreae 1307 (BOL, PRE).
- 3322 (Oudtshoorn) AC Summit of Swartberg Pass, Prince Albert, among rocks, 4900 ft., 12:04, Bolus 11638 (BOL, NH); CC Montague Pass, 3:11:1894, Schlechter 2071 (PRE), Montague Pass, 11:1894, Schlechter 5855 (NH, PRE).
- 3323 (Willowmore) CB Bo Kouga, Longkloof, on shady rock face, 2000 ft., 18:8:73, Bayliss 5934 (NBG), Uniondale, west of Haarlem, rhenosterveld, common, 22:10:77, Linder 1575 (BOL); DC Coldstream, c. 2300 ft., 11:1892, Glass s.n. (588 in NH); DD Joubertina, west of Wagenboomsriver, 1800 ft., 26:10:43 Fourcade 6179 (FOUR in BOL), Knysna, Blue Lilies Bush, 11:11:35, Laughton 78 (BOL).
- 3324 (Steytlerville) CB Konga, 12:11:41, Esterhuysen s.n. (BOL); CD Karreedouw, 10:30, Jeppe s.n. (FOUR in BOL, PRE).

- 3325 (Port Elizabeth) CC van Staaden's 11:09, Paterson 908 (GRA); DC Port Elizabeth, 30:10:37, Cutting 13 (BOL), N-W of Port Elizabeth, undulating country, 16:11:28, Gillett 2423 (BOL), Setler's Park, south-facing shady cliffs in moss and crevices, 23:10:78, common, Hosten 125 (BOL), P.E. Valley, 10:12, Paterson 2340 (GRA)
- 3326 (Grahamstown) AD Atherstone Station, near Ron's Camp, 10:1891, South s.n. (Schönland 402, GRA).
- 3418 (Simonstown) AB Karbonkelberg, 29:10:44, Compton 16352 (NBG), Steenberg, shady rock ledge, 1200 ft., Compton 17876, mixed with H.villosa var. condensata (NBG), summit of Karbonkelberg, 18:12:45, Leighton 1513 (BOL), Aries Kraal, 30:12:45, Leighton 892 (BOL), Hout Bay Mountain, 27:10:39, Lewis 690 (SAM), Tokai Forest, 11:44, Lewis 785 (SAM), Kalk Bay Mountains, on rocks, 10:46, Lewis 4778 (SAM), Retreat, sandy flats, 24:10:20, Pillans 4015 (PRE), Constantia, Bergvliet Farm, flats north of east avenue, 16:10:16, Purcell s.n. (91202 in SAM), by Slangkop River, 26:9:1897, Wolley Dod 3220 (BOL); BA Youngsfield, 5:11:35, Compton 5953 (NBG), Cape Flats, Ndabeni, 10:40, Salter s.n. (55848 in SAM), Cape Flats, Zeyher 4678 (SAM); BB Palmiet River Valley, Aries Kraal, 11:44, Lewis 923 (SAM), Caledon, mountain slopes above Steenbras Siding, 2000 ft., 11:32, Thorne s.n., (50425 in SAM).
- 3419 (Caledon) AB Just above Caledon Hotel, 5:10:28, Gillett 1121 (BOL); AC Hermanus, 7:11:64, Lavranos 3728 (PRE), Hermanus, 11:21, Rogers s.n., (22695 in Herb. Tvl. Mus., PRE).
- 3420 (Bredasdorp) AB Swellendam, Napky, coastal Rhenosterveld on shaley slope, c. 300 ft., 22:9:62, rare, Acocks 22746 (PRE), Swellendam, Langeberg, 25:9:29, Badenhorst s.n. (34987 in PRE); BA between Grootvadersbosch and Rietkuil, Oct., Zeyher 3901 (SAM); BD Cape Infanta, under bushes on steep, rocky slopes, 16:11:61, Esterhuysen 29395 (BOL).
- 3421 (Riversdale) AB Riversdale, Zuurbraak, on mountain-side, 800 ft., 11:10:1897, Galpin 4588 (PRE), Riversdale, Muir s.n. (10064 in Marloth's Fl. Afr. Austr., PRE); BA Albertinia commonage, under bushes, 150 - 300 ft., 10:12, Muir (PRE).
- 3422 (Mossel Bay) AB Silver River, 500 ft., 10:21 Fourcade 1583 (FOUR in BOL).
- 3424 (Humansdorp) BB Blaauwkranz, by well, 13:11:49, Morris 426 (NBG).

Uncertain localities:

- 3218 BB or 3219 AA Pakhuis Pass, 2500 ft., 30:10:40, Bond 601 (NBG). 3218 BB or 3219 AA Pakhuis Pass, 10:29, Leipoldt s.n. (BOL).
- 3319 (Worcester) CB or DA Hex River Valley, 10:1893, Marloth 1969 (PRE).
- 3322 (Oudtshoorn) DC or DD between Hooge Kraal and the Karatara River, on rocks of road cutting, 11:27, Fourcade 3474 (FOUR in BOL).
- 3423 (Steytlerville) AB or BA hills east of Keurbooms River, 9:11:28, Hutchinson 1368 a (BOL).
- 3325 (Port Elizabeth) DC Somerset East, Boschberg?, without ticket, MacOwan s.n. (BOL).
- 3326 (Grahamstown) BC? Brickfields, 3:11:09, Daly and Cherry 1044 (GRA).
- 3423 (Knysna) AA? Knysna, Matjiesfontein, 200 ft., 11:28, Fourcade 4166 (FOUR in BOL).
- 3318 (Cape Town) DC or 3418 (Simonstown) AB Pipe Track Route, Constantia side, 13:12:27, Young s.n. (27359 in Herb. Tvl. Mus., PRE).
- 3220 (Sutherland) Sutherland, Roggeveld, Uitkyk Farm Valley, 10:20, Marloth 9702 (PRE), Sutherland, Klipdrift, lower slopes of Roggeveld escarpment, under bushes, c. 2200 ft., 30:9:54, occasional, Acocks 17769 (PRE).
- No locality, Schelppe 387 (BOL).

6a. Holothrix villosa var. condensata:

- 3318 (Cape Town) CD Table Mountain, rock fissures, 2800 ft., 12:1883, Bolus 4905 (BOL), Table Mountain, slopes behind Window Gorge, crevices in S-facing rock faces, 2500 ft., 6:12:45, Esterhuysen 12305 (BOL), Table Mountain, near Fernwood Buttress, 2500 ft., 7:12:44, Leighton 748 (BOL), Table Mountain, 12:39, Lewis 682 (SAM), Table Mountain, lower plateau above Kirstenbosch, on wet rocks, 11:44, Lewis 817 (SAM).
- 3319 (Worcester) AB Koue Bokkeveld, Skurfdeberge, near Gydouw, 12:1891, Bolus s.n. (BOL); CA Bainskloof, south aspect, clefts of rocks, 12:1899, no collector's name (GRA); CB Worcester, peak north of Chavannesberg, wet cliff on eastern side, not seen elsewhere, 900 m, 17:12:21, Andreae 843 (PRE); CD East of Villiersdorp, Silver Streams in Waterkloof, eastern slope, rock ledges, locally frequent, 2800 ft., 23:11:74, Oliver 5491 (PRE).



- 3322 (Oudtshoorn) CD Montague Pass, in crevices in rocks of cuttings, 16:12:77, Linder 1726 (BOL).
- 3418 (Simonstown) AB Constantiaberg, 17:12:39, Compton 8267 (NBG), Cliffs towards Constantia Nek, 11:39, Esterhuysen s.n. (54326 in SAM), Hout Bay Valley, slopes, Goulimis s.n. (BOL), Kalk Bay Mountains, on wet rocks, 12:44, Linley s.n. (56126 in SAM), hills west of the Muizenberg, damp cliffs, 17:11:18, Pillans 3508 (PRE), Klaver Valley, south slope of Zwartkop, on damp rocky ledges, 10:12:38, mixed with H.villosa, Salter 7940 (NBG), Constantiaberg, 12:38, Salter s.n. (53749 in SAM), Steenberg Plateau, 16:12:38, Salter s.n. (53205 in SAM), Constantiaberg, 12:36, Salter s.n. (54056 in SAM), Constantiaberg, 22:11:1896, Wolley Dod 2139 (BOL); AD Swartkop Mountains, above Smitswinkel Flats, on wet soil, 10:39, Esterhuysen s.n. (BOL 54579 in SAM).
- 3419 (Caledon) AA Platteberg, south of Palmiet River, on almost vertical rock face on steep south slope, c. 2500 ft., 2:12:61, Esterhuysen 29418 (BOL); AC Platteberg and Paardeberg, near Palmiet River Mouth, 12:43, Stokoe 9062 (BOL); AD Caledon, Babylon's Tower, on mossy cliff faces of steep south slopes, 16:11:69, Esterhuysen 32315 (BOL), Babylon's Tower, above 800 m, in seepages or places exposed to wet S-E winds, 12:12:77, common, Linder 1680 (BOL), Caledon, Maanskynkop, in crannies in broken rock faces, on south slope, 26:11:50, Taylor 253 (BOL); BD between Rooi Els and Hangklip, Buffel's Kloof, 11:45, Lewis 4776 (SAM).
- 3424 (Humansdorp) AA Humansdorp, Elandsrivier, 12:35, Jeppe s.n. (33387 in Herb. Tvl. Mus., PRE).

#### Uncertain Localities:

- 3419 (Caledon) AA or BD Caledon, Palmiet River, 7:11:42, Bond 1527 (NBG), Palmiet River Mountains, 11:48, Stokoe s.n. (61024 in SAM); BA or BB Riviersonderend valley, 11:09, Leipoldt s.n. (BOL).
- Waal Vlei, 13:12:1896, Wolley Dod 2306 (BOL).

#### 7. Holothrix thodei:

- 2828 (Bethlehem) DB Royal Natal National Park, northern boundary, in exposed site above Cave Sandstone, rare, c. 6500 ft., 23:1:77, Schelte 7691 (BOL), Witsieshoek, summit of Quaqua Mountains, stony and grassy places, 2300 m, 2:1896, Thode 48 (BOL).

- 2829 (Harriesmith) AC van Rensburg Kop summit, among short grass, 1964, Jacobs s.n. (BOL); CC Camel's Head, in rock crevices in grassland, 1:44, Burgell s.n. (7314 in NU), Cathedral Peak Forest Research Station, Catchment 5, in crevices and in "peaty" mats on rock outcrop, common, 7400 ft., 12:1:51, Killick 1304 (PRE), Camel's Head, in rock crevices in grassland, fairly common, 1:44, Schelte 397 (BOL,NU).
- 2929 (Underberg) AB Giant's Castle Game Res., Giant's hut area, on rocky basalt outcrop, 8500 ft., 28:1:68, Trauseld 961 (NU); CC Lesotho, Sehlabathebe Park, in grassland near Aponogeton pools, soil mainly from Cave Sandstone with a little lithosol (volcanic rock), high rainfall, mist common, cool to cold, insolation intense, 2300 - 2500 m, fairly common, 4 - 14:1:73, Guillarmod, Getliffe and Mzamane 32 (PRE), Sehlabathebe Nat. Park, Matsva a Mafikeng, montane grassland, c. 2450 m, 27:1:78, Hoener 1993 (BOL); CD Underberg, Boesmansnek, at Border-gate, in grassland, occasional, 29:2:79, Linder 2087 (BOL).
- 3028 (Matatiele) BA Matatiele, Fikilemotho Peak, 23-2400 m, 15:2:14, McLoughlin 192 (BOL).
- 3127 (Lady Frere) DB Satansnek, between Engcobo and Maclear, in shade on steep damp bank, occasional, 9:2:77, Batten 11 (BOL).

8. Holothrix secunda:

- 2816 (Oranjemund) BB Western Richtersveld, 11:8:77, G. & F. Williamson 2622 (BOL).
- 2817 (Vioolsdrif) CA Richtersveld, Stinkfonteinberg, S-W of van Zylsrus, upper eastern slopes on summit of ridge, 9:77, Oliver, Tölken and Venter 651 (PRE).
- 2917 (Springbok) AA Richtersveld, Karoegapoort, 9 km south of Lekkersing, main hill north of poort, in lee of bushes on stony well-drained north side, in light shade, karoo, 9:77, Oliver, Tölken and Venter 822 (PRE); BA North of Steinkopf, Kossies, 8:9:53, van Heerde 25325 (BOL); BD 5 km west of Steinkopf, rocky hilltop south of the road in rock crevices 25:9:74, Goldblatt 2780 (NBG); DA Spektakelberg, near summit of pass, 13:9:77, Schelte 7743 (BOL); DB near O'okiep, Nababiep Well, stony area, 3200 ft., 9:1883, Warden 6570 (BOL).
- 3017 (Hondeklipbaai) BB Khamieskroon, 1 mile south of Arkoep, N-W slope on granite, with Aloe dichotoma etc., 23:6:76, Bruyns 1307 (NBG); BC Pass on way to Wallekraal, 8:29, Bolus s.n. (BOL); BD Brakdam, 9:45, Lewis 1383 (SAM).

- 3118 (Van Rhynsdorp) AB near Nieuwerust, 7:9:45, Barker 3760 (N8G); BC Giftberg, 2:9:48, Compton 20836 (N8G), Giftberg, rock crevices near edge of escarpment, 3000 ft., 14:10:53, Esterhuysen 22098 (BOL), Giftberg, 1-2000 ft., damp places, 11:9:11, Phillips s.n. (7557 in Percy Sladen Mem. Exp. BOL, SAM); DA 10 miles SSE of Van Rhynsdorp, Matsikamma Range, 1000 ft., 24:9:62, Oliver s.n. (BOL), Giftberg Plateau, on rock-sheets in fynbos, under bushes, c. 1600 ft., frequent, 21:9:48, Acocks 14901 (PRE).
- 3119 (Calvinia) CA Lokenburg, and fynbos of T.M.S. ridges, under bushes, 2200 ft., fairly frequent, 16:9:56, Acocks 19029 (PRE), Lokenburg, arid fynbos of valley, under bushes, rare, c. 2000 ft., 25:9:54, Acocks 17725 (PRE); CC Calvinia, 19 miles north of Doringbos, in litter on outcrop under bushes, occasional, 2500 ft., 11:10:54, Schelte 4956 (BOL); CD Calvinia, top of Botterkloof Pass, 2750 ft., 23:9:52, Lewis 2677 (SAM).
- 3218 (Clanwilliam) AD Piketberg mountain, 9:41, Stokoe s.n. (55886 in SAM); BA Graafwater, 8:9:33, Compton 4329 (BOL, N8G), Boschkloof, Barker 2648 (N8G), Boschkloof, Bond 528 (N8G), 5 miles south of Clanwilliam, 9:9:53, Compton 24322 (N8G), 10 km north of Clanwilliam, on farm "Steenbrug", foothills of Mt. Synnot, among rocks and boulders in cool dry place in dry Euryops speciosissimus - Rhus incisa fynbos, c. 150 m, 1:9:77, Linder 1126 (BOL), Clanwilliam, 8:1895, Leipoldt s.n. (BOL), 4 miles west of Clanwilliam, 28:9:32, Salter 2738 (BOL), Clanwilliam, among rocks, 350 ft., 21:8:1896, Schlechter 8599 (BOL), Nardouw Kloof, 9:47, Stokoe s.n. (59690 in SAM); DA Piketberg, Boesman's Kloof River, 30:9:43, Leighton 132 (BOL); DB near Clanwilliam, Oliphant's River, among bushes and rocks, 256 ft., 9:1896, Leipoldt 251 (SAM), Clanwilliam, Leipoldt s.n. (20489 in SAM).
- 3219 (Wupperthal) AA Koudeberg, near Wupperthal, 2900 ft., 4:10:1897, Bolus 9094 (BOL, PRE).
- 3220 (Sutherland) BC South of Sutherland, north aspect outcrop, 10:10:54, Schelte 4936 (SAM); DA Verlaten Kloof, foothills 750 m, 10:20, Marloth 9629 (PRE); DB 36 miles south of Sutherland, under karoo bushes on north-aspect outcrop, occasional, 2600 ft., 10:10:54, Schelte 4936 (BOL).
- 3319 (Worcester) AD Ceres, Mitchell's Pass, 5:10:41, Walgate 374 (N8G); BC 5 miles beyond Karooport along Calvinia road, 11:9:37, Lewis s.n. (BOL), Ceres, Karooport, 26:9:44, Barker 3014 (N8G), Karooport, hills north of telephone exchange, under bushes, 23:9:75, Bruyns 247 (BOL), 1 mile north of Karooport, 26:9:75, Bruyns 1132 (BOL, N8G), Worcester, base of northern slopes of hill behind Osplaats, rare, 3500 ft., 10:21, Pillans s.n. (14188 in BOL); BD Calvinia, 30 miles S-W of Middelpas, 29:9:68, Stayner s.n. (87960 in N8G); CB Worcester, Brand Vlei, 29:9:51, Barker



- 7527 (NBG), Worcester Nature Res., south slope, rare, 8:63, Oliver 181, mixed with H.villosa (PRE); CD Hex River Valley, near DeDoorns, c. 1700 ft., 9:08, Bolus 13191 (BOL), Calvinia, top of Botterkloof Pass, 24:9:52, Johnson 558 (NBG); DB Robertson, Koo, 4000 ft., 28:9:31, Compton 3901 (BOL); DC Ceres, Paardekop, near Spes Bona, Dwyka rocks, 650 m, 3:10:25, Marloth 12536 (PRE); DD McGregor, 24:9:41, Barker 1496 (NBG), Robertson, Robertson Karoo, 24:9:35, Compton 5776 a (BOL, NBG), Robertson, between McGregor and Stormvlei Kloof, 10:40, Leipoldt 3229 (BOL, NBG, PRE), Robertson, Muir 2764 (PRE), south of Robertson, Muiskealkop, in shales on southern slope below the summit, 13:9:69, Wisura 433 (NBG).
- 3320 (Montague) BA Laingsburg, 3 miles north of Matjiesfontein, occasional, c. 3300 ft., 20:9:53, Acocks 17155 (PRE); BB Laingsburg, Whitehill, 4000 ft., 30:7:32, Compton 4096 (BOL, NBG), Whitehill Ridge, south side, 30:10:29, Compton 3621 (BOL); CC near Ashton, in karoo scrup, 200 m, 10:03, Marloth 3234 (BOL), Swellendam - Robertson road, Bonnievale, hills of Bokkeveld beds, 200 m, 1:10:23, Marloth 11808 (PRE), Montague Baths, on rocks, common, 10:21, Page 75 (BOL, PRE), Kogmanskloof, c. 3 miles south of tunnel on slope, 6:10:68, Tölken 1585 (BOL); DC Perdekop, west of Barrydale, in succulent scrub with Haworthia cymbiformis, north aspect under bushes in sandy soil 1550 ft., 14:10:78, Schelte 7900 (BOL).
- 3322 (Oudtshoorn) BC 8½ miles east of De Rust, Spekboomveld, rare, under Rhenosterbos on steep south aspect, c. 1500 ft., 8:10:59, Acocks 20621 (PRE); CA Uniondale, 10:12, Paterson s.n. (GRA).
- 3325 (Port Elizabeth) BC P.E., Suurberg Pass, in shady rock-crevices, not common, 3000 ft., 17:8:73, Bayliss 5912 (NBG).
- 3420 (Bredasdorp) AA Swellendam, Hesquaspoort, marginal valley bushveld, locally fairly frequent, c. 500 ft., 19:9:62, Acocks 22700 (PRE); AB Swellendam, Weltevrede Farm (Dr A.L. Geyer) 30:9:63, Barker 9939 (NBG), Swellendam, hills near town, 10:17, Marloth 8631 (PRE), Bontebok Park, on top of Banks of Breede River bend at Elsiekraal, on rocks, rainfall c. 750 mm, c. 100 m altitude, 10:63, Liebenberg 7249 (PRE).

#### Uncertain localities:

- 3419 (Caledon) BA or BB Riviersonderend Mountains, 10:40, Stokoe 7379 (BOL),
- 3319 (Worcester) A Ceres Karoo, 3000 ft., 22:9:31, Compton 3813 (BOL).

- 3322 (Oudtshoorn) A between Prince Albert and Klaarstroom, Eiken Kraal, 27:9:35, Leipoldt s.n. (BOL).

9. Holothrix incurva:

- 2828 (Bethlehem) DB Witsieshoek, basalt outcrops below Sentinel and Witches, c. 8500 ft., 22:1:77, Schelpé 7677 (BOL), Witsieshoek, at beginning of path to Sentinel, rocky area near carpark, on rocks in soil pockets, usually in damp areas, 8000 ft., 22:1:77, Stewart 1947 (NU); DC Lesotho, Butha Butha, damp gully between Ox Bow River campsite and Khatibe B. camp, gully sometimes subject to extreme heat, 8500 ft., 22:1:62, Troughton 835 (GRA); DD Mont-aux Sources, 3000 m, 4:13, Dyke s.n. (5524 in Marloth, Fl. Austr, Afr. PRE), slopes of Mont-aux Sources, 8-9000 ft., 12:1893, Flanagan 1981 (BOL), Mont-aux Sources, in rock cracks in basalt or steepish slopes, occasional, 7500 ft., 22:2:79, Linder 2059 (BOL), Mont-aux Sources, 2:27, Prescott-Ducie s.n. (BOL), Mont-aux Sources, near Hut, on rock ledges, 9900 ft., locally common, 19:3:46, Schelpé 1333 (NH, NU).
- 2829 (Harriesmith) AC Lesotho, Likolobeng, 9000 ft., 28:12:48, Guillarmod 725 (PRE), Likolobeng, 8500 ft., Guillarmod 1254 (PRE); AD near van Reenen, 5-6000 ft., 3:1895, Haygarth s.n. (Wood 5574 in BOL, NH); CC East face of Camel, rock crevices in grassland, 1:44, Schelpé 395 (BOL, NU), Camel, on west-aspect basalt cliff, 7700 ft., 18:1:65, only one plant seen, Schelpé 7206 (BOL).
- 2928 (Marakabei) AA Lesotho, Bitsilebe, shady rocks, 2:1:49, Compton 21434 (NBS).
- 2929 (Underberg) CB Sani Pass, in moss on basalt cliffs, damp places, 8800 ft., 23:3:77, Hilliard and Burtt 9803 (NU).
- 3028 (Matatiele) AC Ongeluknek, mountain-slopes to south of top of pass, in cracks in basalt, 2400 m, common, 9:2:77, Linder 1033 (BOL); CA Naude's Nek Pass, steep east slope near top of pass, on dry rock ledges, common, 2400 m, 25:3:77, Linder 1048 (BOL).

Uncertain Localities:

- 2829 (Harriesmith) AA or AB Banks of Bokong River, 7600 ft., Coetzee 515 (PRE).

10. Holothrix micrantha:

- 2628 (Johannesburg) AA near Johannesburg, Killarney, marsh, 12:9:25, A. Mottley 2015 (J).

11. Holothrix filicornis:

- 2816 (Oranjemund) BB South-west Richtersveld, on rock crevice, 6:77, Williamson 2562 (BOL), South-western Richtersveld, mountainside, very large scattered colony, 7:77, Williamson 2565 (BOL).
- 2817 (Vioolsdrif) AC N-E end of Paradysberg, in rock crevices and under rocks, flowered U.C.T., 11:7:70, Tölken 3293 (BOL); CA Richtersveld, Stinkfontein S-W of Zylarus, upper eastern slopes on summit of ridge, 9:77, Oliver, Tölken and Venter 652 (PRE), Richtersveld, Cornelsberg in Stinkfontein mountains, in main large kloof on east side below beacon, 9:77, Oliver, Tölken and Venter 702 (PRE).
- 2917 (Springbok) AA Richtersveld, Karoegapoort 9 km south of Lekkersing, main hill north of poort, in lee of bushes on stony well-drained north side, in light shade, karoo, 9:77, Oliver, Tölken and Venter 823 (PRE); DB 14 miles west of Springbok, rhenosterveld of shale and quartzite hills, under bushes, common very locally, c. 2000 ft., 8:6:57, Acoccks 19269 (BOL).

12. Holothrix scopularia:

- 2530 (Lydenburg) DD Summit of Ivy Hills, Moodies, Sept. - Oct., 4500 ft., Culver 72 (BOL), Barberton, upper Moodies, 4500 ft., 9 - 10:1899, Galpin s.n. (PRE).
- 2531 (Komatipoort) CC near Barberton, Ivy Reef, summit of mountains, grassy slopes, 4500 ft., 9 - 10:1899, Galpin 585 (BOL).
- 2828 (Bethlehem) DA Golden Gate Park, Generaalskop, at summit, 9000 ft., rare, 21:1:65, Roberts 3173 (PRE); DC Lesotho, Malibamatso valley near Ox Bow, on grassy slope, 12:71, Schmitz 1566 (PRE); DD slopes of Mont-aux Sources 8-9000ft., 1:1894, Flanagan 1980 (BOL, GRA, PRE, SAM).
- 2829 (Harriesmith) CC Bergville, Cathedral Peak Forest Research Station, on stony ridge of spur forming south boundary of Catchment 2, occasional, 7500 ft., 1:2:50, Killick 1189 (PRE), Cathedral Peak, upper Masonjwan Valley (Catchment 3) on grassed rocky outcrop, very rare, 6100 ft., 31:12:64, Schelte 7159 (BOL).
- 2927 (Maseru) DC Lesotho, Matalile Maluties, slope of Ivang Mountain, 6:1:18, Dieterlen 1301 (PRE).
- 2928 (Marakabei) AC Lesotho, Mamalapi, 25:12:48, Compton 21266 (NBG), Lesotho, Mamalapi, grassy slopes with Watsonia, 9000 ft., 26:12:48, Guillarmod 627 (PRE).

- 2929 (Underberg) AB Giant's Castle Game Reserve, Log Cabin area, on rocky outcrop above Cave Sandstone cliffs, 6100 ft., 28:10:68, rare, Trauseld 1024 (BOL); AD Giant's Hut Area, on rocky basalt outcrop, 8500 ft., 28:1:68, Trauseld 961 A (PRE); BA Tabamhlope, in grass, 8:10:42, van der Merwe 2586 (PRE); CB Underberg, Bamboo Mountain, 12:73, Grice s.n. (No herb. number, NU), Sani Pass, on rock outcrop in fynbos, solitary, 7700 ft., 1:12:62, Hilliard 934 (NU); CC Sehlabathebe National Park, midway on trail from lodge to waterfall, montane grassveld, south slope, c. 2400 m, 21:12:75, Beverley 040 (NU), Sehlabathebe, 2300 - 2500 m, grassland near Aponogeton, fairly common in soil mainly from Cave Sandstone rock with a little lithosol (volcanic rock), high rainfall, mist common, cool to cold, insolation intense, 4 - 14:1:73, Guillarmod, Getliffe and Mzamane 78 (PRE); Sehlabathebe, on the ridge running from Thaba Moea to the falls, gentle slope, grassveld, c. 2500 m, 20:12:77, Hoener 1941 (BOL), Sehlabathebe, in grassland near ledge, sandstone, 2700 m, 6:2:77, Linder 1004 (BOL), Sehlabathebe, on grassy slopes, locally frequent, 12:76, Schmitz 7051 (PRE); CD Garden Castle Forest Reserve, N-W of ranger's office, 2250 m, 6:11:76, O'Conner 371 (NU), Underberg, "Penwarne" Farm, among grass on rocky ground, 3:11:77, Shirley s.n. (NU); DB Mpendhle, 5500 ft., 15:11:24, Levett 88 (NH); DC Himeville, on farm "Rainbow", in recently burnt grassveld, 1700 m, 10:10:73, O'Conner 211 (NU), Himeville, farm "Rippon", south bank of Umkomozane River, 12:11:76, Stewart 1825 (NU).
- 2930 (Pietermaritzburg) AD Mount Gilboa, 5-6000 ft., Whyllie s.n. (Wood 10028, NH).
- 3028 (Matatiele) AD Ongeluknek, mountain slope south of top of pass, below cliffs of escarpment, grassland, basaltic soil, 2400 m, 9:2:77, Linder 1031 (BOL); BA Matatiele, summit of the Drakensberg at Makomerin, 2500 m, 17:12:13, McLoughlin 170 (BOL), Makomerin, 7000 ft., 12:13, McLoughlin s.n. (BOL); BB Ramatselis Nek, rocky outcrops and grassland, 2250 m, 30:11:74, Boardman 6 (PRE),  $\frac{1}{4}$  km from Ramatselis Gate, south-facing hillside, grassland, sandy soil, 2250 m, Boardman 190A, B (PRE), Ramatselis Gate, mountain slopes N-W of border post, common on dry slopes, 2300 m, 24:12:76, Linder 816 (BOL); CA Naudés Nek, 1:78, Linder 1747 (BOL), Pass up to Naudés Nek, below summit, in grassland, c. 7500 ft., 15:12:76, Stewart 1916 (NU).
- 3029 (Kokstad) AD Mount Currie, slopes above waterfall, 5750 ft., common, 18:1:20, McLoughlin 423 (BOL), Mount Currie, 15:10:39, McLoughlin 437 (BOL), Mount Currie, 28:1:40, McLoughlin 494 (BOL), Mount Currie, McLoughlin s.n. (BOL), Mount Currie, 6500 ft., 22:10:44, McLoughlin s.n. (BOL), slopes of Mount Currie, just above waterfall on clayey ground, 15:10:39, McLoughlin s.n. (26262 in PRE), slopes of Mount Currie, grassland, 5300 ft., 10:1883, Tyson 1542 (BOL, 20505 in SAM).



- 3127 (Lady Frere) DB Engcobo, above Mbulembe, S-W and S-E slopes of Crown Hill, 1300 m, 15:9:12, McLoughlin 116 (BOL), Engcobo, 9L10L12, McLoughlin s.n. (BOL, 12762 in Herb. Tvl. Mus., PRE).
- 3128 (Umtata) BC Tsolo, Matiwana Mountains, 1300 m, 7:11:15, McLoughlin 257 (BOL).
- 3226 (Fort Beaufort) BD Kingwilliams Town, summit of Elandsberg, in grassland, single plant found, 1800 m, 14:2:77, Linder 1064 (BOL); DB Stockenstrom, summit of Elandsberg, 6000 ft., 1:1886, Scully 391, 1371 (BOL, 1371 in Herb. Norm. Austr. Afr., SAM).
- 3227 (Stutterheim) AC Cathcart, Fairford, 11:16, Cotterwell 117 (GRA); CA Hogsback, 3800 ft., 1:18, Rattray s.n. (BOL); CC Pirie, 4000 ft., 11:1893, Sim 1267 (BOL, PRE).

Uncertain localities:

- 2929 (Underberg) CB, DC? Polela distr., Glengariff, Prosperity, among grass, 5500 ft., only 4 found, 15:10:72, Rennie 148 (NU).

Lesotho, 11:22, Ashton s.n. (17338 in BOL).

13. Holothrix parviflora:

- 3030 (Port Shepstone) CB Port Shepstone, Horseshoe Farm, on cliff, 5:9:65, Stray 5007 (NH, PRE); CC Izingolweni, Horseshoe Dam, on damp rocks near water, 9:8:74, Nicholson 1453 (PRE).
- 3225 (Somerset East) DA Kommadagga, 10:8:63, Bayliss 1562 (NBG, PRE).
- 3227 (Stutterheim) CD King William's Town, Tembani, Alexandra Road, 6:05, Brownlee s.n. (BOL), Fort Murray, on dry rock, 1000 ft., 6:1893, mixed with H. orthoceras, Sim 950 (NU, PRE).
- 3320 (Montague) CC Montague, Kogmanskloof, 5:8:49, Steyner 246 (NBG).
- 3321 (Ladismith) CC Garcias' Pass, under trees, on damp ground, in a deep shady kloof, 9:08, Phillips s.n. (2135 in SAM); DC George, Hooe Kraal Pass, 500 ft., 8:42, Fourcade 5700 (FOUR in BOL).
- 3323 (Willowmore) BB Aberdeen, near Swanepoelspoort, shady rocks on mountain, 1200 m, 9:05, Marloth 4130 (BOL), Swanepoelspoort Berge, 8:05, Marloth s.n. (4130 in Herb. Marloth, Fl. Austr. Afr., PRE); CA Uniondale, 8 miles south of Avontuur, on a damp shady bank, 18:7:37, Salter 6734 (BOL).

- 3324 (Steytlerville) CB Humansdorp, near Kouga River, rock cracks, 8:37, Esterhuysen s.n. (BOL); CC Kouga River Poort, on road to Zuurans, 1100 ft., 9:25, Fourcade 3073 (FOUR in BOL); CD Karreedouw, 9-10:34, Jeppe s.n. (33389 in Herb. Tvl. Mus., PRE); DA Steytlerville, poort between Patensie and Cambria, half way along, steep south slopes, damp rock ledges, 500 ft., 11:9:73, Oliver 4500 (PRE); DD 8 miles west of Patensie, 29:7:72, Stayner s.n. (95391 in NBG).
- 3325 (Port Elizabeth) CC Van Staaden's Wildflower Reserve, forest walk, on moss-covered rocks without soil, south slope in forest, 15:10:78, Hosten 129 (BOL), Longmore Forest Reserve, damp shaded rocks, 1000 ft., 1:9:33, Long 1018 (PRE); CD Uitenhage, near the Zwartkop River, amongst mosses on the roots of trees in a forest, September, Ecklon and Zeyher 3907 (SAM), Uitenhage, forest near the Zwartkop River, among mosses on the roots of trees, September, Zeyher 37 (BOL); DC Port Elizabeth, Gordon s.n. (34900 in PRE), Baakens River Valley Nature Reserve, "false macchia", dry moss under tall bushes, numerous on a 50 yd. long bank, moderate shade to exposed ledges (small plants), c. 300 ft., 24:9:61, A.V. Hall 716 (BOL), P.E., 8:1893, Hallack s.n. (3006 in Herb. Galpin, PRE), Setlar's Park, short road between office and quarry, mossy slope on side of path in shallow black soil, 31:8:78, Hosten s.n. (BOL), Setlar's Park, south-facing embankment of Baakens River above footbridge, rocky slope, rather dry, 31:8:78, Hosten s.n. (BOL), Baaken's River, sea level, wet rocky ledges, 3:8:31, Long 426 (PRE), Baaken's River, just below Glen Hurd, 17:9:74, Oliver 1160 (NBG), Redhouse, 8:11, Paterson s.n. (BOL), near P.E., 9:05, Smith s.n. (BOL), P.E., "The Valley", among rocks, below 100 ft., 10:1877, Tyson 3074 (SAM), P.E., July, West, 216 (BOL, GRA).
- 3326 (Grahamstown) AB Albany, Pluto's Vale, on steep south slope amongst karroid scrub, 9:29, Dyer 2081 (GRA); AC Alicedale 9:17, Cruden 4 a (GRA); AD Howieson's Poort, under bushes of Passerina - Metalasia association, 25:9:20, Britten 2577 (GRA, PRE); BA between Fort Brown and Botha's Ridge, Fish River scrub on steep shale slopes, only one plant seen, 1000 ft., 20:7:46, Acocks 12766 (PRE); BC near Grahamstown, Dassie Kranz, 9:08, Daly 1002 (GRA, 10777 in Herb. Tvl. Mus., PRE), Grahamstown, cliff on southern face of Signal Hill, peaty crevices in rocks, 2400 ft., 9:1888, Galpin 162 (BOL), Grahamstown, south slope of Signal Hill, under rocks, 2500 ft., 9:1888, Galpin s.n. (162 in Herb. Galpin, PRE), near Grahamstown, rocky places, c. 2300 ft., 9-10:1892, Glass s.n. (5457 in NH), Grahamstown, 9:1894, Guthrie 3323 (NBG), Botha's Hill, rock-cracks, 11:1865, MacDwan 627 (BOL, SAM), near Grahamstown, rocky places, 2300 ft., 9-10:1892, Schönland s.n. (34901 in PRE), near Grahamstown, Signal Hill, c. 2100 ft., 9:1893, Schönland s.n. (34894 in PRE), Grahamstown,

- dense wooded to light sandy areas, 10:62, Watson 5 (PRE); DB Bathurst, Hopewell, south of Southwell, Euphorbia forest of Kariega Valley, frequent on kranz, 400 ft., 12:9:51, Acocks 16144 (PRE), Kowie West, Parker 1052 (BOL).
- 3420 (Bredasdorp) AB Swellendam, 7:26, Kennedy from Drew 6893 (PRE).
- 3422 (Mossel Bay) AA Mossel Bay, Langeberg, clefts in rocks, 9:13, Muir 1302 (PRE).
- 3423 (Knysna) AA Knysna, Noetzie, coastal forest, locally frequent, 200 ft., 11:7:60, Acocks 21206 (PRE), Knysna, Groot River, in openings in coastal scrub forest, 1800 - 2000 ft., 14:7:54, Taylor 1330 (SAM), Noetzie, at coast, on rocks just above high water, 15:7:57, Noble s.n. (65746 in NBG); AB Plettenberg Bay, 150 ft., 9:32, Fourcade 4808 (FOUR in BOL), Knysna, Keurbooms River hill, 150 ft., 8:42, Fourcade 5730 (NBG), Plettenberg Bay, common in scrub bush on rocks on hill, 200 ft., 11:22, Keet 1018 (PRE), Plettenberg Bay, moist bank, 5:9:47, Rodin 1176 (BOL), Plettenberg Bay, 9:21, Smart s.n. (22827 in Herb. Tvl. Mus., PRE).

#### Uncertain Localities:

- 3325 (Port Elizabeth) DC? Port Elizabeth?, 28:9:1885, J. Mackay ? (BOL).
- 3420 (Bredasdorp) AB?, Swellendam ? 9:28, van der Merwe s.n. mixed with H.orthoceras (BOL).
- Dontsa Hill, 15:8:41, Doe, 36 (BOL), Kaffraria, Cooper, 1804 (NH, PRE). No locality, McLoughlin 627 (BOL).

#### 14. Holothrix orthoceras:

- 2329 (Pietersburg) AB Soutpansberg, foot of Lejuma (proper) dome, in dense shade in patch of indigenous forest, 5:4:58, Meeuse 10356 (PRE); CD Pietersburg, 2:6:48, Murray s.n. (34927 in PRE); DD Houtboschberge, in shade, 5500 ft., 30:3:1894, Schlechter 4738 (BOL).
- 2330 (Tzaneen) CC Tzaneen, 11:5:60, Botha s.n. (34923 in PRE).
- 2530 (Lydenburg) AB 22 miles S-E of Lydenburg, Kemps Heights, shady wooded slopes, cultivated in Pretoria, 2:4:54, Codd 8196 (PRE); BA 11½ km west of Sabie, Mount Anderson old road, mountain forest slope, 12:3:58, Strey 2991 (PRE); BC Lydenburg, Wonderkloof Nature Reserve, on rocks in



shaded area, 25:3:74, Elan - Puttick 9 (PRE); DB Lydenburg, Kaapsche Hoop, 5 miles S-W of hotel in forest, under trees, 31:5:72, Nel, 216 (NBG, PRE), Kaapsche Hoop, 9:6:21, Comm. S.A. Gardening s.n. (15296 in PRE); DD Transvaal, Ivy Range, 5000 ft., 4:8:1890, Thorncroft 321 (NH), Moodies, rocks in bush, 5000 ft., 30:4:1890, Thorncroft s.n. (BOL).

- 2531 (Komatipoort) CC Barberton, summit of Abbot's hill, rocks 3600 ft., Culver 50 (BOL), 10,6 km S-E of Barberton, de Bilt farm, in riverine forest, alongside river, 3100 ft., 23:4:74, de Souza 423 (PRE).
- 2828 (Bethlehem) DD Mont-aux Sources, Tugela Gorge, in mosses, 5500 ft., 4:20, Allsop 19 (PRE), Mont-aux Sources, on rocks in forest, 5000 ft., 5:46, Lewis 4774 (SAM), Mont-aux Sources, above hotel, in forest on rocks in moss, 22:2:79, Linder 2071 (BOL), Mont-aux Sources, Duiwels Hoek, on forest floor, occasional, 5100 ft., 4:6:46, Schelpé 1465 (NU), Mont-aux Sources, 8:4:51, Steyn 1086 (NBG), Mont-aux Sources, 9:4:51, Steyn 1028 (NBG), Mont-aux Sources, 20:2:69, Trauseld NU35 (NU), Mont-aux Sources, in Podocarpus latifolius forest, 5300 ft., 20:2:64, Trauseld 187 (PRE), Mont-aux Sources, 9:30, van Wyk 42 (PRE).
- 2829 (Harriesmith) AD near Van Reenen's Pass, in wood, 5200 ft., 3:2:1895, Wood 5527 (PRE); CB Bergville, Rhem s.n. (23634 in BOL), Bergville Nat. Park, damp spots under rocks in forest, 6000 ft., 17:4:49, Sidey 1633 (PRE); CC Cathedral Peak in dense bush along stream bed, moist, shady, 5500 ft., 3:60, Germishuyzen 62 (PRE), Cathedral Peak Forestry Res., Rainbow Gorge, in Gorge forest on shady mossy rock, 14:4:78, Hilliard 8134 (NU), Cathedral Peak Forest Research Station, occasional in Podocarpus latifolius forest, 5650 ft., 6:2:51, Killick 1395 (PRE), Cathedral Peak area, Ribbon Falls forest, 6000 ft., Schelpé 150 (NU).
- 2830 (Dundee) CC Weenen Area, 3-4000 ft., 16:3:1898, Wyllie s.n. (Wood 6764, PRE); DB Hlolela, "Fern forest" at the Cavern Holiday Resort, on rocks on forest floor, 1570 m, 17:2:73, O'Connor 171 (NU); DC Qudeni, Gouzaga Mission, 28:3:39, Gerstner 4054 (NH, PRE).
- 2929 (Underberg) AD Giant's Castle, on forest floor, 6000 ft., 4:5:56, Binham 46 (NU).
- 2930 (Pietermaritzburg) AC Karkloof, "Twin Falls" farm, on dry rocky floor in bush, 1500 m, 13:4:75, O'Connor 349 (NU); CB P.M.B., Swartkop, on south-facing moss-covered, shady rocks, 16:3:67, Amm s.n. (37594 in NU); CC P.M.B., Cottingham, gate of farm "Keerom", on boulders in forest, 4500 ft., 23:3:69, Strey 8425 (NU), Illovo, 2000 ft., Wood s.n. (20502 in SAM); CD Richmond, hilltops above Byrne, on patch of forest over drainage line, on rocks and in soil between rocks, intermittent shade, 5000 ft., 22:3:75, Stewart 1738 (NU); DC Mid Illovo, 1500 ft., 4:1883, Wood 1869 (SAM, NH).

- 3029 (Kokstad) CD Tabankulu, kloof forest on hillside, in humus, 16:2:71, Hilliard and Burt 6519 (NU).
- 3226 (Fort Beaufort) BC Halfway up Katberg Pass, on damp boulders in semi-shade, 4500 - 5000 ft., 3:4:65, Bokelman s.n. (BOL).
- 3227 (Stutterheim) CA Hogsback, Swallowtail Falls, in forest, in moss layer on rock-face, 2:5:56, Comins 1451 (GRA, PRE), Kieskamma Hoek, 4:44, Goulmie s.n. (23633 in BOL), Hogsback Forest, 3900 ft., 29:4:54, Schirach 287 (NBG), Pirie, 4000 ft., 11:1893, Sim 947 (BOL, GRA, NU, PRE); CD King William's Town, Debe Nek, 3:29, Latimer s.n., mixed with H. orthoceras (563/29 in Nat. Bot. Gdns. BOL), King William's Town, McLoughlin s.n. (BOL), near King, Yellowwood Falls, right bank below falls, on ledges in shade, 1500 ft., 14-21:4:40, McLoughlin 626 (BOL), Kei Road, stony banks of kloof in forest, 2000 ft., 25:4:27, Ranger 22 (PRE), Fort Murray, on dry rock, 1000 ft., 6:1893, mixed with H. parviflora, Sim 950 (NU, PRE).
- 3326 (Grahamstown) BA Bothasberg, in shade, MacOwan s.n. (1297 in NH); BB Keskamma Hoek, 0,3 miles east of Debe Nek, high forest, 2500 ft., 5:5:46, Story 3485 (PRE); BC Grahamstown, Collingham Kloof, 6:6:48, Isaac s.n. (25327 in BOL), near Grahamstown, rocky places in woods, MacOwan s.n. (BOL, SAM), Grahamstown, 15:3:44, Widdicombe 5 (BOL).

#### Uncertain Localities:

- 3227 (Stutterheim) Stutterheim, Dontza Pass, 14:4:41, Doe 28 (BOL).
- Fern Kloof, South s.n. (BOL). No locality, Sanderson 899 (NH). No locality or collector's name (11212 in NH).

#### 15. Holothrix mundtii:

- 3318 (Cape Town) CD Cape Flats, 2 miles east of Rondebosch, in sand, 100 ft., 10:1884, Bolus 4971 (BOL, 4971 in PRE), Black River near Rondebosch, under pine trees, Fair s.n. (BOL, PRE), Rondebosch, lower mountain slopes at the University, 10:43, Levyns s.n. (55847 in SAM), Orange Kloof, by rock, 20:10:1895, Wolley Dod 497 (BOL); DC Visser's Hok, 11:10:50, Rosenbrock s.n. (56738 in NBG).
- 3320 (Montague) CA Near Hermanuspietersfontein, in sand, 100ft., 9:01, Kensit s.n. (BOL).
- 3322 (Dudtshoorn) CD George, Klein Zwartrivier, 8:0:28, Gillett 1258 (BOL).

- 3324 (Steytlerville) CD Karreedouw, 2000 ft., 11:32, Jeppe s.n. (4875 in FOUR, BOL).
- 3325 (Port Elizabeth) DC Port Elizabeth, 9:37, Cutting 5 (BOL).
- 3418 (Simonstown) AB Constantiaberg, in cracks (on north side?) c. 1300 ft., 10:1894, Borhin? s.n. (BOL), Karbonkelberg, 1800 ft., 29:10:44, Compton 16361 (NBG), Silvermine Valley, under a shrub, scarce, 10:39, Esterhuysen 1286 (BOL), Near Hout Bay, north slopes of Hangberg at start of ascent from Nek, sandy ledge above a rock, recently burnt, 520 ft., 10:41, Penfold 281 (NBG).
- 3420 (Bredasdorp) AB Swellendam mountains, 9:24, Muir s.n. (34999 in PRE).
- 3421 (Riversdale) AB Bredasdorp, Brandfontein, flats near coast, under shrubs, shallow soil, 13:10:51, Esterhuysen 19035 (BOL), Near Riversdale, damp areas in hills, 10:04, Kensit s.n. (BOL).
- 3424 (Humansdorp) BA Karreedouw, 10:32, Jeppe s.n. (33390 in Herb. Tvl. Mus., PRE).

#### Uncertain Localities:

- 3419 (Caledon) BA or BB Riviersonderend mountains, Mund s.n. (20496 in SAM).
- 3323 (Willowmore) CA? Uniondale, Lauterwater, 2100 ft., 10:33, Fourcade 5026 (FOUR in BOL).
- 3424 (Humansdorp) BB? Humansdorp, between Uitvlugt and Bou Plaats, 12:32, Jeppe s.n. (FOUR in BOL).

#### 16. Holothrix aspera:

- 2917 (Springbok) DA Spektakel, 25:8:41, Barker 1584, (NBG).
- 3118 (Van Rhynsdorp) BC Giftberg Plateau, fynbos in crevices of rock-sheets under bushes, c. 1600 ft., frequent, 21:9:48, Acocks 14902 (PRE), Giftberg, 2:9:48, Compton 20857 (NBG); Giftberg, 2978, Goldblatt 3848 A (BOL), Summit of Giftberg, 5:9:55, H. Hall 1004 (NBG), Karoopoort, in fissures of rocks, 8:19, Marloth 9167 (PRE), Giftberg, 1-2000 ft., 9:11, Phillips s.n. (7562 in Percy Sladen Mem. Exp., BOL, PRE); CD van Rhynsdorp, farm "Kliphoek", beneath shrubs and between rocks, 12:8:70, H. Hall 3750 (NBG); DC Klaver, 22:8:32, Bolus s.n. (BOL), Heerenlogement Flats, 21:7:41, Bond 1068 (NBG), Heerenlogement, 21:7:41, Esterhuysen 5567 (BOL, PRE).

- 3119 (Calvinia) AC Kloof near Nieuwoudtville, 9:30, Bolus s.n. (BOL), between Nieuwoudtville and Dorlogs Kloof, 8:41, Leipoldt 3806 (BOL, PRE), S-W of Nieuwoudtville, on escarpment, Uitkomst Farm, in sandy soil in shade of bushes, solitary, 27:9:70, Thomas s.n. (90885 in NBG); BC Ceres, Hottentot's Kloof, 27:9:44, Barker 3074 (NB); BD Calvinia, 19 miles from Doornbos, occasional in litter on outcrop under bushes, 2500 ft., 11:10:59, Schelppe 4956 a (BOL); CA Lokenburg, arid fynbos of T.M.S. ridges, rock sheets, c. 2300 ft., 29:8:53, Acocks 17032 (PRE); CD Calvinia, top of Botterkloof, 24:8:50, Barker 6595 (NBG), base of Botterkloof, 21:7:61, Barker 9290 (NBG), top of Botterkloof, 8:50, Lewis 2335 (SAM).
- 3218 (Clanwilliam) BA Between Lambert's Bay and Vredendal, near Berg Kraal, stony outcrops, 4:9:55, Lewis 4360 (SAM); BB Clanwilliam, 250 ft., Acocks 601 (PRE), Clanwilliam near Doorn River Mouth, 24:7:48, Compton 20730 (NBG), Citadel Kop, 8:9:53, Compton 24315 (NBG), Langkloof near the Nardouw road, amongst rocks, 2:9:45, Leighton 1104 (BOL), Clanwilliam, sandy hills, under bushes, 250 ft., 8:1896, Leipoldt 252 (SAM), near Clanwilliam, mountain slopes, 250 ft., 8-9:1896, Leipoldt 1757 (GRA, PRE), Pakhuis Pass, 9:38, Salter 7503 (SAM), Clanwilliam, under bushes and in stony crevices, 250 ft., 7:1896, no collector's name, (NBG); BD Pakhuis, 7:9:33, Compton 4313 (BOL), Clanwilliam, under bushes, in stone-crevices, in sandy-clay soil, rare, 7:1896, Leipoldt 601 (BOL), Clanwilliam, 8:1895, Leipoldt s.n. (BOL), 10 miles south of Clanwilliam, 8:9:33, Salter 3656 (BOL), Oliphant's River Mountains, 300 ft., 30:8:1894, Schlechter 5077 (BOL), Blaauwberg, 1500 ft., 10:8:1896, Schlechter 8465 (BOL); DB Oliphant's River Valley, Nardouw road, 9:45, Lewis 1356 (SAM), Oliphant's River, 8:1894, Schlechter 5036 (NH), Oliphant's River, hills, 300 ft., 30:8:1894, Schlechter 5077 (SAM), Nardouw Pass, 8:49, Stokoe s.n. (61025 in SAM).
- 3319 (Worcester) AB Gydouw Pass, 30:7:27, Leipoldt s.n. (BOL); AD Ceres, 7:19, Marloth s.n. (16336 in BOL); BC Karooport, 23:9:70, Goldblatt 577 (BOL); CB Worcester Karoo Gardens, 12:8:68, Steyner s.n. (88058 in NBG); CD Northern Koue Bokkeveld, Suurvlakte, stony plateau, in sand, 14:9:75, very rare, Esterhuysen, 33948 (BOL); DA Hex River Valley, 13:8:1897, Wolley Dod, 4054 (BOL).

#### Uncertain Localities:

- 3220 (Sutherland) DA or DC Klein Roggeveld, foothills, Tangua western side, 600 m, 9:21, Marloth 10389 (BOL).
- 3218 (Clanwilliam) BD? Blaauwberg, 10:8:1896, Drake s.n. (8465 in Pl. Schl. Austr. Afr., PRE).



17. Holothrix macowaniana:

- 3225 (Somerset East) DD Stockenstrom, Willsdale, grassy slopes, 9:1884, Scully s.n. (20503 in SAM).
- 3226 (Fort Beaufort) AD Howieson's Poort, 8:1892, Glass s.n. (BOL, 5387 in NH), Howieson's Poort, C. 200 ft., 9:1892, Glass s.n. (Schönland 577 in NH); DA Katberg mountains near Seymour, 1884, Scully s.n. (BOL, SAM).
- 3326 (Grahamstown) CA Kagaberg mountains, Weale s.n. (BOL).

18. Holothrix culveri:

- 2531 (Komatipoort) DD near Barberton, Fig Tree Creek, de Kaap, rocky slopes, 2000 ft., 8-9:1880, Culver 84, 84 a (BOL).

19. Holothrix burchellii:

- 3126 (Queenstown) DD Queenstown, Lesseyton Mountains, 400 ft., 10:1893, Galpin s.n. (1578 in Herb. Galpin, PRE), Bram Nek, 28:10:46, Thorns s.n. (56760 in NBG), hills above Queenstown, 10:1896, Wolley Dod s.n. (BOL).
- 3218 (Clanwilliam) DA near Piquetberg, 10:1892, Bolus s.n. (BOL).
- 3224 (Graaf Reinet) DD Graaf Reinet, Oudeberg, mountain-sides 4000 ft., 11:1872, Bolus 177 (BOL).
- 3226 (Fort Beaufort) AC Alicedale, 11:16, Cruden s.n. (GRA); BC Grahamstown, Oatlands, 1800 ft., 10:1891, Bennie 204 (GRA).
- 3227 (Stutterheim) CD King Williams Town, 10:1892, Bolus s.n. (2741 in Guthrie, NBG), near King Williams Town, grassy slopes, 1200 ft., 11:1893, Flanagan 2206 (BOL, PRE, SAM). King Williams Town, McLoughlin s.n. (BOL), King Williams Town, 9:08, Pym s.n. (GRA), near King Williams Town, 16:9:42, Schnell s.n. (BOL), near King Williams Town, 10:42, Schultz s.n. (BOL), near King Williams Town, common, 11:1890, Sim 958 (PRE), near King Williams Town, grassy hill-slopes, 1250 ft., 10:1887, Tyson 2990 (PRE, SAM); DB Grassy slope near Komgha, 2000 ft., 12:1891, Flanagan 1306 (BOL, PRE); DC East London, railway enclosure next to National Road, 3 miles north of Egerton near level crossing, in grass, probably burned 1 year ago, 850 ft., 28:9:61, six plants, A.V. Hall 709 (BOL).
- 3322 (Oudtshoorn) CA near Oudtshoorn, mountains, 10:05, Hops s.n. (BOL); CD George, Marloth 8386 (PRE).

- 3323 (Willowmore) CA Uniondale, 2700 ft., 11:28, Fourcade 4249 (FOUR in BOL); CB Uniondale, Haarlem, rocky hillside, 26:11:41, Esterhuysen 6928 (BOL), rocky hill south of Haarlem, 2700 ft., 11:27, Fourcade 3494 (FOUR in BOL), Haarlem, slopes between village and the river, on dry rocky slopes, 22:10:77, occasional, Linder 1574 (BOL).
- 3325 (Port Elizabeth) CC Cliffs above Gamtoos River bridge, 4:10:63, Schelte 7133 (BOL); CD Uitenhage, "The Aloes", 154 ft., 12:12, Drège 3170 (PRE), Uitenhage, on the grass fields near the Zwartkops River, August, Ecklon and Zeyher 3904 (SAM); DC Redhouse, 10:11, Paterson 193 (BOL, GRA).
- 3326 (Grahamstown) BA Grahamstown, 10:02, Daly and Sole 2414 (PRE), between Botha's Hill and Grahamstown, 1000 - 2000 ft., 10:1830, Ecklon and Zeyher s.n. (PRE); BC Grahamstown, rocky kopjie, 2700 ft., 23:10:64, Bayliss 2471 (NBG), Currie's Kloof, among grass under bushes, 11:1866, MacOwan 1525 (SAM); Grahamstown, 1894, Glass 474 (NBG); DB Bathurst, Cawoods Post, 10:10:47, Sidey 1255 (PRE).
- 3420 (Bredasdorp) AB Port Beaufort, on bushy hills near Oysterbed Guesthouse, c. 30 m, 24:10;71, Schlieben and Ellis 12387 (PRE).
- 3421 (Riversdale) AB Near Riversdale, mountains, among bushes, c. 650 ft., 10:04, Bolus 11382 (BOL), Ruggens, c. 300 ft., 7:10:1897, Galpin s.n. (4589 in Herb. Galpin, PRE), Riversdale, reservoir near National Road, 5:10:69, Nesbit 90 (BOL), Riversdale, Alwynsfleur 5:10:69, Nesbit 91 (BOL); BA Gouritz River bridge, upper edge of valley, on north aspect, bushveld, locally frequent, 500 ft., 23:10:60, Acocks 21631 (PRE); BB Herbertsdale, by Lang Touw River, stony places, 10:13, Muir 1121 (PRE).
- 3422 (Mossel Bay) AA About 15 miles west of Mossel Bay on the National Road, 10:52, Barnard s.n. (62794 in SAM), George, hills above Great Brak river, 100 ft., 9:10, Fourcade, 5400 (FOUR in BOL); BB high dunes between Knysna and the Goukamma river, 200 m, Proteoid-Thamnochortus vegetation, heavily grazed, 24:10:77, Linder 1584 (BOL).
- 3423 (Knysna) AB Plettenberg Bay, in Rectory grounds, one only, 200 ft., 29:10:64, Wurts 2199 (NBG).
- 3424 (Humansdorp) BB In rocks above Assegailbosch, 11:34, Jeppe s.n. (33386 in Herb. Tv1. Mus., PRE).

#### Uncertain Localities:

- 3326 (Grahamstown) CB? Alexandria, Belevue-Tvolutsi cutting, south aspect, on shale ledges, occasional, 27:11:55, Archibald 6051 (PRE).

- 3226 (Fort Beaufort) ? Victoria East, Hancorn, 1800 ft., thornveld, very rare, 17:10:64, Acocks 23479 (PRE).  
Near Dixon's bush, Lower Albany, 10:1891, Bennie s.n. (5212 in NH).

20. Holothrix randii:

- 2528 (Pretoria) CA Hatfield, 23:9:34, Broom s.n. (32752 in Herb. Tvl. Mus., PRE), Meintjies Kop, behind V.B., 22:9:50, Codd 6162 (PRE), Meintjies Kop, south slope in grass, 4500 ft., 18:9:48, de Winter 375 (PRE), Mucklenek, occasional on eastern slopes near the valley, 16:9:30, Goosens 82 (PRE), Meintjies Kop, 2:10:24, Hawlett s.n. (34931 and 34932 in PRE), Pretoria, 12:9:04, Leendertz 258 (PRE), Pretoria, 10:58, Mauve s.n. (34941 in PRE), below Prinzhof, rocky ledges above Aapies River, in stratified shale, with Scilla sp. and Helichrysum caespititium, very uncommon, one of the first spring flowers in the area, Smith s.n. (34934 in PRE), Pretoria, 9:19, Vogt s.n. (34948 in Herb. Tvl. Mus., PRE), Wonderboom Suid, 9:58, Wagener s.n. (34940 in PRE); CC Irene, Doornkloof, hillslopes, 9:32, Smuts 352 (PRE).
- 2628 (Johannesburg) AA Melville Koppies Nature Reserve, upper north slope near quartzite ridge, 10:62, MacNae s.n. (65553 in N8G).

Uncertain Localities:

- 2429 (Zebediela) CC7 Knoppiesfontein, 9:09, Jenkins 7207 (PRE).

21. Holothrix schlechteriana:

- 2917 (Springbok) DB 5 miles from Springbok on Pofadder road, 7:11:62, Hardy and Bayliss 1115 (N8G, PRE).
- 3125 (Steysburg) AC Middelburg, Grootfontein College, grassy dolerite hill, fairly frequent, 4300 ft., 25:10:52, Acocks 16511 (PRE), Grootfontein, hillsides, rare, 4200 ft., 30:10:47, Theron 353 (PRE), Grootfontein, south side of stony hills, 15:10:52, Theron 1399 (PRE).
- 3320 (Montague) BA Laingsburg, Whitehill Karoo Garden, 30:10:29, Compton 3620 (BOL), Whitehill Ridge and Karoo Garden, Compton 16384 (N8G); BB near Laingsburg, dry stony hills, 12:02, Pillans 9367 (BOL), Matjiesfontein, among short karoo scrub, 29:10:63, Schelppe s.n. (BOL).



- 3227 (Stutterheim) CD King Williams Town, commonage, 8:10:42, Schnell s.n. (BOL).
- 3322 (Dudtshoorn) DC Knysna, Kaaiban's Gat, 12:30, Flugge-de-Smit s.n. (BOL).
- 3324 (Steytlerville) CD Essenbosch, c. 250 yds below road to stream, between stones on bank, Fourcade 5926 (FOUR in BOL), hills south of Karreedouw, 1300 ft., 1:31, Jeppe s.n. (4550 in FOUR, BOL), Karreedouw, 12:1:34, Jeppe s.n. (33392 in Herb. Tvl. Mus., PRE).
- 3325 (Port Elizabeth) BC Uitenhage, Erion, 11:26, Thode A 1128 (PRE); CD Uitenhage, Witteklip, 12:08, West s.n. (BOL); DC Port Elizabeth 10.37, Cutting s.n. (BOL), Settler's Park, north-facing cliffs under school playground, 23:10:78, Hosten 124 (BOL), Settler's Park, north-facing cliff under Forth Avenue Primary School, leaves withered, 16:12:78, Hosten 140 (BOL), Port Elizabeth, 12:1895, Kensley 240, 328 (BOL), Redhouse, 10:11, Paterson s.n. (BOL), Redhouse, 11:11, Paterson s.n. (25808 in Herb. Tvl. Mus., PRE).
- 3326 (Grahamstown) AD Howieson's Poort, Nov. or Dec., Glass 423 (BOL), Howieson's Poort, 11:1891, South 423 (GRA); BC Grahamstown, Signal Hill, 12:06, Britten s.n. (BOL, GRA), West Hill, near railway line, 10:29, Dyer 2152 (GRA), East of Grahamstown, growing under trees between rocks on hills, 9:12:46, Erens 1962 (PRE); BD Bathurst, Hope-well, margin of Euphorbia forest, 500 ft., occasional, 3:11:45, Acocks 12071 (PRE); DB Bathurst, "Seafield", in kloof near coast, 10:26, Flecher 21 (GRA).
- 3327 (Peddle) BB East London, Buffels Pass, 28:11:45, Compton 17780 (NBG).
- 3419 (Caledon) AC Hermanus, 2:31, de Villiers s.n. (181/31 in Nat. Bot. Gdns., BOL).
- 3423 (Knysna) AB Knysna, Keurbooms River, in bush on coastal dunes, 1:1:56, Esterhuysen 25152 (BOL).
- 3424 (Humansdorp) AB Clarkson, 17:11:1894, Penther s.n. (10572 in Herb. Tvl. Mus., PRE), Clarkson, 500 ft., 17:11:1894, Schlechter 2529 (PRE), near Clarkson, among rocks, 500 ft., 17:11:1894, Schlechter 6015 (BOL).

Uncertain localities:

- 3323 (Willowmore) DC, DD or 3323 (Steytlerville) CC ?  
Tsitsikamma mountains, 11:1894, Schlechter 6015 (NH).

Brak River, 11:41, Schelpe 012 (NU). Coney Glen, Williamson 92 (GRA). Albany, Blaauwkranz valley under shrubs, 350 m, 23:11:21, Marloth 10920 (PRE).

22. Holothrix grandiflora:

- 3118 (Van Rhynsdorp) CA Papendorp, about 25 miles west of Vredendal, 100 ft., usually in rock crevices, 12:6:70, (in leaf only) and 22:3:71 (in flower), H. Hall 3521 (NBG); Papendorp, near Olifant's River Mouth, summit of rock outcrops in very small cavities in full sun, associated with xerophytic Crassulas and Mesems in very arid conditions, 100 ft., 28:3:71 (flowering), H. Hall 3521 (BOL), Papendorp, about 25 miles west of Vredendal, rock-crevices of sandstone-quartz conglomerate, 100 ft., 6:70 (leaf only) and 7:3:71 (flowering), H. Hall 3923 (NBG), Papendorp, near Olifant's River Mouth, 5:3:74, Schelpe 7663 (BOL).
- 3218 (Clanwilliam) AB Clanwilliam, van Pattensvlei, south bank of Jakkals "River", on white T.M.S., in crevices and hollows in rocks, very common, 27:3:76, Bruyns 1280 (NBG), Suurfontein near Lambert's Bay, bridge across Jakkals River, in crevices on rocks, large outcrop of T.M.S. alongside riverbed, common locally, 27:3:76, Bruyns 1282 (NBG).
- 3321 (Ladiesmith) DA Calitzdorp, karoo, 1937, Oddie s.n. (BOL).
- 3419 (Caledon) CB S-W, extremity of Walkers Bay, near coast, Guthrie s.n. (BOL).

SPECIMENS IN LIQUID PRESERVATIVE (BOL)H. exilis

3322 DC Wilderness, 11/1/66, A.V. Hall 1162.

H. cernua

3424 AB Near Clarkson, 10/65, A.V. Hall 1107

3319 CA Bains Kloof, Esterhuysen 35093

? Esterhuysen 30822.

3420 AB Swellendam, 23/9/64, A.V. Hall 1083

3318 CD Table Mountain, 26/1/66, A.V. Hall 1164.

H. villosa

3319 AC Tulbagh, near Gouda, A.V. Hall 955

3420 BD Cape Infanta, Esterhuysen s.n.

2917 DB Springbok, 20/9/71, A.V. Hall 1197

3319 CA Bain's Kloof and Brandwacht P., 11/78, Esterhuysen s.n.

3218 AB, BC or DA Piketberg summit, 24/9/68, Tolken s.n.

H. incurva

3028 AD Ongeluksnek, 9/2/77, Linder 1033

3028 CA Naude's Nek, 10/2/77, Linder 1048

2828 DB Royal Natal National Park, north boundary, Witches, basalt, 8300 ft., and Sentinel, east base, 1/77, Schelpe 7206

2828 DB Camel, on west aspect basalt cliff, rare 18/1/65, Schelpe 7206

H. filicornis

- 2917 DB Koppie next to Springbok, south slope, quartz, rock cracks, not uncommon, 16/6/78, H.M.F. 20 (van der Westhuizen, Hester Malan Reserve).
- 2917 DB 23 km from Springbok on road to Spektakelberg, south slope, hard red clayey soil under bushes, scarce, H.M.F. 21 (van der Westhuizen, Hester Malan Reserve).

H. scopularia

- 3028 AD Ongeluksekk, Linder 1031
- 7 Stewart s.n.
- 3028 BB Ramatselisos 24/12/76, Linder 816
- 2829 CC Upper Masonjwaan Valley, grassed rocky outcrop, 6100 ft., very rare, 31/12/64, Schelpe 7159

H. parviflora

- 3423 AA Knysna, Noetzie, 22/7/60, Carter s.n.
- 3326 BC Grahamstown, A.V. Hall 734
- 3325 DC Baakens River valley, A.V. Hall 706
- 3323 DC Knysna, Natures Valley, scrub overlooking Salt River, 15/7/67, Powrie 67

H. mundtii

- 3418 AB Hout Bay, A.V. Hall 659
- 3418 AB Chapman's Peak, 17/9/65, A.V. Hall 1060

H. aspera

- 3118 BC Giftberg, 2000 ft., 17/9/65, Oliver s.n. and A.V. Hall 1061.
- 3218 BB Clanwilliam, Oliver 1477
- 3218 CC Near Langebaan, Meeuklip Farm, on granite outcrop, Duckitt s.n.

H.burchellii

- 3227 DC Egerton, A.V. Hall 709  
 3327 BB East London, 1/9/62  
 3326 BC Grahamstown, 10/64, Seagrief s.n.  
 3326 DA H.burchellii? Kasuka River Bridge, A.V. Hall 740

H.schlechteriana

- 3320 BB Laingsburg, Matjiesfontein, 29/10/63, Schelte s.n.

### APPENDIX III : BIBLIOGRAPHY

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