

PRECIS, the Botanical Research Institute herbarium data bank

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ABSTRACT

PRECIS has been modified to make it more useful to taxonomists. The simplified system contains only specimen-related data, and the resulting decrease in the size of the data bank will make it more efficient to operate and maintain. The methods used to encode herbarium data, the operation of the storage and retrieval system, and several examples of system output, demonstrating the flexibility and versatility of PRECIS and its applications in herbarium curation and taxonomic research are described.

RÉSUMÉ

LE SYSTEME PRECIS, BANQUE DE DONNÉES DE L'HERBARIUM DE L'INSTITUT DE RECHERCHE BOTANIQUE.

Le système 'PRECIS' a été modifié pour le rendre plus commode à utiliser par les taxonomistes. Le système simplifié contient seulement des données relatives aux spécimens, et la réduction qui en résulte dans la dimension de la banque de données le rendra plus efficace à exploiter et à tenir à jour. Les méthodes utilisées pour l'encodage des données de l'herbarium, le fonctionnement de la mémorisation et le système d'extraction, ainsi que plusieurs exemples de sortie du système, démontrant la souplesse d'emploi du système 'PRECIS' et ses applications dans la gestion de l'herbarium et de la recherche taxonomique, sont décrits.

BACKGROUND

The computerized information system (PRECIS) developed for the National Herbarium of South Africa (PRE), as outlined by Morris & Glen (1978), became operational in 1980. Although the system functioned as it was designed, it became evident that its value to research at the Botanical Research Institute (BRI) was reduced by difficulties with maintenance and operation. After a trial period of approximately one year, the authors completely re-evaluated the system and provided a critical review of the system. The major difficulties with the system can be summarized as follows:

1. The system was too large (4 disk packs were necessary for on-line service) and the complex nature of the data base made programme maintenance and alterations difficult.
2. There was a large amount of extraneous information, and a high percentage of empty records (mostly information not available on older specimens) was carried by the system (Morris & Manders, 1981).
3. The high cost of routine inquiries of the data bank, the difficulty in manipulating and correcting the data and the slow turn-around of requests discouraged use of the system.
4. The specimen labels were in a cryptic format unsuitable for curatorial and research purposes.

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In the light of these difficulties, the Botanical Research Institute decided to reassess the system according to Institute priorities, but with special emphasis on the specific requirements of herbarium curation and flora research. Datametrical Services reviewed possibilities for improved operation and efficiency of the system.

The problem of the size of the data bank and the extraneous information it carried (Morris & Glen, 1978) was the most serious. From the standpoint of herbarium curation and flora research, the system was overburdened with a great deal of peripheral, although related, information. This included information encoded under Economic Botany, Photography, Garden Records, and some broad ecological data (regional rainfall, degree of frost, soil depth and colour, etc.). The remaining taxonomic information was either specimen-related or species-related. Although there was an overlap of categories applicable to both groups, a further reduction in the size of the data bank could be brought about by the separation of specimen-related data and species-related data, where possible.

The problems of manipulating and correcting the data were traced to a single oversight in the encoding process (Morris, 1980): the computer number allocated to each individual specimen had not been recorded on the specimens when they were encoded. Because these computer numbers were not available, it was not possible to update the system in the most efficient and inexpensive way. The process of obtaining a listing of the computer numbers and attaching them to the specimens was tried, but was found too expensive in both computer time and man-hours. Another possibility, updating information only when data was extracted for research or curatorial purposes, was much too lengthy a process and would retard research in non-taxonomic areas, as well as hamper curation of the collection. Clearly, what the Institute needed, was quick, inexpensive

access to the data on a specimen by specimen basis and by groups of related taxa.

The problem of cryptic specimen labels, was only partly correctable on the old system because of the way data was encoded. Although the format was adequate for data base operations, it was unsatisfactory for research and curation, especially to anyone unfamiliar with the system. It was clear that a method for producing complete and readable labels had to be designed.

Investigations showed that a simpler and more efficient system could be developed around a smaller data base with more clearly circumscribed requirements. Furthermore, it was found that the existing data base could be restructured for use in the new system.

THE NEW SYSTEM

Over a period of approximately one year, a new Herbarium Data System has been developed. The new system consists of three main parts. The first is a restructured version of the data bank for the 600 000 specimens at the National Herbarium, Pretoria (PRE). The second is a program (SPECUPDATE) that handles new data input, initial specimen output and permanent data file creation. The last part is the Burroughs-developed information retrieval system (INQUIRY).

1. The data bank

The data bank for the new system contains only specimen information. With the size problem of the old system in mind, the new system is restricted to data important to collectors, curators and taxonomic and floristic researchers. Although the system can be used to generate some species-related information from encoded specimen data (flowering times, substrate preference etc.), it has been accepted that a separate taxon-based data bank should be developed for this purpose. Thus, for instance, flower colour for the 890 specimens of *Acacia karroo* will not be stored for each specimen in the herbarium data bank, but rather only once under the taxon, in a separate species data bank, which will be

developed in the future. This type of descriptive information can, however, be printed on the specimen labels (see below).

The data bank has been divided into 10 data sets, each containing 40–70 000 specimens (Tables 1 & 2). Specimen data for each of the four wings of the National Herbarium is contained in 2 or 3 data sets. Each set contains an exclusive range of taxon numbers referred to as genspec numbers (Morris & Glen, 1978).

TABLE 2.—Total number of taxa and specimens in each herbarium wing in PRE

Wing	Genera	Species	Specimens
A	876	6 320	134 083
B	476	7 880	107 737
C	480	5 110	116 260
D	570	5 402	134 962
Total	2 402	24 712	493 042

As indicated above, the amount of data encoded for PRECIS has been reduced to make the information more manageable and accessible. Specimen data is now entered on collecting forms that give the collector more flexibility in recording data for the specimen labels and the data bank. The collecting forms (Fig. 1) are A5 in size and encoding is done on one side of the form only. The form is divided into four parts (A–D).

1.1 Part A contains collector and locality information (registered number of collector, locality number, specimen number, date, grid reference, region and major, minor and precise localities) that will appear on both the specimen label and in the data bank. It is possible to repeat this information for all specimens collected at a site by repeating only the collectors number and the locality number on subsequent collecting forms.

TABLE 1.—Data sets in PRECIS, with the taxa and numbers of specimens in each

Wing	File name	Families included	Genspecs	No. genera	No. species	No. specimens
A	CRYMON	Cryptogams – Eriocaulaceae (minus Poaceae)	0–832A	451	2 091	39 648
A	GRASSE	Poaceae	9900–9904	209	1 104	49 800
A	PETMON	Commelinaceae – Orchidaceae	896–1837	216	3 125	44 635
B	CASOXA	Casuarinaceae – Oxalidaceae (minus Fabaceae)	1855–3937	341	6 005	64 282
B	LEGUME	Fabaceae	3443–3910C	135	1 875	43 455
C	LINSTE	Linaceae – Sterculiaceae	3945–5091	196	2 139	59 915
C	OCHASC	Ochnaceae – Asclepiadaceae	5112–6924	284	2 971	56 345
D	CONSCR	Convolvulaceae – Scrophulariaceae	6968–7645	173	1 508	43 391
D	BIGOOD	Bignoniaceae – Goodeniaceae	7705–8716	171	1 377	32 270
D	COMPOS	Asteraceae	8734–9605A	226	2 517	59 301

BOTANICAL RESEARCH INSTITUTE, PRETORIA PLANT COLLECTING FORM

A. Name of collector _____ **Name of plant** _____

Registered No. of collector Locality No. Specimen No. Date Grid ref. Region

4 6 8 1 0 _____ _____ _____ _____ _____ _____

Major location _____ 1 Botswana 3 Lesotho 5 D.F.S. 7 Swaziland 9 Other

Minor location _____ 2 Cape Prov 4 Natal 6 S.W.A. 8 Transvaal

Precise location _____

4 6 8 1 1 _____

4 6 8 1 2 _____

B. Notes

4 6 8 1 3 _____

4 6 8 1 4 _____

4 6 8 1 5 _____

4 6 8 1 6 _____

4 6 8 1 7 _____

4 6 8 1 8 _____

C. 4 6 8 1 9

Height 1 1 m	01 Abandoned land	01 Desert	01 Soil	01 Poorly-drained	01 Gravel	01 Tree
	02 Cultivated land	02 Karoo	02 Stony soil/rocky	02 Well-drained	02 Sand	02 Shrub
	03 Planted pasture	03 Grassland	02 Bare rock	03 Pan/depression	03 Loam	03 Dwarf shrub
	04 Plantation	04 Open shrubland	04 Talus	04 Seepage area	04 Clay	04 Herb
	05 Garden	05 Closed shrubland	05 Cliff face	05 Marsh/swamp	05 Black turf	05 Graminoid
	06 Road/railwayside	06 Open woodland	06 Termite mound	06 Floodplain	06 Humus rich	06 Geophyte
	07 Grazed heavily	07 Closed woodland	07 Dune-desert	07 Bank river/stream	07 Salt/brack	07 Epiphyte
	08 Burned recently	08 Forest	08 Dune-beach	08 River/stream	08 Calcrete	08 Climber
	09 Disturbed—other	09 Fynbos	09 In water	09 Dry river/stream bed	09 Laterite	09 Parasite
	10 No effect seen	10 Afroalpine	10 Trunk	10 Ditch/donga	10 Disturbed	10 Succulent
Aspect N S E W NE SW SE NW		11 Branch	11 Lake/dam	11 Gray mottles	11 Hydrophyte	
		12 Leaf	12 Sea/estuary/lagoon	12 Other	12 Bryophyte	
		13 Other			13 Lichen	

D. HERBARIUM USE ONLY

Name of plant _____

GenSpec _____ Det. by _____ Date _____

Herbarium Code _____ Type _____ Flower _____ Fruit _____ Labels needed _____

FIG. 1.—Plant collecting form.

1.2 Part B provides space for the description of the plant or other notes. This information can be in the form and style chosen by the collector and will appear on the specimen labels exactly as it was recorded. The data from part B is label information only and is not stored in the data bank.

1.3 Part C provides space for recording altitude, aspect and height of plants, and each will appear in the data bank and on the specimen label. A second group of blocks is provided to encode descriptive and environmental notes for the data bank only. Each subject field (biotic effects, vegetation type, substrate, moisture regime, soil type and life form) has its own descriptive terms listed on the encoding form. These fields should provide an abstract of the information given in part B, and do not appear on the specimen labels. This form of data storage is used because it is economical of space while providing a qualitative method for returning specimen data.

Part D is intended for use by the identifier of the specimen and contains space for the specimen's name, genspec number, determiner and date, computer number, southern African Herbarium code, type status, presence of flowers and fruit, and number of labels needed. The first four fields occur on the labels and in the data bank, the remainder appear in the data bank only.

2. Specupdate

This program is the heart of the new system. It is responsible for a large variety of functions including new data input, data set manipulation and maintenance, and initial specimen output in the form of encoded data and specimen labels. A brief review of the routine operation of this program follows: 1, as the collecting forms are completed they are grouped in bundles and encoded into data files; 2, data for each specimen is checked by the program for errors in each of the defined fields, and if none are found it

proceeds to print all of the encoded information (Fig. 2); 3, this printout is returned to the collector or herbarium for approval or correction; 4, when approved, the program then prints the required number of specimen labels (Fig. 3), and simultaneously transfers the data into the proper wing data set. When this is completed the program removes the bundle from the data file.

The system also has several smaller programs designed to correct or update the information already stored in the wing data sets. These alterations can be made for individual specimens or in groups of related specimens.

3. Inquiry

The information stored in the data sets is accessible by the Burroughs information retrieval package (INQUIRY). This system is suitable for research at the Institute, because it is an on-line system available on remote terminals. Information requested from the data bank can be displayed on terminals or printed out at the Institute. In addition, the possible uses of the system are increased because the requested data can be sorted, and the format of the printout varied to suit particular purposes. There are four major areas of information retrieval available from the herbarium data bank. A few of the possibilities are listed below as examples.

3.1 Collectors information

Specific information relating to a collector's record-keeping, including register of his collecting localities (Fig. 4), lists of collected specimens reported by specimen number (Fig. 5) or selected groups of plants (Fig. 6).

3.2 Herbarium curation

In addition to specimen label production by the new system, INQUIRY provides lists of specimens

2917DA BOUCHER C 003121 PHYLICA AGATHOSMOIDES PILLANS SPRINGBOK. NARIES. 24.1 KM - SPRINGBOK-KLEINSEE SANDSTONE. ARID FYNBOS. SCATTERED. ROUNDED BUSHES.	0600791 CAPE 1976/09/02	ESTERHUYSEN EE 030376	0600792 CAPE 1963/10/13 1143 M	BATCHNO: 0000041 ACCDATE: 03/82 LABELS: 01 LOCNO: 760000
P 2 0 FYNBO STONY SHRUB M. CROSBY. 0000 MAUVE REID SMOOK 034347 PHYLICA NERVOSA PILLANS WORCESTER DIV. DE DOORNS. NEAR OR ON BANKS OF STREAM. NOT SEEN ELSEWHERE. MUCH BRANCHED TOWARDS THE TOP, WITH TOUGH STEMS. SEPALS DARK PURPLE-BROWN.	HEIGHT 0.50 M 4886.000-00600 0600793 CAPE 1976/08/22	P 2 0 STONY SHRUB ESTERHUIZEN 0000 3416BB VAN WYK AE 004412 PHYLICA ERICOIDES L. VAR. ERICOIDES GORDONSBAAI. BERGHANG TEENOR KAMPTERREIN. FYNBOS, IN VOLLE SONLIG. GOEDGEDREINEERDE SANDGROND. REDELIKE STEILHELLING. DWERGSTRUİK MET WIT BLOMME. KOM PLEK-PLEK VOOR.	HEIGHT 0.74 M 4886.000-12400 0600794 CAPE 1981/04/17	BATCHNO: 0000041 ACCDATE: 03/82 LABELS: 01 LOCNO: 630000 BATCHNO: 0000041 ACCDATE: 03/82 LABELS: 01 LOCNO: 760000
P 2 0 BNK R ESTERHUIZEN 0000 3423AB VAN WYK AE 004361 PHYLICA AXILLARIS LAM. VAR. PULCHRA PILLANS HARKERVILLE. KRANSHOEK NATUUR RES KRUISFONTEIN STAATSBOS. FYNBOS IN VOLLE SON. GOED GEDREINEERDE SANDGROND. HOUAGTIGE DWERGSTRUİK WAT ALGEMEEN VOORKOM. WIT BLOMME.	HEIGHT 2.13 M 4886.000-11100 0600795 CAPE 1981/04/14	P 2 0 FYNBO SOIL WELL SAND DW SH M. CROSBY. 0000 3322AC OLIVER EGH 005584 PHYLICA PURPUREA SOND. VAR. PURPUREA SWARTBERG. SUMMIT RIDGE SE OF BLOUDBERG (NORTH SIDE) DRY STONY SLOPE WITH RESTIAD PROTEOID SCRUB. A FEW LOW SCATTERED SEMI-SPREADING PLANTS. HEADS WHITE, DARK BROWN INSIDE FLOWERS..	HEIGHT 0.50 M 4886.000-05900 0600796 CAPE ASPECT NW 1975/01/04 1646 M	BATCHNO: 0000041 ACCDATE: 03/82 LABELS: 01 LOCNO: 810000 BATCHNO: 0000041 ACCDATE: 03/82 LABELS: 01 LOCNO: 810000
P 2 0 FYNBO SOIL WELL SAND DW SH M. CROSBY. 0000	HEIGHT 1.00 M 4886.000-02500	P 2 0 FYNBO P. HERMAN. 0000	HEIGHT 0.15 M 4886.000-13600	BATCHNO: 0000041 ACCDATE: 03/82 LABELS: 01 LOCNO: 750000

FIG. 2—'Counterfeit' specimen label, for proofreading by the collector or herbarium staff.

NATIONAL HERBARIUM PRETORIA 0600774			NATIONAL HERBARIUM PRETORIA 0600778		
2427DC HERMAN PPJ 000178	Grid Ref/ Ruitverw. Legit & No.	Regio Anno Alt. TRANS 1981/02/11	3325DA WELLS WJ 004211	Grid Ref/ Ruitverw. Legit & No.	Regio Anno Alt. CAPE 1970/03/12
CASSIA ABSUS L.			LOXOSTYLIS ALATA SPRENG.F. EX REICHB.		
BOSHOFFSBERGE. LEEUPOORT REC. FARM. 82 KM FROM WARBATHS ON ROAD TO THABAZIMBI HERB WITH YELLOW FLOWERS. FRUIT AND SEED COLLECTION.			ADDU STASIE. 3 MILES FROM SUURBERG INN ON ADDU ROAD. BUSHCLUMP. SMALL TREE. SEED.		
L. DU TOIT 0000 Det. Ref./Verw. 3536.000-00400			... 0000 Det. Ref./Verw. 4586.000-00100		
NATIONAL HERBARIUM PRETORIA 0600777			NATIONAL HERBARIUM PRETORIA 0600783		
2427DC HERMAN PPJ 000170	Grid Ref/ Ruitverw. Legit & No.	Regio Anno Alt. TRANS ASPECT SE 1981/02/11	2230BD VAN ROOYEN W 003120	Grid Ref/ Ruitverw. Legit & No.	Regio Anno Alt. TRANS 1981/02/03
MAYTENUS UNDATA (THUNB.) BLAKELOCK			MAYTENUS PUBESCENS N. ROBINSON		
BOSHOFFSBERGE. 82 KM FROM WARBATHS ON THABAZIMBI ROAD. OPPOSITE LEEUPOORT RECREATION FARM. STEEP KOPPIES. TREE WITH CREAM COLOURED FLOWERS. OCCASIONALLY.			VENDA. MUTALE. BOOMSAVANNE, MOPANIEVELD. DROE LEEMGROND. STRIJK. HEIGHT 1.30 M		
P. HERMAN 0000 Det. Ref./Verw. 4626.000-01800			P. HERMAN 0000 Det. Ref./Verw. 4626.000-01500		
NATIONAL HERBARIUM PRETORIA 0600782			NATIONAL HERBARIUM PRETORIA 0600784		
3225AD DU TOIT CF 000158	Grid Ref/ Ruitverw. Legit & No.	Regio Anno Alt. CAPE 1979/10/17	ESTERHUYSEN EE 034598	Grid Ref/ Ruitverw. Legit & No.	Regio Anno Alt. NATAL 1977/07/15 1676 M
MAYTENUS LINEARIS (L.F.) MARAIS			PTEROCELASTRUS ROSTRATUS WALP.		
BERGKWAGGA NAS. PARK WELTEVREDE KLOOF. OU LANDE IN SUKSESSIE STADIUM. STRIJK. BLARE IS AAN STAM SOWEL AS AAN DORINGS GEHEG. HEIGHT 1.20 M			BERGVILLE DISTRICT. UMSCHLAZINE. BELOW NDEDEMA TRIBUTARY IN SMALL FOREST ON SANDSTONE SLOPES, BELOW CLIFFS. TREE.		
P. HERMAN. 0000 Det. Ref./Verw. 4626.000-00500			P. HERMAN. 0000 Det. Ref./Verw. 4630.000-00200		

FIG. 3.—Specimen labels.

COLLECTOR	LOCNO	GRID	REGION	DATE	MAJOR	MINOR	REGNO
SMOOK L	81-0030	2528BD	TRANS	1981/03/17	KWANDEBELE	FARM GEMSBOKFONTEIN	94
	AT FARMHOUSE AREA DISTURBED						
SMOOK L	81-0031	2528EB	TRANS	1981/03/17	KWANDEBELE	FARM BOEKENHOUTFONT.	94
	AT FARM BOUNDARY						
SMOOK L	81-0032	2528BD	TRANS	1981/03/17	KWANDEBELE	BOEKENHOUTFONTEIN FR	94
	AT RIVER						
SMOOK L	81-0033	2528BD	TRANS	1981/03/17	KWANDEBELE	FARM BOEKENHOUTFONT.	94
	CLIFF ABOVE RIVER						
SMOOK L	81-0034	2528BD	TRANS	1981/03/17	KWANDEBELE	FARM GEMSBOKFONTEIN	94
	LOCAL AIRSTRIP						
SMOOK L	81-0035	2529AC	TRANS	1981/03/18	KWANDEBELE	FARM GOEDEREDE	94
SMOOK L	81-0037	3025EB	O F S	1981/03/31	TROMPSBURG	TROMPSBURG	94
	TOWN						
SMOOK L	81-0040	3025CA	CAPE	1981/04/01	COLESBERG	COLESBERG	94
	5 KM OUT OF COLESBERG ON ROAD TO STEYNSBURG						
SMOOK L	81-0041	3025CA	CAPE	1981/04/01	COLESBERG	COLESBERG	94
	7 KM FROM COLESBERG ON ROAD TO STORMFONTEIN						
SMOOK L	81-0042	3025CD	CAPE	1981/04/01	COLESBERG	FARM HOLLE RIVER	94
	20 KM FROM COLESBERG ON ROAD TO STORMFONTEIN						
SMOOK L	81-0043	3025DA	CAPE	1981/04/01	COLESBERG	BULTFONTEIN	94
	42 KM EAST OF COLESBERG ON BULTFONTEIN RD						
SMOOK L	81-0044	3025DC	CAPE	1981/04/02	COLESBERG	FARM BOESMANSPOORT	94
	75 KM S E OF COLESBERG ON ROAD TO BULTFONTEIN-STEYNSBURG						
SMOOK L	81-0045	3125AB	CAPE	1981/04/02	COLESBERG	FARM WELTEVREDE	94
	HAASFONTEINBERG 50 KM N E OF NOUPOORT						

FIG. 4.—Collector's register of localities.

COLLECTOR'S REGISTER FOR R E MAGILL

11/27/81

SP#NO	NAME	YR	MO	DAY	REGION	GRID	MAJOR	MINOR
3340	MACROCOMA TENUE (HOOK. & GREV.) VITT	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3341	BRYUM BILLARDIERI SCHWAEGR.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3342	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3343	MACROCOMA TENUE (HOOK. & GREV.) VITT	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3345	FORSSTROMERIA PRODUCTA (HORNSCH.) PAR.	1977	2	2	TRANS	2437CA	SEKUKUNILAND	LULU MTS.
3346	PAPILLARIA AFRICANA (C. MUELL.) JAEG.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3347	PILOTRICHELLA PANDURAEFLIA (C. MUELL.) JA	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3347	PAPILLARIA AFRICANA (C. MUELL.) JAEG.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3348	BRACHYMENIUM PULCHRUM HOOK.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3350	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3352	PAPILLARIA AFRICANA (C. MUELL.) JAEG.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3353	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3354	SEMATOPHYLLUM BRACHYCARPUM (HAMPE) BROTH.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3355	SEMATOPHYLLUM BRACHYCARPUM (HAMPE) BROTH.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3356	CAMPYLOPUS SP.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	STEELPOORT
3357	BRYUM CAPILLARE HEDW.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3359	MACROCOMA TENUE (HOOK. & GREV.) VITT	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3360	BRYUM SP.	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULUBERG
3361	SEMATOPHYLLUM BRACHYCARPUM (HAMPE) BROTH.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3362	PAPILLARIA AFRICANA (C. MUELL.) JAEG.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3364	CAMPYLOPUS SP.	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULUBERG
3364	CAMPYLOPUS SP.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3365	AULACOPILUM TRICHOPHYLLUM AONGSTR.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3366	PTYCHOMITRIUM SURCRIPATUM THER. & P. VARD	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3367	BRUNIA SECUNDA (HOOK.) B.S.G.	1977	2	2	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3368	MACROCOMA TENUE (HOOK. & GREV.) VITT	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULU MTS.
3369	GRIMMIA APOCARPA HEDW.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULU MTS.
3371	BRYUM BILLARDIERI SCHWAEGR.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3372	MACROCOMA TENUE (HOOK. & GREV.) VITT	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULU MTS.
3375	LEPTODON SMITHII (HEDW.) WEB. & MOHR	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULU MTS.
3376	FISSIDENS GLAUDESCENS HORNSCH.	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULUBERG
3377	TORTULA PAGURUM (MILDE) DE NOT	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3378	LEPTODON SMITHII (HEDW.) WEB. & MOHR	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULU MTS.
3379	TORTULA PRINCEPS DE NOT.	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULUBERG
3379	TORTULA PRINCEPS DE NOT.	1977	2	3	TRANS	2437CA	SEKUKUNILAND	LULUBERG
3380	BRACHYMENIUM ACUMINATUM HARV. IN HOOK.	1977	2	3	TRANS	2430CA	SEKUKUNILAND	LULUBERG
3381	LEUCODON MARITIMUS (HOOK.) WIJK & MARG.	1977	2	2	TRANS	2437CA	SEKUKUNILAND	LULU MTS.
3385	CAMPYLOPUS INTROFLEXUS (HEDW.) BRID.	1977	2	4	TRANS	2529D		
3386	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	2	4	TRANS			
3387	CAMPYLOPUS INTROFLEXUS (HEDW.) BRID.	1977	2	4	TRANS	2529		
3389	CAMPYLOPUS INTROFLEXUS (HEDW.) BRID.	1977	2	4	TRANS			
3390	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	2	4	TRANS			
3391	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	1	31	TRANS	2437CC	HAARTENSDOOP	GROOT DUURIVER
3395	TRICHOSTOMUM BRACHYDONTIUM BRUCH.	1977	1	31	TRANS	2437CC	HAARTENSDOOP	GROOT DUURIVER
3398	SEMATOPHYLLUM BRACHYCARPUM (HAMPE) BROTH.	1977	3	10	TRANS	2631AB		
3400	MICROCAMPYLOPUS PERPUSILLUS (MITT.) BROTH.	1977	3	10	TRANS	2630AB		
3400	MICROCAMPYLOPUS PERPUSILLUS (MITT.) BROTH.	1977	3	10	TRANS	2630AB		
3401	LEPTODONTIUM BRACHYPHYLLUM BROTH. & THER.	1977	3	10	TRANS	2630AB		

FIG. 5.—Collector's register of specimens.

GRASSES COLLECTED BY R P ELLIS

11/28/81

NAME	SPMNO	YR	MO	DY	REGION	GRID	MAJOR	MINOR
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1828	1974	1	15	TRANS	2629AB		BAPSFONTEIN
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1825	1974	1	15	TRANS	2629AB		BAPSFONTEIN
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1830	1974	1	15	TRANS	2629AB		BAPSFONTEIN
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1854	1974	1	15	TRANS	2630DA		AMSTERDAM
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1861	1974	1	15	TRANS	2630DA		ATHOLE EXP. FARM
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1862	1974	1	15	TRANS	2630DA		ATHOLE EXP. FARM
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	1865	1974	1	21	TRANS	2329DD		MAGDEBASHLOOF
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	2063	1974	2	6	TRANS	2529AJ	LOSKOP DAM	RHENOSTERHOF
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	2571	1975	10	25	CAPE	3326BC		GRAHAMSTOWN
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	2606	1975	12	17	CAPE	3127DB		KONGA
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	2607	1975	12	17	CAPE	3127CB		STUTTERHEIM
ALLOTROPIS SEMIALATA (R.BR.)HITCHC.	3160	1979	1	24	D.F.S	2529BD	WITSIESHOEK DIST.	ON ROAD FROM WIT
ANDROPOGON APPENDICULATUS NEES	38	1969	11	12	NATAL	2729BD		CLONTARF SIDING
ANDROPOGON APPENDICULATUS NEES	94	1969	12	2	TRANS	2530AB		
ANDROPOGON APPENDICULATUS NEES	652	1971	10	23	CAPE	3320DC	BARRYDALE	TRADDONS PASS
ANDROPOGON APPENDICULATUS NEES	715	1971	11	22	TRANS	2529CC	PRETORIA	FAERIE GLEN
ANDROPOGON APPENDICULATUS NEES	1373	1972	12	27	TRANS	2629AB	KAALFONTEIN	ESSELEN PARK
ANDROPOGON APPENDICULATUS NEES	1429	1973	1	25	CAPE	3137CA		HOGSBACK
ANDROPOGON APPENDICULATUS NEES	1425	1973	1	10	NATAL	2529CC		CATHEDRAL PEAK
ANDROPOGON APPENDICULATUS NEES	1800	1973	12	20	TRANS	2529DA		CULLINAN
ANDROPOGON DISTACHYUS L.	1497	1974	1	23	TRANS	2231CC	KRUGER NAT. PARK	PUNDA MILIA
ANDROPOGON EUCOMUS NEES	457	1971	3	3	TRANS	2530BA	SABIE	LONG TOM PASS
ANDROPOGON EUCOMUS NEES	1357	1972	12	19	TRANS	2529AC		ONDERSTEEPOORT
ANDROPOGON EUCOMUS NEES	1391	1972	12	27	TRANS	2629AA		HALFWAY HOUSE
ANDROPOGON EUCOMUS NEES	1526	1973	3	9	TRANS	2630DA		AMSTERDAM
ANDROPOGON GAYANUS KUNTH VAR. POLYCLADUS (	119	1969	12	3	TRANS	2431DD		KRUGER NAT. PARK
ANDROPOGON GAYANUS KUNTH VAR. POLYCLADUS (	554	1971	3	27	TRANS	2231AC		PUNDA MILIA
ANDROPOGON GAYANUS KUNTH VAR. POLYCLADUS (	1591	1973	3	13	TRANS	2337CA		DUIWELSKLOOF
ANDROPOGON GAYANUS KUNTH VAR. POLYCLADUS (	2746	1976	3	23	30TSM	1925DA		
ANDROPOGON GAYANUS KUNTH VAR. POLYCLADUS (	3031	1977	5	19	30TSM	1924AC		CHIBE NAT. PARK
ANDROPOGON GAYANUS KUNTH VAR. POLYCLADUS (	3195	1978	2	21	TRANS	2331AB	KRUGER NAT. PARK	SHINGIDZI DIST.
ANDROPOGON HUILLENSIS RENDLE	321	1970	9	29	S.W.A	1723CD	CAPRIVI	CUANDO RIVER
ANDROPOGON HUILLENSIS RENDLE	1341	1972	12	18	TRANS	2529CD	PRETORIA	LYDIANA
ANDROPOGON HUILLENSIS RENDLE	1525	1973	3	9	TRANS	2630DA		
ANDROPOGON HUILLENSIS RENDLE	2741	1976	3	21	30TSM	1923CB	OKAVANGO SWAMPS	MAUW
ANDROPOGON LACUNOSUS J.G.ANDERS.	499	1971	3	4	TRANS	2730AC		WAKKERSTROOM DIS
ANDROPOGON LACUNOSUS J.G.ANDERS.	1451	1974	1	15	TRANS	2630DA	AMSTERDAM	
ANDROPOGON RAVUS J.G.ANDERS.	399	1971	1	28	TRANS	2531CC		EUREKA CITY
ANDROPOGON RAVUS J.G.ANDERS.	1424	1973	1	10	NATAL	2929CC		CATHEDRAL PEAK
ANDROPOGON RAVUS J.G.ANDERS.	1425	1973	1	10	NATAL	2929CC		CATHEDRAL PEAK
ANDROPOGON RAVUS J.G.ANDERS.	3163	1978	1	25	NATAL	2929CC	NATAL DRakensBERG	GIANT'S CASTLE A
ANDROPOGON SCHINZII HACK.	1507	1974	1	23	TRANS	2231CB		SASELANDONGA
ANDROPOGON SCHIRENSIS HOCHST. EX A.RICH VA	2061	1974	2	6	TRANS	2529AD	LOSKOP DAM	WELTEVREDF
ANDROPOGON SCHIRENSIS HOCHST. EX A.RICH VA	237	1970	3	11	TRANS	2729BD		MAJUBA PASS
ANDROPOGON SCHIRENSIS HOCHST. EX A.RICH VA	423	1971	2	9	TRANS	2529CA	BRUNNERIA	BOTANICAL GARDEN
ANDROPOGON SCHIRENSIS HOCHST. EX A.RICH VA	447	1971	3	2	TRANS	2530BA	LYDENBURG	LONG TOM PASS
ANDROPOGON SCHIRENSIS HOCHST. EX A.RICH VA	452	1971	3	2	TRANS	2530BA	LYDENBURG	LONG TOM PASS
ANDROPOGON SCHIRENSIS HOCHST. EX A.RICH VA	1026	1972	2	5	TRANS	2429CB		WYLSRROOM

FIG. 6.—Specimens of a particular collector in one plant family.

that are useful in various curatorial duties such as type registers (Fig. 7), lists of specimens sorted by collectors for loan forms (Fig. 8), or catalogues of taxa (Fig. 9).

3.3 Floristic and taxonomic research

This covers specimen data specific to the distribution of taxa. The system provides an important tool to research on regional (Fig. 10) or local floras by providing lists of specimens from requested areas. Other possibilities include sorting specimens by altitude (Fig. 11) for zonal distribution

data or producing lists of grid references (Fig. 12) for use in production of distribution maps for publication (Fig. 13) or research purposes (Fig. 14).

3.4 Specimen-related taxon data

The information encoded in sections C and D of the collecting form can be extremely important in gaining additional information for taxonomic or floristic research. Each of the fields can be used in connection with taxon numbers to produce lists of specimens that fall within specific categories such as succulent Compositae, aquatic bryophytes (Fig. 15),

TYPE SPECIMENS OF HERMANNIA IN PRE

12/08/81

GENUS	SPECIES	NAME	COLLECTOR	SPMNO	PRENO	TYPES
5056000	11100	HERMANNIA GLABRATA L.F.	THUNBERG CP	PRE 48009	293854	T
5056000	11100	HERMANNIA GLABRATA L.F.	THUNBERG CP	PRE 48010	293855	T
5056000	11300	HERMANNIA GLANDULIGERA K. SCHUM.	RAUTANEN	78	303267	T
5056000	11300	HERMANNIA GLANDULIGERA K. SCHUM.	SCHINZ H	600	303266	T
5056000	11700	HERMANNIA GRACILIS ECKL. & ZEYH.	ECKLON ZEYHER	358	320185	T
5056000	11900	HERMANNIA GRANDIFLORA AIT.	BURCHELL WJ	1536	300974	T
5056000	12000	HERMANNIA GRANDIFLORA N.E. BR.	GALFIN EE	940	293121	T
5056000	12300	HERMANNIA GRISEA SCHINZ	SCHLECHTER R	4631	304613	T
5056000	12500	HERMANNIA GROSSULARIFOLIA L.	PRE	PRE 48449	300956	H
5056000	12500	HERMANNIA GROSSULARIFOLIA L.	PRE	LH 854.14	300955	H
5056000	12500	HERMANNIA GROSSULARIFOLIA L.	DREGE	PRE 48452	300957	P
5056000	12700	HERMANNIA GUERKEANA K. SCHUM.	SCHINZ H	601	304649	T
5056000	12700	HERMANNIA GUERKEANA K. SCHUM.	DINTER K	355	304650	T
5056000	12900	HERMANNIA HELIANTHEMUM K. SCHUM.	MARLOTH R	1237	307537	L
5056000	13100	HERMANNIA HELIOPSIS VERDOORN	PILLANS NS	9063	322652	H
5056000	13300	HERMANNIA HETEROPHYLLA (CAV.) THUNB. SUBSP	THUNBERG CP	PRE 47854	289184	H
5056000	13300	HERMANNIA HETEROPHYLLA (CAV.) THUNB. SUBSP	SUNNERAT P	JU 12483	289183	H
5056000	14700	HERMANNIA INCANA CAV.	CELS D	473	317110	H
5056000	14700	HERMANNIA INCANA CAV.	ECKLON ZEYHER	333	317116	S
5056000	14700	HERMANNIA INCANA CAV.	DREGE JF	7300	317113	T
5056000	14700	HERMANNIA INCANA CAV.	MASSON	PRE 49280	317115	T
5056000	14700	HERMANNIA INCANA CAV.	WILLDENOW	12308	317111	T
5056000	14700	HERMANNIA INCANA CAV.	DREGE JF	7302	317114	T
5056000	14700	HERMANNIA INCANA CAV.	DREGE JF	7301	317112	T
5056000	14900	HERMANNIA INVOLUCRATA CAV.	THUNBERG	PRE 51810	354811	T
5056000	14900	HERMANNIA INVOLUCRATA CAV.	THUNBERG CP	PRE 39657	323992	T
5056000	14900	HERMANNIA INVOLUCRATA CAV.	ECKLON ZEYHER	346	323993	T
5056000	15300	HERMANNIA JOHANNSSONI N.E. BR.	JOHANNSEN Y	PRE 49247	316753	H
5056000	15400	HERMANNIA JOUBERTIANA HARV.	JOUBERT H	PRE 49736	325055	T
5056000	15500	HERMANNIA JUTIAE DINTER & ENGL.	DINTER K	8321	326055	T
5056000	16200	HERMANNIA LEUCANTHA SCHLECHT.	SCHLECHTER	11456	290323	H
5056000	16200	HERMANNIA LEUCANTHA SCHLECHT.	SCHLECHTER	11456	290322	S
5056000	16500	HERMANNIA LINEARIFOLIA HARV.	BARBER	PRE 9230	303492	S
5056000	16500	HERMANNIA LINEARIFOLIA HARV.	DREGE	PRE 48750	303493	T
5056000	16700	HERMANNIA LINEIFOLIA BURM.F.	ECKLON ZEYHER	404	310918	H
5056000	16700	HERMANNIA LINEIFOLIA BURM.F.	PRE	PRE 5189	310917	T
5056000	16900	HERMANNIA LINNAEIDES (BURCH.) K. SCHUM.	BURCHELL WJ	1878	293819	H
5056000	17000	HERMANNIA LITSEALIS VERDOORN	ACOCKS JPH	15205	301984	T
5056000	17300	HERMANNIA MACRA SCHLTR.	SCHLECHTER M	106	326045	S
5056000	17300	HERMANNIA MACRA SCHLTR.	SCHLECHTER R	11403	325044	S
5056000	17500	HERMANNIA MALVAEFOLIA N.E. BR.	EVANS MS	55	296533	T
5056000	17700	HERMANNIA MARGINATA PILLANS	DREGE	PRE 48020	293279	H
5056000	17700	HERMANNIA MARGINATA PILLANS	ZEYHER CL	133	293281	T
5056000	17700	HERMANNIA MARGINATA PILLANS	ZEYHER CL	133	293280	T
5056000	17900	HERMANNIA MERXMULLERI M. FRIEDRICH	MERXMULLER GI	1664	302048	T
5056000	18300	HERMANNIA MICRANTHA ADAMSON	ADAMSON RS	2618	323977	T
5056000	18500	HERMANNIA MICROPETALA HARV.	SCHLECHTER R	11576	304668	T
5056000	18500	HERMANNIA MICROPETALA HARV.	FORBES	PRE 9227	304667	T

FIG. 7.—List of type specimens in a genus.

LOAN OF SCYPHOGYNE TO STE FROM PRE

11/28/81

COLLECTOR	SPMNO	NAME	GENUS	SPECIES	TYPES	PRENO
DLIVER EGH	4250	SCYPHOGYNE LONGISTYLA N.E.BR.	6246020	1000		302493
SCHLECHTER R	7556	SCYPHOGYNE LONGISTYLA N.E.BR.	6246020	1000	S	302705
SCHLECHTER R	9748	SCYPHOGYNE LONGISTYLA N.E.BR.	6246020	1000	S	302706
ESTERHUYSEN EE	3544	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302495
ESTERHUYSEN EF	3543	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302496
ESTERHUYSEN EE	2694	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302497
ESTERHUYSEN EE	10996	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302498
ESTERHUYSEN EE	12490	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302499
ESTERHUYSEN EF	9452	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302500
ESTERHUYSEN EE	17725	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		302501
OREGF	PRE 13574	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100	T	302707
STOKOE TP	PRE 51842	SCYPHOGYNE MICRANTHA (BENTH.) N.E.BR.	6246020	1100		355030
SCHLECHTER	PRE 48479	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302661
FLANAGAN HG	PRE 48480	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302662
SMITH CA	2728	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302663
PONT JM	1175	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302664
GALPIN EE	12840	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302665
ROGERS FA	TM 24399	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302666
SCHLECHTER R	7663	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302667
GALPIN EE	3728	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302668
SCHLECHTER R	10359	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302669
BOLUS	4685	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302670
STOKOE TP	SAM 62409	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302671
STOKOE TP	SAM 67023	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302672
STOKOE TP	62402	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302673
BOLUS M	8483	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302674
HUTCHINSON J	610	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302675
HUTCHINSON J	607	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302676
GALPIN EE	12350	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302677
MARLOTH R	11505	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302678
MARLOTH R	83603	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302679
SCHLECHTER R	10059	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302680
SCHLECHTER R	8828	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302681
SCHLECHTER R	9227	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302682
GROBLER PJ	32324	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302683
STOKOE TP	PRE 48499	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302684
STOKOE TP	PRE 49500	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302685
TAYLOR HC	4527	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302686
TAYLOR HC	4369	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302687
THOMPSON MF	651	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302688
BOUCHER C	1096	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302689
MARSH JA	526	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302690
TAYLOR HC	3695	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302691
WHITE F	5586	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302692
TAYLOR HC	4980	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302715
VAN DER MERWE	1326	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302716
VAN DER MERWE	1344	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302717
ESTERHUYSEN EE	17751	SCYPHOGYNE MUSCOSA (AIT.) STEUD.	6246020	1200		302725

FIG. 8.—List of specimens to be sent on loan.

HYDROCHARITACEAE			
85000			
GENUS	SPECIES	COUNT	SCIENTIFIC NAME
	85000	100	15 HALOPHILA OVALIS (R.BR.) HOOK. F.
	88000	100	18 LAGAROSIPHON CRISPUS RENDLE
	88000	200	6 LAGAROSIPHON ILICIFOLIUS OBERM.
	36000	300	11 LAGAROSIPHON MAJOR (RIDLEY) MOSS EX WAGER
	86000	400	104 LAGAROSIPHON MUSCOIDES HARV.
	66000	500	16 LAGAROSIPHON VERTICILLIFOLIUS OBERM.
	89000	100	6 VALLISNERIA AETHIOPICA FENZL
	89000	99999	2 VALLISNERIA SP.
	95000	100	13 OTTIELIA EXSERTA (RIDLEY) DANDY
	95000	200	10 OTTIELIA KUIJENENSIS (GUERKE) DANDY
	95000	300	13 OTTIELIA MURICATA (C.H.WP.) DANDY
	95000	400	36 OTTIELIA ULVIFOLIA (PLANCH.) WALP.

FIG. 9.—'Shelf list' of species in a genus.

FERNS OF PRETORIA DISTRICT

11/28/81

NAME	COLLECTOR	SPMNO	MINOR	PRECISE-LOCALITY
ADIANTUM CAPILLUS-VENERIS L.	BOSMAN M		2774 PELINDABA	
ADIANTUM CAPILLUS-VENERIS L.	MOGG ADD	PRE 38112	PRETORIA	WATERKLOOF RAVINE
ADIANTUM CAPILLUS-VENERIS L.	PIENNAAR PJ		776 GARSTFONTEIN	
ADIANTUM CAPILLUS-VENERIS L.	REINECKE L		2691 GARSTFONTEIN	DEBBES RAVINE
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	BOTTOMLEY AM		2775 GARSTFONTEIN	WOLWEKLOOF
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	MOGG ADD		2415 WONDERBOOM POORT	HILL TO LEFT OF POORT
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	BOSMAN M		2707 WATERKLOOF	RAVINE
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	BERMEYER AA		27451 PRETORIA	WOLVEGATE W. OF PRETORIA
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	MOGG ADD		2509 WATERKLOOF	RAVINE
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	REINECKE L		2624 ERASMUS DRIFT	FREITAGS FARM
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	MOGG ADD		2969 PRETORIA DIST.	WONDERBOOM
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	REPTON JE		1037 DONKERPOORT	
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	MOGG ADD		10414 PRETORIA	KAALPLAATS PYRAMID NW. OF
ASPLENIUM AETHIOPICUM (BURM.F.) BECHERER	LEENDERTZ P		1955 FAIRY GLEN	
ASPLENIUM VARIANS WALL. EX HOOK. & GREV. S	VORSTER PJ		2726 FOUNTAINS VALLEY	
ASPLENIUM VARIANS WALL. EX HOOK. & GREV. S	BOTTOMLEY AM		2975 PELINDABA	
CETERACH CORDATUM (THUNB.) DESV.	LEEMAN AC		3056 PRETORIA	
CETERACH CORDATUM (THUNB.) DESV.	MOGG ADD		2777 GARSTFONTEIN	WOLWEKLOOF RAVINE
CETERACH CORDATUM (THUNB.) DESV.	MOGG ADD		3754 WATERKLOOF RAVINE	
CETERACH CORDATUM (THUNB.) DESV.	BOSMAN M	PRE 2876	PRETORIA DIST.	WONDERBOOM
CETERACH CORDATUM (THUNB.) DESV.	MOGG ADD		2067 PELINDABA	
CETERACH CORDATUM (THUNB.) DESV.	MOGG ADD		10417A PYRAMID	KAALPLAATS NW. DIST.
CETERACH CORDATUM (THUNB.) DESV.	BOTTOMLEY AM		2617 WATERKLOOF RAVINE	
CETERACH CORDATUM (THUNB.) DESV.	LEENDERTZ R		1617 FAIRIE GLEN	
CETERACH CORDATUM (THUNB.) DESV.	BOSMAN M		2712 WATERKLOOF RAVINE	
CETERACH CORDATUM (THUNB.) DESV.	MOGG ADD		15959 WONDERBOOM POORT	
CETERACH CORDATUM (THUNB.) DESV.	PARKER M		2365 SILKAATSWEM	KLOOF ABOVE JENNINGS FARM
CETERACH CORDATUM (THUNB.) DESV.	REPTON JE		1123 FAIRIE GLEN	ON RD. TO TYGERPOORT ON R
CETERACH CORDATUM (THUNB.) DESV.	REINECKE L		2627 ERASMUS DRIFT	OF RANGE OF HILLS
CETERACH CORDATUM (THUNB.) DESV.	MOGG ADD		4553 PYRAMID	NR. ERASMUSDRIFT FREITAGS
CETERACH CORDATUM (THUNB.) DESV.	BOTTOMLEY AM		2630 KLAPPERKOP	KAALPLAATS NW. PRETORIA
CETERACH CORDATUM (THUNB.) DESV.	REPTON JE		1601 WONDERBOOM RES.	SOUTH VALLEY
CETERACH CORDATUM (THUNB.) DESV.	DOIDGE EM		2419 FOUNTAINS VALLEY	MAGALIESBERG UPPER SLOPE
CETERACH CORDATUM (THUNB.) DESV.	MOORE ES	PRE 38786	ASHBURY	
CETERACH CORDATUM (THUNB.) DESV.	THE SUPER		1719 PRETORIA	PRINCESS PARK
CHEILANTHES CONTRACTA METT. EX KUHN	REPTON JE		5335 RIETVLEI RES.	
CHEILANTHES HIRTA SWARTZ	MOGG ADD		12308 PRETORIA DIST.	ASHBURY DOLOMITES
CHEILANTHES HIRTA SWARTZ	DOIDGE EM		4927 DONKERPOORT	
CHEILANTHES HIRTA SWARTZ	BOTTOMLEY AM		2979 FAIRIE GLEN	WILLOW HILL
CHEILANTHES HIRTA SWARTZ	BOTTOMLEY AM		2614 WATERKLOOF	
CHEILANTHES HIRTA SWARTZ	BOSMAN M		2977 MAGALIESBERG	WONDERBOOM
CHEILANTHES HIRTA SWARTZ	REPTON JE		1632 WONDERBOOM RES.	MAGALIESBERG SLOPE
CHEILANTHES HIRTA SWARTZ	KINGES H		1769 ZWAVELPOORT	E. OF PRETORIA ON SLOPE !!
CHEILANTHES HIRTA SWARTZ	MOGG ADD	PRE 38301	WATERKLOOF RAVINE	
CHEILANTHES HIRTA SWARTZ	THEILER A		9691 WONDERSTEEPOORT	
CHEILANTHES HIRTA SWARTZ	MOGG ADD		12309 PRETORIA DIST.	ASHBURY DOLOMITES
CHEILANTHES HIRTA SWARTZ	BOTTOMLEY AM		2779 GARSTFONTEIN	WOLWEKLOOF

FIG. 10.—Specimens listed for a local flora.

COMPOSITAE OF THE HIGH DRakensBERG
11/28/81

SCINAME	SUBSTRATE	LIFEFORM	ALT	ASPECT
URSINIA MONTANA DC. SUBSP. MONTANA		HERB	2345	
URSINIA MONTANA DC. SUBSP. MONTANA			2345	
VENIDIUM MICROCEPHALUM DC.			2345	S
VERNONIA CAPENSIS (MOULT.) DRUCE	STONY		2345	N
VERNONIA OLIGOCEPHALA (DC.) SCH. BIP. EX W	STONY		2345	E
VERNONIA OLIGOCEPHALA (DC.) SCH. BIP. EX W	STONY		2345	N
BERKHEYA SETIFERA DC.			2050	
DICOMA SP.			2050	
MELICHRYSUM AUREUM (MOULT.) MERR. VAR. AUP	SOIL	HERB	2050	
MELICHRYSUM CHIONOSPHAERUM DC.	SOIL	SHRUB	2050	
MELICHRYSUM DECORUM DC.			2050	
MELICHRYSUM PLATYPTERUM DC.			2050	
MELICHRYSUM SPLENDIDUM (THUNB.) LESS.		7w SHRUB	2050	
SENECIO PURPUREUS L.			2050	
URSINIA SERICEA (THUNB.) N.E. BR.			2050	
BERKHEYA CIRSIOFOLIA (DC.) ROESSL.			2060	
BERKHEYA ROSULATA ROESSL.			2060	
FELICIA BELLIOIDIDES SCHULTH. SUBSP. FOLIAT			2060	S
GERBERA NATALENSIS SCH. BIP.		HERB	2060	
MELICHRYSUM ADEMOCARPUM DC. SUBSP. ADEMOC			2060	
MELICHRYSUM ARGENTISSIMUM J.M. WOOD			2060	
MELICHRYSUM COOPERI HARV.		HERB	2060	
MELICHRYSUM GLOMERATUM KLATT			2060	E
MELICHRYSUM HYPHOCEPHALUM HILLIARD	CLIFF		2060	SW
MELICHRYSUM MONTICOLA HILLIARD			2060	
MELICHRYSUM SP.			2060	
MELICHRYSUM SP.	STONY		2060	
MELICHRYSUM SUTHERLANDII HARV.		SHRUB	2060	
LEDNTOXYX SQUARROSA (L.) DC.	STONY	HERB	2060	
LOPHOLAENA SEGMENTATA (OLIV.) S.M. COE	STONY		2060	
WIDORRELLA UNULATA (THUNB.) SOND. EX HARV.			2060	
RELHANIA ACEROSA (DC.) BREMER	CLIFF	7w SHRUB	2060	
SENECIO BARBATUS DC.			2060	
SENECIO BELVISICAPUS (DC.) SCH. BIP.			2060	
SENECIO DISCORDIFRANUS HILLIARD & BURTT			2060	
SENECIO HARVEIANUS MACOMAN			2060	
SENECIO TANACETOPSIS HILLIARD			2060	
URSINIA SERICEA (THUNB.) N.E. BR.			2060	
ASTER BAKERIANUS BURTT DAVY EX G.A. SM.			2075	
ASTER HARVEIANUS MUNTZE			2075	
ASTER SP.			2075	
ATHANASIA WOODII (THELL.) HILLIARD	STONY	SHRUB	2075	
ATHANASIA WOODII (THELL.) HILLIARD	STONY	SHRUB	2075	
ATHRIXIA ANGUSTISSIMA DC.			2075	
ATHRIXIA FONTANA MACOMAN		HERB	2075	
ATHRIXIA FONTANA MACOMAN			2075	
BERKHEYA MACROCEPHALA J.M. WOOD			2075	
BERKHEYA SEMINEVEA HARV. & SOND.	STONY		2075	

FIG. 11.—Specimens in a taxon sorted by altitude.

MAPPING GRIDS FOR MACROCOMA SPP.

NAME	11/28/81		
	COLLECTOR	SPIND	REGION GRID
MACROCOMA TENUE (HOOK. & GREV.) VITT	VON BREITENBAC	124 TRANS	2330CC
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGER	1184C TRANS	2330CC
MACROCOMA TENUE (HOOK. & GREV.) VITT	VON BREITENBAC	125 TRANS	2330CC
MACROCOMA TENUE (HOOK. & GREV.) VITT	CROSBY CROSBY	7640 TRANS	23300B
MACROCOMA TENUE (HOOK. & GREV.) VITT	CROSBY CROSBY	7641 TRANS	23300B
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3299 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3311 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3360 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3343 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3292 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3168 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3372 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3174 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3302 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3150 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3340 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3201 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3181 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3301 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3359 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3159 TRANS	2430CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	VORSTER PJ	481 TRANS	24300B
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN	509 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	BOL 509 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN	511 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4597 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN	510 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	NH 510 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN	5119 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4978 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN	664 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	BOL 510 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	CROSBY CROSBY	7751 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4876 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	BOL 5118 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4955 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	NH 5118 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	BOL 511 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	REHMANN A	NH 509 TRANS	24300D
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4309 TRANS	25300E
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4916 TRANS	25300E
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAUVE VENTER G	9 TRANS	2530CA
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4740 TRANS	25300C
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4729 TRANS	25300C
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	4730 TRANS	25300C
MACROCOMA TENUE (HOOK. & GREV.) VITT	DUMMY COLLECTO	4743 TRANS	25300C
MACROCOMA TENUE (HOOK. & GREV.) VITT	KLUGE JP	1042 TRANS	2531CC
MACROCOMA TENUE (HOOK. & GREV.) VITT	MAGILL RE	3500 SWAZI	2631AA

FIG. 12.—Specimens sorted by grid reference, for mapping.

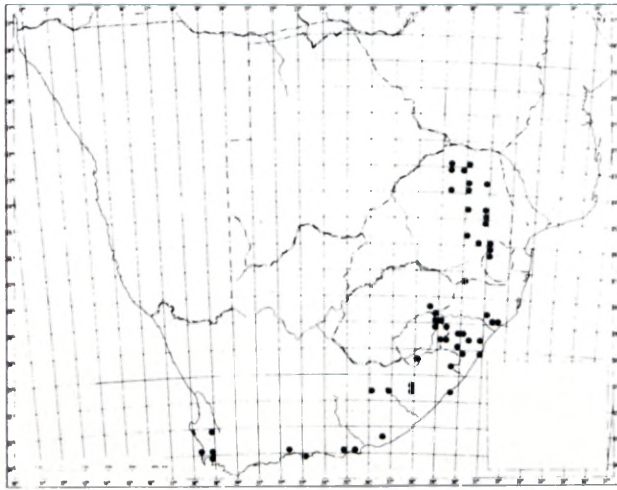


FIG. 13.—Distribution map prepared by hand from specimens sorted by grid reference.

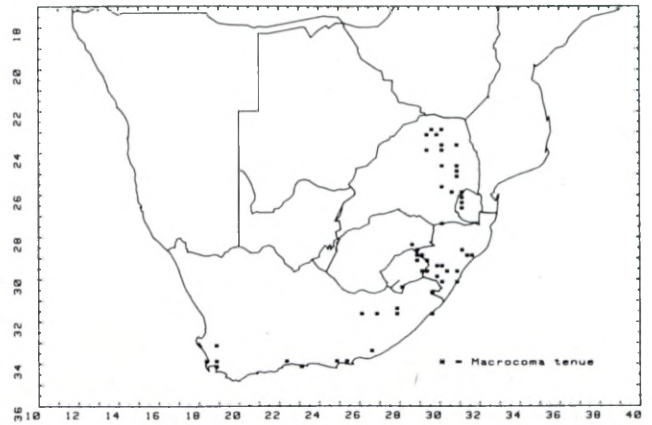


FIG. 14.—Distribution map prepared by Hewlett Packard desktop computer from specimens sorted by grid reference.

AQUATIC CRYPTOGAMS

11/28/81

SCI NAME	MOISTURE	SUBSTRATE	REGION	GRID	PRENO
MARSTLEA AEGYPTIACA WILLO.	LAKE	SOIL	CAPE	2620CC	472076
MARSTLEA AEGYPTIACA WILLO.	BNK RIV	SOIL	SWAZI	2631AA	525374
MARSTLEA AEGYPTIACA WILLO.	BED RIV		S.W.A		80024
MARSTLEA AEGYPTIACA WILLO.	BNK RIV		LESOT		514350
MARSTLEA AEGYPTIACA WILLO.	MARSH		O.F.S	2875DD	489653
MARSTLEA AEGYPTIACA WILLO.	MARSH		S.W.A	1914AB	80026
MARSTLEA AEGYPTIACA WILLO.	RED RIV	SOIL	S.W.A	1913AB	80027
MARSTLEA AEGYPTIACA WILLO.	MARSH	SOIL	S.W.A		80028
MARSTLEA AEGYPTIACA WILLO.	MARSH		S.W.A		80025
MARSTLEA AEGYPTIACA WILLO.	PAN/DEP	SOIL	TRANS	27259B	240148
MARSTLEA AEGYPTIACA WILLO.	MARSH		S.W.A	1913AB	482025
MARSTLEA AEGYPTIACA WILLO.	PAN/DEP		CAPE	2824RA	80029
MARSTLEA AEGYPTIACA WILLO.	BED RIV	SOIL	S.W.A		103354
MARSTLEA AEGYPTIACA WILLO.	PAN/DEP		TRANS	27253B	357034
MARSTLEA APPOSITA LAUNERT		WATER	NATAL	2632CC	80031
MARSTLEA BURCHELLII (KUNZE) A.BRAUN	LAKE		CAPE	3123AC	547241
MARSTLEA BURCHELLII (KUNZE) A.BRAUN	MARSH		O.F.S	2925CB	80042
MARSTLEA BURCHELLII (KUNZE) A.BRAUN	MARSH	SOIL	CAPE	2724AA	514212
MARSTLEA BURCHELLII (KUNZE) A.BRAUN	BNK RIV		CAPE		482027
MARSTLEA BURCHELLII (KUNZE) A.BRAUN	MARSH		CAPE		549551
MARSTLEA BURCHELLII (KUNZE) A.BRAUN	PAN/DEP		O.F.S	29258B	472759
MARSTLEA BURCHELLII (KUNZE) A.BRAUN		WATER	CAPE	3120AD	472462
MARSTLEA CAPENSIS A.BRAUN	PAN/DEP		TRANS	2627AB	533715
MARSTLEA CAPENSIS A.BRAUN	BED RIV	SOIL	S.W.A	1918AB	80045
MARSTLEA CAPENSIS A.BRAUN	LAKE		O.F.S	2927	80054
MARSTLEA CAPENSIS A.BRAUN		WATER	TRANS	2431DD	80051
MARSTLEA CAPENSIS A.BRAUN		WATER	TRANS	2431DD	80050
MARSTLEA CAPENSIS A.BRAUN	PAN/DEP		TRANS	2531AB	80049
MARSTLEA CAPENSIS A.BRAUN		WATER	TRANS	2531CC	80044
MARSTLEA CAPENSIS A.BRAUN	MARSH		S.W.A		80047
MARSTLEA CAPENSIS A.BRAUN	MARSH	SOIL	TRANS	2623AB	482023
MARSTLEA CAPENSIS A.BRAUN	BNK RIV		CAPE		80057
MARSTLEA CAPENSIS A.BRAUN	MARSH		S.W.A	1918AB	80046
MARSTLEA EPHIPPIOCARPA ALSTON	PAN/DEP		TRANS		482029
MARSTLEA EPHIPPIOCARPA ALSTON		WATER	TRANS		80065
MARSTLEA EPHIPPIOCARPA ALSTON		WATER	TRANS	2330	80056
MARSTLEA EPHIPPIOCARPA ALSTON	BED RIV	SOIL	TRANS		80071
MARSTLEA EPHIPPIOCARPA ALSTON	MARSH	SOIL	S.W.A		80063
MARSTLEA EPHIPPIOCARPA ALSTON	MARSH		S.W.A		80062
MARSTLEA FARINOSA LAUNERT	LAKE	SOIL	BOTSW		103383
MARSTLEA MACROCARPA PRE SL		WATER	O.F.S	2627	80147
MARSTLEA MACROCARPA PRE SL	LAKE		LESOT	2927	472466
MARSTLEA MACROCARPA PRE SL	BNK RIV		S.W.A		238799
MARSTLEA MACROCARPA PRE SL	MARSH	SOIL	NATAL	2731CC	482631
MARSTLEA MACROCARPA PRE SL	MARSH		S.W.A		80133
MARSTLEA MACROCARPA PRE SL	MARSH		S.W.A	2515DD	40135
MARSTLEA MACROCARPA PRE SL		WATER	CAPE	3227CC	80177
MARSTLEA MACROCARPA PRE SL		WATER			80183

FIG. 15.—Example of a taxon sorted by life form and moisture regime.

GRASSES GROWING ON DUNES

11/29/81

GENUS	SPECIES	SCI NAME	SUBSTRATE	MOISTURE	SOILTYPE	VEGTYPE	REGION	GRI
9902560	100	AMPHIPHILA ARENARIA (L.) LINK	DUNE	BH			CAPE	3218AB
9902560	100	AMPHIPHILA ARENARIA (L.) LINK	DUNE	BH	SAND		CAPE	3418A9
9902560	100	AMPHIPHILA ARENARIA (L.) LINK	DUNE	BH			CAPE	3421AD
9902560	100	AMPHIPHILA ARENARIA (L.) LINK	DUNE	BH	SAND		CAPE	3418BA
9902560	100	AMPHIPHILA ARENARIA (L.) LINK	DUNE	BH			CAPE	3327
9902560	100	AMPHIPHILA ARENARIA (L.) LINK	DUNE	BH			CAPE	
9902560	100	LAGURUS OVATUS L.	DUNE	BH			CAPE	3419AD
9902610	100	LAGURUS OVATUS L.	DUNE	BH			CAPE	3419AD
9902610	99999	LAGURUS SP.	DUNE	DT	SAND	DESERT	S.W.A	2315BA
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	BH	SAND		CAPE	2822CB
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT		FOREST	S.W.A	2419DD
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT			CAPE	2727BA
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT	SAND		CAPE	2826BA
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT	SAND		CAPE	2919BC
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT			CAPE	2822CB
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT			CAPE	2822DA
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT			S.W.A	2619DC
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT	SAND		S.W.A	2419CA
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT			CAPE	2822CA
9902611	100	STIPAGROSTIS AMABILIS (SCHWEICK.) DE WINT.	DUNE	DT			S.W.A	2419AD
9902611	200	STIPAGROSTIS ANOMALA DE WINT.	DUNE	DT	SAND		CAPE	2727AA
9902611	300	STIPAGROSTIS BREVIFOLIA (NEES) DE WINT.	DUNE	DT	SAND		S.W.A	2819AC
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	BH	SAND		CAPE	2816DA
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	BH			CAPE	3019CA
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	SAND	CL SHRB	S.W.A	2517BB
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	SAND		CAPE	2917AC
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	SAND	GRASSLD	CAPE	2917AA
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	DUNGA	SAND	S.W.A	2419DD
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	2114BC
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	SAND		CAPE	2621DD
9902611	400	STIPAGROSTIS CILIATA (DESF.) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	2517BB
9902611	900	STIPAGROSTIS GARUBENSIS (PILG.) DE WINT.	DUNE	DT			S.W.A	
9902611	1000	STIPAGROSTIS GEMINIFOLIA NEES	DUNE	DT	SAND		CAPE	2917AC
9902611	1000	STIPAGROSTIS GEMINIFOLIA NEES	DUNE	DT	SAND		CAPE	2917AC
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	BH			S.W.A	2314A9
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT	SAND		S.W.A	2315CA
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT	SAND		S.W.A	2415CB
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT	SAND		S.W.A	2314
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT	SAND		S.W.A	2314
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT	SAND		S.W.A	2315CA
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT	GRAVEL		S.W.A	2314
9902611	1200	STIPAGROSTIS GONATOSTACHYS (PILG.) DE WINT.	DUNE	DT			S.W.A	2314
9902611	2100	STIPAGROSTIS LUTESCENS (NEES) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	
9902611	2100	STIPAGROSTIS LUTESCENS (NEES) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	2315CA
9902611	2100	STIPAGROSTIS LUTESCENS (NEES) DE WINT. VAR.	DUNE	DT	PNK PIV		S.W.A	2315CA
9902611	2100	STIPAGROSTIS LUTESCENS (NEES) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	2615CB
9902611	2100	STIPAGROSTIS LUTESCENS (NEES) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	2315BD
9902611	2100	STIPAGROSTIS LUTESCENS (NEES) DE WINT. VAR.	DUNE	DT	SAND		S.W.A	

FIG. 16.—Example of a taxon sorted by habitat.

FOREST CLIMBERS

11/28/81

GENUS	SPECIES	SCI NAME	GRID	MAJR	MINR
830900	500	TRICALYSIA CAPENSIS (METSN.) SIM	2831CD	ESHOWE DIST	DHLINZA FOR
830900	600	TRICALYSIA JUNDII (SCHINZ) BRENNAN VAR. JU	2731AA		MAKANES
8352000	400	CANTHIUM GUEINZII SONO.		MAPUMULO DIST	THRINGS POST.
8352000	400	CANTHIUM GUEINZII SONO.	2631AC		MBABANE
8352000	400	CANTHIUM GUEINZII SONO.			MARIEPSKOP DIST.
8352000	400	CANTHIUM GUEINZII SONO.	3129DA	FRANSKEI	MTAFUFU
8352000	400	CANTHIUM GUEINZII SONO.	2631AC		MBABANE
8352000	400	CANTHIUM GUEINZII SONO.	2931AD	LOWER TUGELA DIST.	STANGER
8352000	400	CANTHIUM GUEINZII SONO.	2430DB	PILGRIMS REST DIST.	MARIEPSKOP
8352000	400	CANTHIUM GUEINZII SONO.	3030CB	PORT SHEPSTONE	ST. MICHAEL'S-ON-SEA
8352000	400	CANTHIUM GUEINZII SONO.			MTUNZINI DIST.
8352000	400	CANTHIUM GUEINZII SONO.			HLABISA DIST.
8352000	400	CANTHIUM GUEINZII SONO.	2530CA	EASTERN CAPE	QUIWELSKLOOF
8352000	400	CANTHIUM GUEINZII SONO.	3030CB	PORT SHEPSTONE	ST. MICHAEL'S-ON-SEA
8352000	400	CANTHIUM GUEINZII SONO.	2531CD		
8352000	400	CANTHIUM GUEINZII SONO.		MBABANE DIST.	NKANOLA DIST.
8352000	400	CANTHIUM GUEINZII SONO.	2831CA	NKANOLA DIST.	UKUTULA FOR.
8352000	400	CANTHIUM GUEINZII SONO.			NKANOLA FOR.
8352000	400	CANTHIUM GUEINZII SONO.			MARIEPSKOP DIST.
8352000	500	CANTHIUM HUILLENSE HIERN	2231CA	KRUGER NAT. PARK	PUNDA MILIA
8352000	600	CANTHIUM INERME (L.F.) KUNTZE			INANDA DIST.
8352000	600	CANTHIUM INERME (L.F.) KUNTZE	2931AD		LAKE ST. LUCIA
8352000	600	CANTHIUM INERME (L.F.) KUNTZE	2631DD		MAPUTA
8352000	1100	CANTHIUM SETIFLORUM HIERN		NOUMU GAME RES.	KHONDO SAND FOR
8352000	1100	CANTHIUM SETIFLORUM HIERN	2731CB		
8352000	99999	CANTHIUM SP.	2930CE	PIETERMARITZBURG DIS	
8333000	1500	PAVETTA DELAGDENSIS BREM.	27319C		WORLD'S VIEW
8339000	100	PSYCHOTRIA CAPENSIS (ECKL.) VATKE			LAKE SIBAYI
8496000	1100	GALIUM SPURIMUM L. SUBSP. AFRICANUM VERDC.		HEIDELBERG DIST.	MAPUMULO DIST
8436000	1100	GALIUM SPURIMUM L. SUBSP. AFRICANUM VERDC.	29299C	BETHLEHEM DIST.	GOODVADERSBOSCH FOR
8486000	1200	GALIUM THUNBERGIANUM ECKL. & ZEYH. VAR. TH	2828DD		GOLDEN GATE HIGHLAND
8496000	99999	GALIUM SP.		ZUURBERG	MONT AUX SOURCES
8499000	100	RUBIA CORDIFOLIA L.			ALFRD DIST
8439000	100	RUBIA CORDIFOLIA L.	2731DA		NEW HANOVER DIST.
8439000	100	RUBIA CORDIFOLIA L.	2930CC		SORDWANA BAY
8439000	100	RUBIA CORDIFOLIA L.	2831CD		KEEROM
8439000	100	RUBIA CORDIFOLIA L.	2832AA	HLABISA	ESHOWE
8489000	100	RUBIA CORDIFOLIA L.	2832AA	HLAPISA DIST.	HLUHLUWE GAME RES.
8489000	300	RUBIA PETIOLARIS DC.	2531CC		HLUHLUWE GAME RES.
8489000	300	RUBIA PETIOLARIS DC.		AMATOLA MTS	BARBERTON
8545000	700	SCAPIOSA DRAKENSBERGENSIS B.L. BURTT	2929DB	BERGVILLE DIST.	VICTORIA EAST
8564000	100	ZEHNERIA MARLOTII (COGN.) R. & A. FERNANDEZ		NORTHERN DIST.	DRAKENSBERG NAT PARK
8564000	200	ZEHNERIA PARVIFOLIA (COGN.) J. H. ROSS	2832AA	HLABISA DIST.	MUTSOSI
8564000	200	ZEHNERIA PARVIFOLIA (COGN.) J. H. ROSS	2831CC	ZULULAND	HLUHLUWE GAME RES.
8564000	200	ZEHNERIA PARVIFOLIA (COGN.) J. H. ROSS	2532DB	INGWAVUMA DIST.	UMHLATUZI LAKE
8564000	300	ZEHNERIA SCABRA (L.F.) SONO.	2230DD	SIBASA DIST.	MAPUTA
8564000	300	ZEHNERIA SCABRA (L.F.) SONO.	2831CC	MTUNZINI DIST.	TATE VONDO FOR. RES.
8564000	300	ZEHNERIA SCABRA (L.F.) SONO.	2430DD	GRASKOP	NSOYE FJR. RES.
8564000	300	ZEHNERIA SCABRA (L.F.) SONO.			KWYNSPAS

FIG. 17.—Example of specimens sorted for two habitat factors.

DWARF SHRUBS OF FYNBOS LIMESTONE SOILS

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GENUS	SPECIES	SCI NAME	GRID	MAJR	MINR
6503000	200	CHIARONIA RACCIFERA L.			BREDASDORP DIV.
6237000	16000	ERICA CURTOPHYLLA GUTH. & BOL.	3421AC		RIVERSDALE
6237000	16000	ERICA CURTOPHYLLA GUTH. & BOL.	3421AC		RIVERSDALE
6237000	53900	ERICA PULCHELLA HOUTT. VAR. PULCHELLA	34209D	MELKHOUT KRAAL	RONDEKOP
6237000	56700	ERICA RUBIGINOSA DULFER VAR. RUBIGINOSA	3420CA		BREDASDORP
5436000	1000	STRUTHIOLOA DODECANDRA (L.) DRUCE	3419DA		HAELKRAAL RIVER
5436000	1000	STRUTHIOLOA DODECANDRA (L.) DRUCE	3419DA	SOUTH-WESTERN CAPE	HAELKRAAL RIVER AREA

FIG. 18.—Example of specimens sorted by three habitat factors.

FLOWERING PHENOLOGY OF THEMEDA TRIANDRA

11/28/81			
MO	REGION	ALT	FLOWER FRUIT CRID
1	TRANS	-999	3 3 2528CD
1	TRANS	-999	3 3 2528CD
1	TRANS	-999	3 3 2529CB
1	TRANS	-999	3 3 2530D9
1	TRANS	1309	3 3 2530DD
1	TRANS	1300	3 3 2530DD
1	TRANS	-999	3 3 2531CC
1	TRANS	1370	3 3 2629AA
1	TRANS	-999	3 3 2627AC
1	TRANS	-999	3 3 2627CA
1	TRANS	-999	3 3 2629AA
1	TRANS	1999	3 3 2629AA
1	TRANS	-999	3 3 2628AA
1	TRANS	-999	3 3 2628AA
1	TRANS	-999	3 3 2629ED
1	TRANS	-999	3 3 2629CD
1	TRANS	-999	3 3 2629CD
1	TRANS	-999	3 3 2629DB
1	O.F.S	-999	3 3 2629DB
1	TRANS	-999	3 3 2629DB
1	SWAZI	-999	3 3 2631EB
1	SWAZI	275	2 3 2631ED
1	S.W.A	-999	3 3 2719ED
1	TRANS	-999	3 3 2725CC
1	TRANS	1214	3 3 2725DA
1	TRANS	1370	3 3 2725AC
1	O.F.S	-999	3 3 2725BC
1	O.F.S	-999	3 3 2726CD
1	O.F.S	-999	3 3 2725CD
1	O.F.S	-999	3 3 2727BD
1	O.F.S	-999	3 3 2727CC
1	TRANS	-999	3 3 2730BA
1	NATAL	667	3 3 2731CA
1	NATAL	-999	3 3 2732DA
1	CAPE	-999	3 3 2822DD
1	TRANS	-999	3 3 2824CC
1	TRANS	-999	3 3 2824CC
1	TRANS	-999	3 3 2824CC
1	TRANS	-999	3 3 2824CC
1	TRANS	-999	3 3 2824CC
1	O.F.S	1500	3 3 2827AB
1	O.F.S	-999	3 3 2827DD
1	O.F.S	1619	3 3 2827DD
1	O.F.S	-999	3 3 2827DD
1	O.F.S	1675	3 3 2829AD
1	O.F.S	-999	3 3 2829BC
1	O.F.S	1990	3 3 2829DA

or grasses growing on sand dunes (Fig. 16). The fields can also be used in combination for lists of forest climbers (Fig. 17), or dwarf shrubs of fynbos on calcrete (Fig. 18), for instance.

Phenological data are also available by selecting all flowering specimens of a taxon and printing the date of collection and other related information such as region, altitude or aspect (Fig. 19).

CONCLUSION

The new system, which will retain the name PRECIS (PRE Computerized Information System), has a smaller but more accessible data base contained in a single disk pack for on-line service. It is designed primarily to provide specimen data for taxonomic and floristic research, but some taxon-related specimen data can be extracted from the information recorded with the specimens.

From our reappraisal and modification of the original system we can make some statements that should apply to all data banks of this type.

1. The data bank should be kept as small as possible, preferably covering only a single information category, such as specimen related data.
2. Encoding and manipulation of data must be kept as simple as possible not only for the collector, but also to enable proper maintenance and updating of the data bank.
3. Rapid access to the data is essential for research and curation, preferably as an on-line service. This includes the necessity of modest expense for routine or essential queries, updating procedures and curatorial output.

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FIG. 19.—Specimens in a species sorted by month of flowering.