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The vegetation ecology of the Eastern Transvaal Escarpment in the Sabie area. 2. Floristic classification

G. B. DEALL*, G. K. THERON** and R. H. WESTFALL*

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ABSTRACT

The indigenous vegetation of the Eastern Transvaal Escarpment in the Sabie area is classified with the aid of the PHYTOTAB program package. Four ecological-formation classes (efc) based on floristics, physiognomy and climate correspond to four data subsets. Plant communities in each efc are defined by means of 46 differential species-groups distributed amongst forest, thicket, woodland, shrubland and grassland structural types. Environmental correlation is facilitated by means of 21 habitat types.

UITTREKSEL

Die inheemse plantegroei van die Oos-Transvaalse platorand in die Sabiegebied is met behulp van die PHYTOTAB-programpakket geklassifiseer. Vier ekologiese formasieklasse (efc) wat op floristiek, fisionomie en klimaat gebaseer is, kom met vier datasubstelle ooreen. Plantgemeenskappe in elke efc word gedefinieer deur middel van 46 differensiële spesiegroepe wat versprei is tussen woud-, ruigte-, bosveld-, struikveld- en grasveldstrukturele tipes. Omgewingskorrelasie word vergemaklik deur middel van 21 habitattipes.

INTRODUCTION

To facilitate land-use planning and management of the Eastern Transvaal Escarpment on a regional and sub-regional basis, the scale of Acocks's (1975) veld types needs to be enlarged (Van der Meulen & Scheepers 1978). A more detailed classification of Veld Types 8 (North-Eastern Mountain Sourveld) and 9 (Lowveld Sour Bushveld) is therefore required. Floristic classifications express relationships between plant communities and their environment and are thus potentially suitable planning tools. This paper describes a detailed floristic classification of Veld Types 8 and 9 in the Sabie area, within the environmental context established by Deall *et al.* (1989). The classification is purely descriptive and predictive, implying no explanation of causality.

METHODS

The study area comprises a broad transect whose locality and physical environment are described comprehensively by Deall *et al.* (1989). Within the transect 251 quadrats (measuring 10 × 20 m each) were distributed subjectively amongst 50 different physiognomic/land type stratification units based on 1: 250 000 Land Type Series 2530 Barberton. The quadrats were distributed as follows: 46 in forest, 64 in thicket, 76 in woodland, nine in shrubland and 56 in grassland [physiognomy based on Edwards's (1983) formation classes]. In each quadrat, all plant species were listed together with their Domin-Krajina cover-abundance values and growth forms (Deall 1985). The total canopy cover and estimated height range of each stratum of vegetation was also recorded for the purpose of physiognomic-structural classification (Edwards 1983). Environmental parameters recorded for each quadrat include the following:

(i) Climatic Belt, based on altitudinal distribution of mist (cf. Deall *et al.* 1989).

(ii) Physiographic Zone, based on altitude and geomorphology (cf. Deall *et al.* 1989).

(iii) Geomorphology, based on position in local landscape. Eight classes were recognized: knolls, terraces, upper slopes, midslopes, foot slopes, dry kloofs, moist stream banks, marshes.

(iv) Aspect, expressed as 'mesoclinal' (67°–247°) and 'xeroclinal' (248°–66°).

(v) Exposure in terms of the degree of exposure to sun and wind, expressed as sheltered, partly sheltered or exposed.

(vi) Lithology (field nomenclature), based on the stratigraphic classification for South Africa (SACS 1980), as adapted by Deall *et al.* (1989).

(vii) Rock cover based on the degree of limitation on mechanical utilization (cf. Van der Meulen 1979).

By means of selected programs in PHYTOTAB (Westfall *et al.* 1982), a provisional phytosociological classification was made on the basis of the entire data set (251 relevés and 1 043 species, including unidentified specimen numbers). Four data subsets were then identified on the basis of floristic and environmental discontinuity (Deall 1985). Species in each subset were then reclassified within the confines of their subset distribution (Coetzee 1983). Thus, both the number of syntaxa (represented by relevé-groups) and the species defining them (represented by differential species-groups), were increased relative to the provisional classification. For the sake of brevity, poorly-defined syntaxa were removed, leaving only those that are clearly defined by

* Botanical Research Institute, Private Bag X101, Pretoria 0001.

** Department of Botany, University of Pretoria, Pretoria 0002.

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TABLE 1.—Forest and Mesic Thicket of the Mistbelt and Low Country: an ecological basis for the recognition of seven habitat types (1.1–1.7) and 12 communities (c.1–c.12), confer Table 2

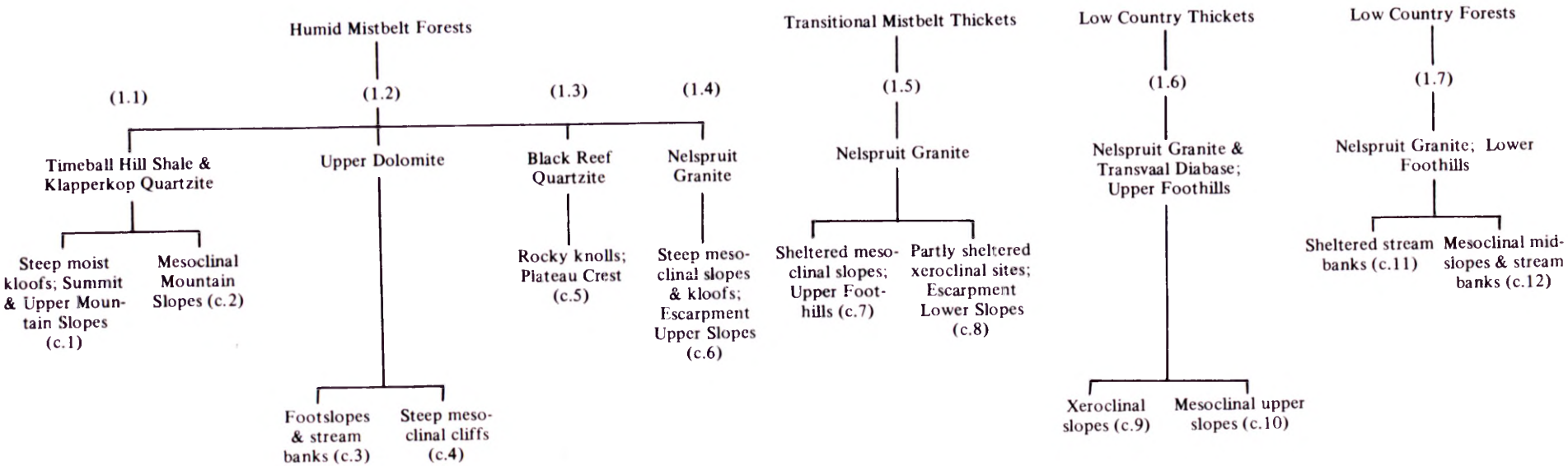


FIGURE 1.—Protected valleys in Lower Mountain grasslands support the *Hypoestes triflora–Dovyalis lucida* Tall/Short Forest (c.3).

differential species-groups. Both non-differential species and species-groups defining more than a single syntaxon were also removed*. Syntaxa were reduced to single columns by transforming the cover-abundance values of differential species to constancy values thereby creating synoptic tables (Deall 1985).

RESULTS

The four data subsets correspond to four ecological-formation classes (efc) based on floristics, physiognomy and climate (especially mist). Each efc is represented by a synoptic table (Tables 2, 4, 6 & 8). The syntaxa in each efc are informally ranked as communities and are grouped according to habitat type (Tables 1, 3, 5 & 7).

Communities are named according to the recommendations for a standardized South African syntaxonomic nomenclature system proposed by the Botanical Research Institute, Pretoria (Scheepers *et al.* MS). Each name comprises a differential species followed by a dominant species and a physiognomic-structural term (Edwards 1983).

Further information on species mentioned in the text but not included in synoptic tables is documented in an annotated checklist (Deall & Backer 1989).

In instances where plants could not be identified beyond the generic level, the epithet sp. is appended (e.g. *Combretum* sp.). It should be noted that such a name may not necessarily refer to a consistent species concept, but may include various species within the genus.

Differential species are not listed in the community descriptions which follow but are referred to in the synoptic tables instead (Tables 2, 4, 6 & 8).

1 FOREST AND MESIC THICKET OF THE MISTBELT AND LOW COUNTRY

Mesic Thicket (Table 1) refers to a denser, more lush type of thicket which normally occurs in the Mistbelt. Where it occurs in the Low Country, it is usually in mesic situations, i.e. riparian or south-facing. Total vegetation cover is usually more than 75 %. Associated communities are represented throughout the altitudinal range but are notably absent on the Summit Peak and on the Escarpment and Summit Plateaux.

1.1 Humid Mistbelt forest associated with Timeball Hill Shale and Klapperkop Quartzite

c.1 *Buddleja salviifolia–Leucosidea sericea* Tall (riparian) Forest

Confined to steep moist kloofs on Summit and Upper Mountain Slopes, notably at Mount Anderson and Blyfstaanhoogte. Differential and dominant species are indicated in Table 2 (Group A). Non-differential dominants include *Diospyros whyteana*.

c.2 *Ochna arborea* var. *arborea–Combretum kraussii* High Forest

Covering extensive areas (e.g. 'Maritzbos') on mesoclinal Mountain Slopes. Differential and dominant species are indicated in Table 2 (Group B). Non-differential dominants include *Cussonia spicata, Syzygium gerrardii, Oxyanthus speciosus* subsp. *gerrardii, Cassipourea gerrardii, Sclerochiton harveyanus* and *Olea capensis* subsp. *macrocarpa*.

1.2 Humid Mistbelt forest associated with Dolomite, Lower Mountains

c.3 *Hypoestes triflora–Dovyalis lucida* Tall/Short Forest

Occurring on footslopes and stream banks, Vertroosting Nature Reserve (Figure 1). Differential and dominant species are indicated in Table 2 (Group C). Non-differential dominants include *Xymalos monospora* and *Sclerochiton harveyanus*.

c.4 *Streptocarpus cyaneus–Dovyalis lucida* Short Forest

* Full phytosociological tables are nevertheless available on request from the Vegetation Ecology Division, Botanical Research Institute, Private Bag X101, Pretoria 0001.

FIGURE 2.—*Ekebergia pterophylla – Psychotria zombamontana* Tall/Short Forest associated with Black Reef Quartzite outcrops, Plateau Crest (c.5). *Aloe arborescens* is noteworthy on massive boulders protruding through the canopy.

Confined to steep mesoclinal cliffs, notably at Sabie. Differential species are indicated in Table 2 (Group D). Dominant species include *Kiggelaria africana, Diospyros whyteana* and *Polystichum luctuosum*.

1.3 Humid Mistbelt forests associated with Black Reef Quartzite outcrops

c.5 *Ekebergia pterophylla–Psychotria zombamontana* Tall/Short Forest

Scattered on rocky knolls of the Plateau Crest, notably in Mac-Mac Nature Reserve (Figure 2). Differential and dominant species are indicated in Table 2 (Group E). Non-differential dominants include *Clivia caulescens* and *Syzygium gerrardii*.

1.4 Humid Mistbelt forests associated with Nelspruit Granite

c.6 *Clerodendrum myricoides–Syzygium gerrardii* Tall Forest

Occurring on steep mesoclinal slopes and kloofs of Escarpment Upper Slopes (Figure 3). Differential species are indicated in Table 2 (Group F). Dominant species include *Combretum kraussii, Oxyanthus speciosus* subsp. *gerrardii, Psychotria capensis* and *Tricalysia capensis*.

1.5 Transitional Misbelt thickets associated with Nelspruit Granite

c.7 *Clematis brachiata–Acacia ataxacantha* Short Thicket

Covering sheltered mesoclinal slopes of Upper Foothills, especially Bergvliet Forest Reserve. Differential species are indicated in Table 2 (Group G). Dominant species include *Brachylaena discolor* subsp. *transvaalensis, Protorhus longifolia, Maytenus mossambicensis* subsp. *mossambicensis, Canthium gueinzii* and *Rhoicissus tomentosa*.

c.8 *Tetradenia* 'complex'–*Acacia ataxacantha* Short Thicket

Occurring patchily on partly sheltered xeroclinal sites of the Escarpment Lower Slopes (Figure 4). Differential species are indicated in Table 2 (Group H). Dominant species include *Canthium inerme* and *Smilax kraussiana*.

FIGURE 3.—*Clerodendrum myricoides–Syzygium gerrardii* Tall Forest (c.6) showing *Tricalysia capensis* dominating the understorey.

FIGURE 4.—Woodland variant of the *Tetradenia* 'complex'—*Acacia ataxacantha* Short Thicket on partly sheltered sites of the Escarpment Lower Slopes (c.8).

1.6 Low Country thickets associated with Nelspruit Granite and Transvaal Diabase, Upper Foothills

c.9 *Pittosporum viridiflorum*—*Acacia ataxacantha* Short Thicket

Scattered on diverse xeroclinal slopes. Differential species are indicated in Table 2 (Group I). Dominant species include *Syzygium cordatum*, *Parinari curatellifolia* and *Diospyros whyteana*.

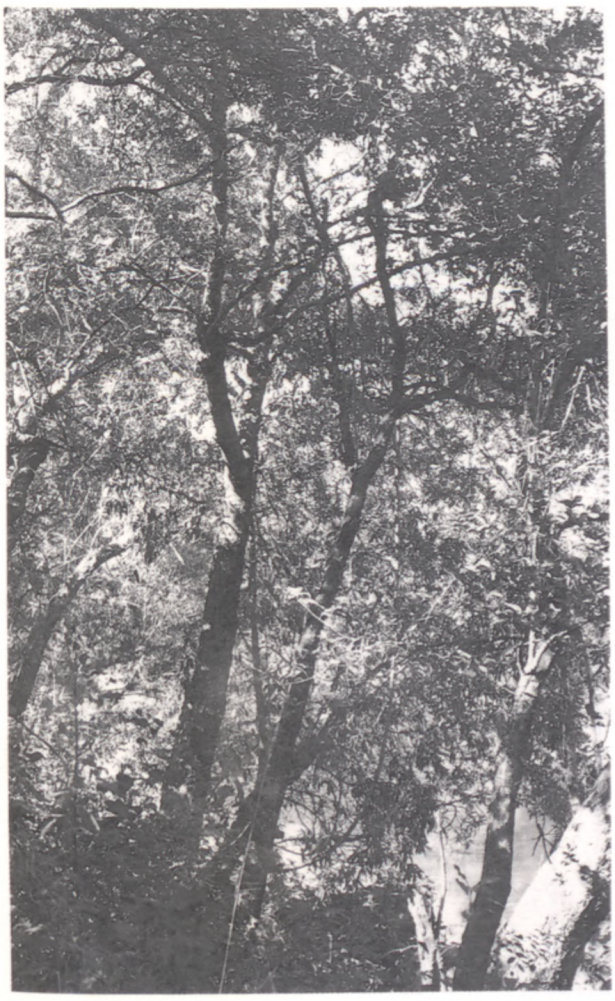


FIGURE 5.—*Pavetta* sp.—*Celtis africana* Tall Forest on sheltered banks of the Sabie river, Lower Foothills (c.12).

c.10 *Pycnostachys urticifolia*—*Acacia ataxacantha* Short Thicket

Occurring intermittently on mesoclinal upper slopes. Differential species are indicated in Table 2 (Group J). Dominant species include *Catha edulis*, *Diospyros whyteana*, *Diospyros lycioides* subsp. *sericea*, *Smilax kraussiana* and *Euclea* 'complex'.

1.7 Low Country forests associated with Nelspruit Granite, Lower Foothills

c.11 *Schoenoplectus corymbosus*—*Syzygium cordatum* Tall (riparian) Forest

Confined to sheltered stream banks. Differential species are indicated in Table 2 (Group K). Dominant species include *Anthocleista grandiflora*, *Syzygium cordatum*, *Diospyros whyteana*, *Oplismenus hirtellus* and *Dalbergia armata*.

c.12 *Pavetta* sp.—*Celtis africana* Tall Forest

Situated on mesoclinal midslopes and stream banks (Figure 5). Differential species are indicated in Table 2 (Group L). Dominant species include *Monanthotaxis caffra*, *Dalbergia armata*, *Rhoicissus tomentosa*, *Maytenus undata*, *Oplismenus hirtellus* and *Dietes iridioides*.

2 WOODLAND AND XERIC THICKET OF THE LOW COUNTRY

Xeric Thicket (Table 3) refers to the 'scrubby' type of thicket normally associated with the Low Country. Associated communities are represented mainly on xeroclinal upper slopes and midslopes underlain by Nelspruit Granite or Transvaal Diabase.

2.1 Partly sheltered woodlands and thickets of rocky sites, Lower Foothills

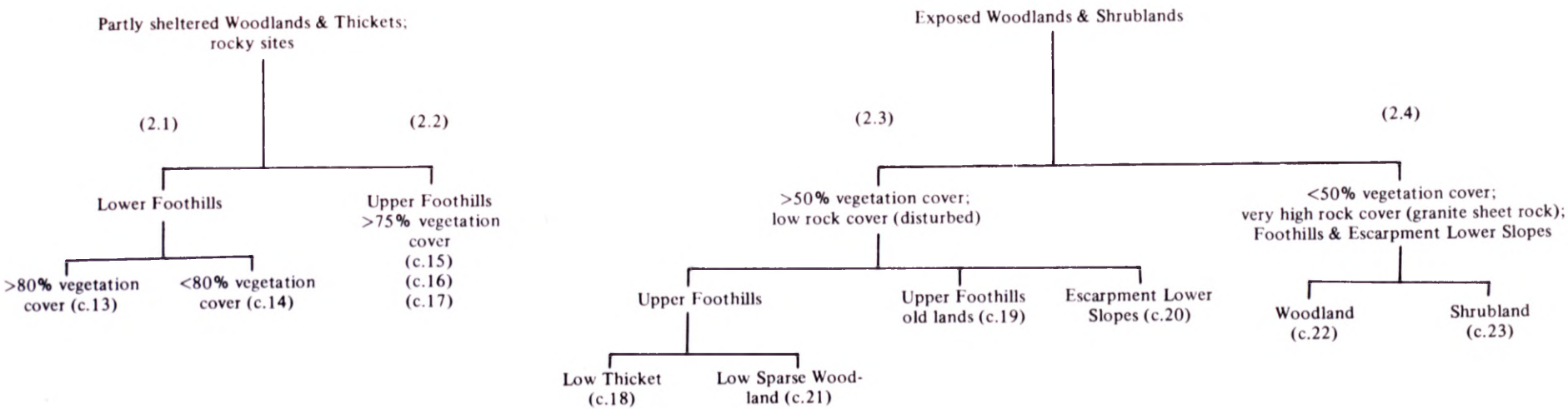
c.13 *Monanthotaxis caffra*—*Rhus pentheri* Short Thicket

TABLE 2.—Floristic classification of Forest and Mesic Thicket of the Mistbelt and Low Country

Habitat type	1.1		1.2		1.3	1.4	1.5		1.6		1.7	
Community number	1	2	3	4	5	6	7	8	9	10	11	12
Total relevés per Community	2	10	2	3	4	4	6	6	5	4	2	5
A. Differential species of Community 1												
* *Buddleja salviifolia* (SH)	5											
Streptocarpus pentherianus (FB)	5	1										
* *Leucosidea sericea* (TR)	5			2								
Rhamnus prinoides (TR)	5			2			1					
Myrsiphyllum ramosissimum (FB)	5	1										
* *Olinia emarginata* (TR)	5	1										
B. Differential species of Community 2												
* *Ochna arborea* var. *arborea* (TR)		4			2							
Scutia myrtina (TR)		3										
Protasparagus setaceus (FB)		5		2								
Bersama tysoniana (TR)		1										
Asplenium sandersonii (PT)		1										
Jasminum angulare (SH)		2										
Podocarpus falcatus (TR)		2										
C. Differential species of Community 3												
* *Hypoestes triflora* (FB)	3		5									
Dumasia villosa var. *villosa* (LN)		1	5									
Adiantum capillus-veneris (PT)			5									1
Clerodendrum glabrum var. *glabrum* (TR)		1	5							2		
D. Differential species of Community 4												
Streptocarpus cyaneus (FB)				5								
Psydrax livida (TR)				5								
Cyphostemma anatomicum (LN)				4								
Buddleja auriculata (SH)	3			4								
E. Differential species of Community 5												
Ekebergia pterophylla (TR)					5							1
Hypolepis sparsisora (PT)					4							
* *Aloe arborescens* (SH)					4							
Lycopodium gnidioides (PT)					4							
Plectranthus rubropunctatus (SH)					4							
Polystachya ottoniana (EP)					4							
Rhus tumulicola (SH)					3							
Bulbophyllum sandersonii (EP)					3							
Rothmannia capensis (TR)		1			3							
Cyanotis pachyrrhiza (FB)					3							
Rumohra adiantiformis (PT)					3							
F. Differential species of Community 6												
Clerodendrum myricoides (TR)						3						1
G. Differential species of Community 7												
Clematis brachiata (LN)	3			2			3					
Myrica pilulifera (TR)					2		2					
Secamone parvifolia (LN)							2					
Choristylis rhamnoides (TR)		1					2			2		
H. Differential species of Community 8												
Tetradenia 'complex' (SH)								4			3	
Aloe longibracteata (FB)								4				
Cryptolepis oblongifolia (FB)								2				
Loudetia simplex (GR)								2				
Gerbera jamesonii (FB)								2	1			
Indigofera swaziensis (SH)								3				1
Pearsonia sessilifolia 'complex' (FB)								3				
Rhus transvaalensis (TR)								3				1
I. Differential species of Community 9												
Pittosporum viridiflorum (TR)		1							5			
Annona senegalensis (TR)									2			
Cassia petersiana (SH)									2	2		
J. Differential species of Community 10												
Pycnostachys urticifolia (SH)							1			4		
Jacaranda mimosifolia (TR)										3		
Triumfetta pilosa var. *effusa* (FB)										3		
Dalechampia capensis (LN)									1	3		
K. Differential species of Community 11												
Schoenoplectus corymbosus (CY)											5	
Lantana camara (SH)										2	5	
Thelypteris gueinziana (PT)											5	
L. Differential species of Community 12												
Pavetta sp. (SH)									1			4
Kirkia acuminata (TR)												2
Berchemia zeyheri (TR)												2
Aneilema aequinoctiale (FB)									1			2
Chionanthus foveolata subsp. *foveolata* (TR)		1										2
Ceropegia woodii (LN)												2
Rhus pentheri (TR)												2

* Dominant species. Digits 1–5 in matrix denote constancy values. For explanation of 'complex' see Deall & Backer (1989). Growth forms: TR = Tree; SH = Shrub; LN = Lianoid; EP = Epiphyte; FB = Forb or herb; CY = Sedge; GR = Grass; PT = Fern.

TABLE 3.—Woodland and Xeric Thicket of the Low Country: an ecological basis for the recognition of four habitat types (2.1–2.4) and 11 communities (c.13–c.23), confer Table 4



Notable around Sandford, with a vegetation cover of more than 80 %. Differential species are indicated in Table 4 (Group A). Dominant species include *Zanthoxylum davyi*, *Acacia ataxacantha*, *Catha edulis* and *Maytenus undata*.

c.14 *Combretum collinum* subsp. *gazense*–*Panicum maximum* Short Closed Woodland

Widespread, with a vegetation cover of less than 80 %. Differential species are indicated in Table 4 (Group B). Dominant species include *Combretum collinum* subsp. *suluense*, *Heteropyxis natalensis*, *Panicum* 'complex' and *Aloe barbertoniae*.

2.2 Partly sheltered woodlands and thickets of rocky sites, Upper Foothills

c.15 *Hyparrhenia gazensis*–*Bauhinia galpinii* Short Thicket

Situated around Evert and Emmett with a vegetation cover of more than 75 %. Differential species are indicated in Table 4 (Group C). Dominant species include *Dombeya rotundifolia* subsp. *rotundifolia*, *Acacia ataxacantha*, *Maytenus heterophylla* and *Protasparagus* sp.

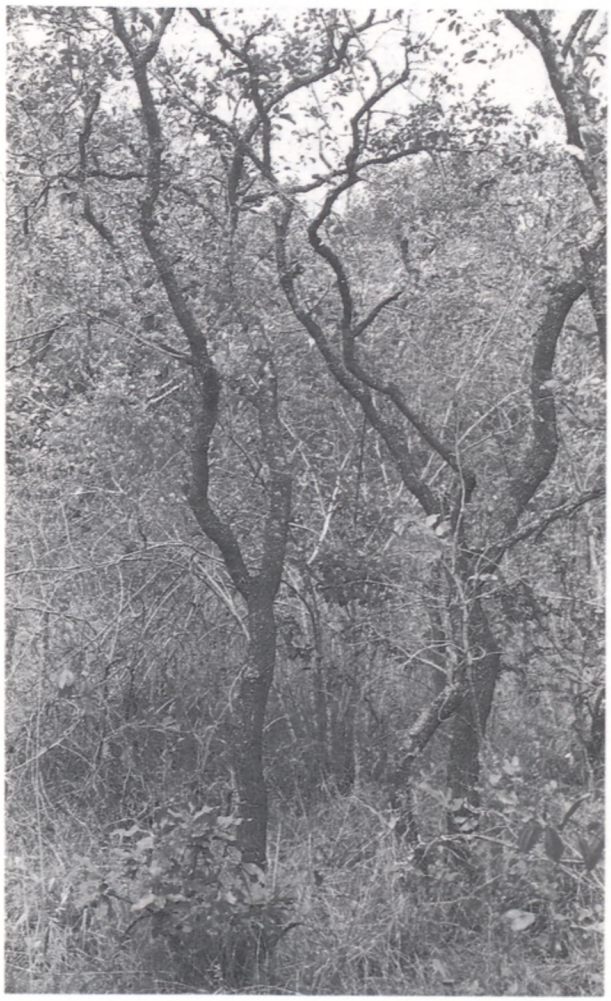


FIGURE 6.—*Dicoma zeyheri*–*Parinari curatellifolia* Short Closed Woodland on xeroclinal granite slope, Upper Foothills (c.16). *Loudetia simplex* dominates the field layer.

c.16 *Dicoma zeyheri*–*Parinari curatellifolia* Short Thicket/Closed Woodland

Notable at Zeederberg with a vegetation cover of more than 75 % (Figure 6). Differential species are indicated in Table 4 (Group D). Dominant species include *Pterocarpus angolensis*, *Catha edulis*, *Faurea speciosa*, *Diospyros whyteana*, *Bauhinia galpinii*, *Smilax kraussiana* and *Flemingia grahamiana*.

c.17 *Rhynchosia sordida*–*Parinari curatellifolia* Short Closed Woodland

Widespread, with a vegetation cover of more than 75 %. Differential species are indicated in Table 4 (Group E). Dominant species include *Faurea saligna*, *Themeda triandra*, *Flemingia grahamiana* and *Cymbopogon* 'complex'.

2.3 Exposed woodlands and shrublands with more than 50 % vegetation cover (disturbed) and low rock cover

c.18 *Mucuna coriacea* subsp. *irritans*–*Antidesma venosum* Low Thicket/Short Closed Woodland

Occurring on heavily utilized sites, Upper Foothills. Differential species are indicated in Table 4 (Group F). Dominant species include *Parinari curatellifolia*, *Bauhinia galpinii*, *Flemingia grahamiana* and *Hyperthelia dissoluta*.

c.19 *Diheteropogon amplectens*–*Parinari curatellifolia* Low Open Woodland

Associated with old-land disturbance, mainly on Upper Foothills. Differential species are indicated in Table 4 (Group G). Dominant species include *Trema orientalis*, *Smilax kraussiana*, *Flemingia grahamiana* and *Schizachyrium sanguineum*.

c.20 *Andropogon schirensis*–*Parinari curatellifolia* Short Open Woodland

Situated on disturbed sites of Escarpment Lower Slopes, notably Bergvliet Forest Reserve. Differential species are indicated in Table 4 (Group H). Dominant species include *Loudetia simplex* and *Schizachyrium sanguineum*.

c.21 *Vernonia centaureoides*–*Hyperthelia dissoluta* Low Sparse Woodland/Tall Sparse Shrubland

Occurring on Upper Foothills in disturbed areas. Differential species are indicated in Table 4 (Group I). Dominant species include *Parinari curatellifolia*.

2.4 Exposed woodlands and shrublands with less than 50 % vegetation cover and high rock cover (usually granite sheet rock)

c.22 *Ceratotheca triloba*–*Bequaertiodendron magalismontanum* Low Open Woodland

Occurring mainly on Upper Foothills and Escarpment Lower Slopes. Differential species are indicated in Table 4 (Group J). Dominant species include *Combretum molle* and *Loudetia simplex*.

TABLE 4.—Floristic classification of Woodland and Xeric Thicket of the Low Country

Habitat type	2.1		2.2			2.3				2.4	
Community number	13	14	15	16	17	18	19	20	21	22	23
Total relevés per community	6	12	5	2	2	3	3	2	2	5	6
A. Differential species of Community 13											
Monanthotaxis caffra (SH)	5										
Mimusops zeyheri (TR)	4	1									
Ansellia gigantea (EP)	3		2								
Eulophia streptopetala (FB)	4	1									
Scadoxus multiflorus subsp. *multiflorus* (FB)	3										
Plectranthus sp. (SH)	2		1								
B. Differential species of Community 14											
Combretum collinum subsp. *gazense* (TR)		3									
Terminalia sericea (TR)		3									
Senecio venosus (FB)		3									
Vernonia natalensis (FB)		3				2					
Lannea discolor (TR)	1	3									1
Chaetacanthus burchellii (FB)		2	1								
Diospyros mespiliformis (TR)		2									
Strychnos madagascariensis (TR)	1	2	1								
Phyllanthus reticulatus (SH)		2									
Maytenus mossambicensis subsp. *mossambicensis* (TR)		2									
C. Differential species of Community 15											
Hyparrhenia gazensis (GR)			4								
Neonotonia wightii (LN)			4								
Triumfetta pilosa var. *pilosa* (FB)			3			2			3		
Euclea natalensis (TR)	1		2								
Ocimum urticifolium (SH)			2								
Erianthemum dregei (EP)			2								
Sphenostylis marginata subsp. *marginata* (LN)			2	3							
D. Differential species of Community 16											
Dicoma zeyheri (FB)				5			2				
Thunbergia atriplicifolia (LN)				5							
Aster sp. (FB)				5	3						
Passiflora edulis (LN)				5		2					
Tridactyle tricuspis (EP)				5						1	
Trimeria grandifolia (TR)				5							
Ipomoea crassipes (FB)				5							
E. Differential species of Community 17											
Rhynchosia sordida (FB)					5						
Senecio serratuloides var. *serratuloides* (FB)					5						
F. Differential species of Community 18											
Mucuna coriacea subsp. *irritans* (LN)		1				5		3			
Triumfetta pilosa var. *tomentosa* (FB)					3	4					
G. Differential species of Community 19											
Diheteropogon amplectens (GR)							4				
Acanthospermum australe (FB)							4		5		
Cassia quarrei (FB)							4				
Hemizygia transvaalensis (FB)							4				
Conyza sumatrensis (FB)				3			4				
H. Differential species of Community 20											
Andropogon schirensis (GR)								5		1	
Gladiolus exiguus (FB)								5			
Diospyros galpinii (FB)								5			
Eriosema gunniae (FB)								5			
I. Differential species of Community 21											
Vernonia centaureoides (FB)									5		
Indigofera oxalidea (FB)									5		
J. Differential species of Community 22											
Ceratotheca triloba (FB)										5	1
Crassula natalensis (FB)										3	
Pellaea calomelanos (PT)		1								3	
Helichrysum kraussii (FB)									3	4	
Protorhus longifolia (TR)										3	
Brachiaria serrata var. *serrata* (GR)										2	
Cephalanthus natalensis (LN)										2	
K. Differential species of Community 23											
* *Aloe petricola* (FB)											5
* *Myrothamnus flabellifolia* (FB)											4
* *Coleochloa setifera* (CY)											4

* Dominant species. Digits 1–5 in matrix denote constancy values. Growth forms: TR = Tree; SH = Shrub; LN = Lianoid; EP = Epiphyte; FB = Forb or herb; CY = Sedge; GR = Grass; PT = Fern.

FIGURE 7.—*Aloe petricola–Coleochloa setifera* Short Sparse Shrubland on granite 'dwala' (c.23).

c.23 *Aloe petricola–Coleochloa setifera* Short Sparse Shrubland

Widespread on Foothills and Escarpment Lower Slopes (Figure 7). Differential and dominant species are indicated in Table 4 (Group K). Non-differential dominants include *Cheilanthes viridis* var. *viridis*.

3 WOODLAND AND SHRUBLAND OF THE MISTBELT

Associated communities are evenly distributed between Humid and Subhumid Mistbelts (Table 5).

3.1 Humid Mistbelt communities on partly sheltered midslopes with low rock cover

c.24 *Galopina aspera–Faurea speciosa* Low Open Woodland/Low Thicket

Notable in Spitskop Forest Reserve on xeroclinal sites underlain by Black Reef Quartzite, Escarpment Upper Slopes (Figure 8). Differential species are indicated in Table 6 (Group A). Dominant species include *Faurea speciosa*, *Rhynchosia komatiensis*, *Acalypha wilmsii*, *Eulalia villosa*, *Smilax kraussiana* and *Flemingia grahamiana*.

c.25 *Artemisia afra–Bowkeria cymosa* Low Thicket/Low Open Woodland

Occurring in Vertroosting Nature Reserve on mesoclinal sites underlain by dolomite, Lower Mountain Slopes. Differential species are indicated in Table 6 (Group B). Dominant species include *Cussonia spicata*, *Bowkeria cymosa*, *Rhus transvaalensis*, *Indigofera swaziensis*, *Rhoicissus tridentata* and *Pteridium aquilinum*.

3.2 Humid Mistbelt communities on exposed Black Reef Quartzite outcrops, Plateau Crest and Escarpment Upper Slopes

c.26 *Tecomaria capensis* subsp. *capensis–Bequaertiodendron magalismontanum* Low Closed Woodland

Situated on xeroclinal upper slopes at Sabie. Differential and dominant species are indicated in Table 6 (Group C). Non-differential dominants include *Psychotria capensis*, *Helichrysum kraussii* and *Cyperus leptocladus*.

FIGURE 8.—*Galopina aspera–Faurea speciosa* Low Open Woodland of Escarpment Upper Slopes (c.24). The community is evidently maintained by fire.

TABLE 5.—Woodland and Shrubland of the Mistbelt: an ecological basis for the recognition of five habitat types (3.1–3.5) and 11 communities (c.24–c.34), confer Table 6

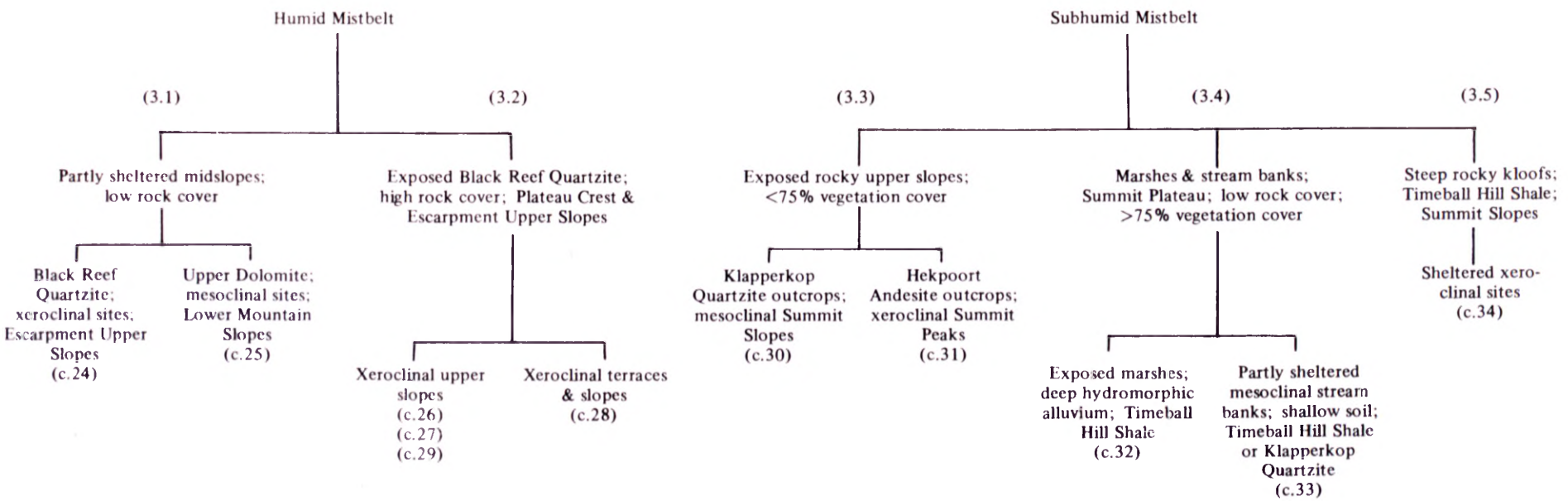


TABLE 6.—Floristic classification of Woodland and Shrubland of the Mistbelt

Habitat type	3.1		3.2				3.3		3.4		3.5
Community number	24	25	26	27	28	29	30	31	32	33	34
Total relevés per community	2	2	3	3	4	4	5	3	4	3	2
A. Differential species of Community 24											
Galopina aspera (FB)	5										
Inula glomerata (FB)	5										
Hyperthelia dissoluta (GR)	5										
Combretum molle (TR)	5		2								
Boophane disticha (FB)	5				2						
Vernonia neocorymbosa (FB)	5										
Eriospermum sp. (FB)	5										
Senecio venosus (FB)	5										
B. Differential species of Community 25											
Artemisia afra (FB)		5									
Lippia javanica (SH)		5				2					
C. Differential species of Community 26											
* *Tecomaria capensis* subsp. *capensis* (TR)			5								
Ochna holstii (TR)			5	2							
* *Ficus ingens* var. *ingens* (TR)			5		2						
Setaria megaphylla (GR)			5								
Tetradenia 'complex' (SH)			4		2						
Arthropteris monocarpa (PT)			4								
Solanum mauritianum (TR)			4								
Canthium mundianum (TR)			4								
Bidens pilosa (FB)			4								
Plectranthus fruticosus (SH)			4								
Heteropyxis natalensis (TR)			4								
Maytenus undata (TR)			4								
Eulophia streptopetala (FB)			4								
D. Differential species of Community 27											
Diospyros galpinii (FB)	3			5							
Gladiolus densiflorus (FB)				5							
Selago hyssopifolia (FB)				4							
Lannea edulis (FB)				4							
Tristachya leucothrix (GR)				4			1				
Pearsonia sp. (FB)				4							
* *Parinari capensis* subsp. *capensis* (FB)				4	2						
E. Differential species of Community 28											
Selago atherstonei (FB)					5	2	1				
* *Aloe petricola* (FB)				2	5						
Burchellia bubalina (TR)					3						
Gladiolus exiguus (FB)					4	2					
F. Differential species of Community 29											
Clutia monticola (FB)	3					4					
Helichrysum 'complex' (FB)				2		3					
Erica drakensbergensis (SH)						3		2			
Pearsonia aristata (FB)						3					
Plectranthus rubropunctatus (SH)						3				2	
Senecio coronatus (FB)						3	1				
Greyia radlkoferi (TR)		3				3					
Conostomium natalense var. *glabrum* (FB)						3					
Pachystigma macrocalyx (SH)						3					
Cephalaria pungens (FB)						3					
Eriosema ellipticifolium (FB)						3	1				
Inulanthera calva (FB)						3					

* Dominant species. Digits 1–5 in matrix denote constancy values. For explanation of 'complex' see Deall & Backer (1989). Growth forms: TR = Tree; SH = Shrub; LN = Lianoid; EP = Epiphyte; FB = Forb or herb; CY = Sedge; GR = Grass; PT = Fern.

TABLE 6.—Floristic classification of Woodland and Shrubland of the Mistbelt (continued)

Habitat type	3.1		3.2				3.3		3.4		3.5
Community number	24	25	26	27	28	29	30	31	32	33	34
Total relevés per community	2	2	3	3	4	4	5	3	4	3	2
G. Differential species of Community 30											
* *Trachypogon spicatus* (GR)					2		3	2			
Crassula sarcocaulis subsp. *sarcocaulis* (FB)						2	2				
Panicum ecklonii (GR)							2				
Tetraselago wilmsii (FB)							2	4			
Ledebouria cooperi (FB)							2				
Gerbera ambigua (FB)							2				
Alloteropsis semialata (GR)							2				
Oxalis obliquifolia (FB)							2	2			
Pentanisia prunelloides (FB)						2	2				
Koeleria capensis (GR)							2				
Euryops pedunculatus (FB)					2		2				
Alepidea longifolia subsp. *longifolia* (FB)							2				
* *Protea roupelliae* subsp. *roupelliae* (TR)							2				
Hypoxis filiformis (FB)							2				
H. Differential species of Community 31											
* *Festuca costata* var. *costata* (GR)								5			
Erica atherstonei (SH)								4			
Cheilanthes pentagona (PT)								4			
* *Protea parvula* (SH)								4			
Cycnium racemosum (FB)							1	5			
I. Differential species of Community 32											
* *Gunnera perpensa* (FB)									4	4	
Nerine angustifolia (FB)									3		
Acalypha caperonioides (FB)		5							4		
J. Differential species of Community 33											
* *Cyathea dregei* (TR)										5	
Agapanthus inapertus subsp. *parviflorus* (FB)							1			4	
Leucosidea sericea (TR)										4	
Clutia affinis (SH)										4	
Pennisetum macrorum (GR)										4	
Diclis reptans (FB)										4	
Helichrysum splendidum (FB)								2		5	
Phygelius aequalis (SH)										4	
K. Differential species of Community 34											
* *Aloe arborescens* (SH)		3									5
Cyperus pseudoleptocladus (CY)							1			2	5
* *Rhus pyroides* (TR)											5
* *Clivia caulescens* (FB)											5
Anthospermum herbaceum (FB)							1				5

* Dominant species. Digits 1–5 in matrix denote constancy values. For explanation of 'complex' see Deall & Backer (1989). Growth forms: TR = Tree; SH = Shrub; LN = Lianoid; EP = Epiphyte; FB = Forb or herb; CY = Sedge; GR = Grass; PT = Fern.

c.27 *Diospyros galpinii–Bequaertiodendron magalismontanum* Tall Open Shrubland/Low Open Woodland

Notable at Sabie on xeroclinal upper slopes. Differential and dominant species are indicated in Table 6 (Group D). Non-differential dominants include *Loudetia simplex*, *Panicum natalense*, and *Rhynchosia monophylla*.

c.28 *Selago atherstonei–Syzygium cordatum* Low Open Woodland

Occurring in Spitskop Forest Reserve on xeroclinal terraces and slopes (Figure 9). Differential and dominant species are indicated in Table 6 (Group E). Non-differential dominants include *Bequaertiodendron magalismontanum* and *Loudetia simplex*.

c.29 *Clutia monticola–Loudetia simplex* Low Open Woodland

Widespread on xeroclinal upper slopes. Differential species are indicated in Table 6 (Group F). Dominant species include *Helichrysum mimetes* and *Rhus tumulicola*.

3.3 Subhumid Mistbelt communities of exposed rocky upper slopes with less than 75 % vegetation cover

c.30 *Trachypogon spicatus–Rhus tumulicola* Low Open Woodland/Tall Open Shrubland

Confined to Klapperkop Quartzite outcrops on mesoclinal Summit Slopes, Hartebeestvlakte (Figure 10). Differential and dominant species are indicated in Table 6 (Group G). Non-differential dominants include *Protea caffra*.

c.31 *Festuca costata* var. *costata–Cliffortia nitidula* subsp. *pilosa* Short Closed/Open Shrubland

Occurring in association with Hekpoort Andesite outcrops on xeroclinal Summit Peaks, notably Mount Anderson. Differential and dominant species are indicated in Table 6 (Group H). Non-differential dominants include *Myrsine africana*, *Vaccinium exul*, *Helichrysum splendidum* and *Cliffortia nitidula* subsp. *pilosa*.

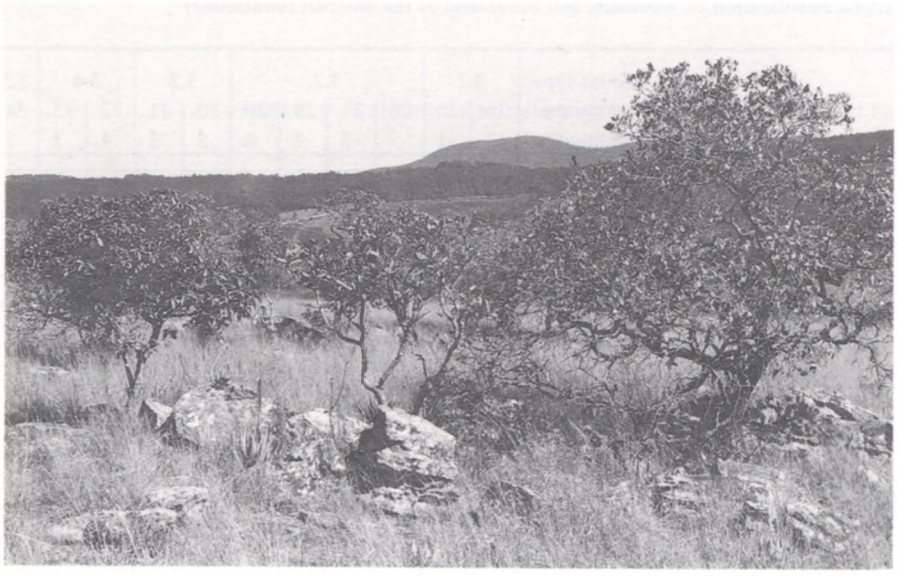


FIGURE 9.—*Selago atherstonei–Syzygium cordatum* Low Open Woodland of Black Reef Quartzite outcrops, Plateau Crest (c.28). *Aloe petricola* is visible bottom right and centre left.

FIGURE 10.—*Trachypogon spicatus–Rhus tumulicola* Low Open Woodland associated with Klapperkop Quartzite outcrops, Summit Slopes (c.30). The conspicuous tree is *Protea caffra*.

FIGURE 11.—*Gunnera perpensa–Nidorella auriculata* Short Open (marshy) Shrubland on deep hydromorphic soils overlying Timeball Hill Shale (c.32). *Eucomis autumnalis* subsp. *clavata* and *Gunnera perpensa* are conspicuous.

FIGURE 12.—Tall Closed (marshy) Grassland variant of Community 32. *Andropogon appendiculatus* is totally dominant.

3.4 Subhumid Mistbelt communities of marshes and stream banks with low rock cover and more than 75% vegetation cover, Summit Plateau

c.32 *Gunnera perpensa–Nidorella auriculata* Short Open (marshy) Shrubland/Tall Closed (marshy) Grassland

Confined to exposed, level terraces with deep hydromorphic alluvium overlying Timeball Hill Shale, Hartebeestvlakte (Figures 11 & 12). Differential and dominant species are indicated in Table 6 (Group I). Non-differential dominants include *Rabdosiella calycina*, *Nerine angustifolia* and *Andropogon appendiculatus*.

c.33 *Cyathea dregei–Hypericum revolutum* Low Open Woodland

Situated at Hartebeestvlakte on partly sheltered, mesoclinal stream banks with fairly shallow soils overlying Timeball Hill Shale or Klapperkop Quartzite (Figure 13). Differential and dominant species are indicated in Table 6 (Group J). Non-differential dominants include *Cliffortia nitidula* subsp. *pilosa*.

3.5 Subhumid Mistbelt communities of steep rocky kloofs in Timeball Hill Shale, Summit Slopes

c.34 *Aloe arborescens–Rhus pyroides* var. *gracilis* Low Bushland

Occurring in sheltered xeroclinal sites below Mount Anderson (Figure 14). Differential and dominant species are indicated in Table 6 (Group K). Non-differential dominants include *Hypericum revolutum*.

4 GRASSLAND OF THE MISTBELT

Associated communities are all fire-maintained, occurring on exposed sites with low rock cover. They are represented over all geological substrates. Table 7.

4.1 Humid Mistbelt grasslands of Escarpment Slopes overlying Nelspruit Granite (more than 75 % vegetation cover)

c.35 *Gladiolus densiflorus–Loudetia simplex* Short Closed Grassland

Notable at Hebron as relic patches on mesoclinal foot slopes with low rock cover. Differential and dominant species are indicated in Table 8 (Group A). Non-differential dominants include *Monocymbium ceresiiforme* and *Athanasia acerosa*.

c.36 *Cliffortia repens–Loudetia simplex* Short Open (grassy) Shrubland

Occurring as relic patches on xeroclinal upper slopes with moderate rock cover, Frankfort Forest Reserve. Differential and dominant species are indicated in Table 8 (Group B). Non-differential dominants include *Eragrostis capensis*, *Pearsonia sessilifolia* 'complex' and *Hemizygia subvelutina*.

4.2 Humid Mistbelt grasslands of Escarpment Plateau (less than 75 % vegetation cover)

c.37 *Tephrosia elongata–Monocymbium ceresiiforme* Low Closed Grassland

Situated in Mac-Mac Nature Reserve on xeroclinal terraces overlying Black Reef Quartzite with moderate rock cover. Differential species are indicated in Table 8 (Group C). Dominant species include *Bulbostylis schoenoides* and *Loudetia simplex*.

c.38 *Helichrysum cephaloideum–Monocymbium ceresiiforme* Low Closed Grassland

Confined to Mac-Mac Nature Reserve on xeroclinal terraces overlying Black Reef Quartzite with low rock cover (Figure 15). Differential species are indicated in Table 8 (Group D). Dominant species include *Rendlia altera*, *Loudetia simplex* and *Becium obovatum*.

c.39 *Wahlenbergia huttonii–Eragrostis racemosa* Low Closed Grassland

Situated around Sabie vicinity on xeroclinal terraces overlying Oaktree Dolomite with low rock cover. Differential species are indicated in Table 8 (Group E). Dominant species include *Loudetia simplex*, *Themeda triandra*, *Bulbostylis schoenoides* and *Helichrysum piloselum*.

FIGURE 13.—*Cyathea dregei–Hypericum revolutum* Low Open Woodland in drainage lines of Summit Plateau (c.33).

FIGURE 14.—*Aloe arborescens–Rhus pyroides* var. *gracilis* Low Bushland of steep rocky kloofs in Timeball Hill Formation, Summit Slopes (c.34).

FIGURE 15.—*Helichrysum cephaloideum–Monocymbium ceresiiforme* Low Closed Grassland of Escarpment Plateau (c.38). *Pteridium aquilinum* is dominant in patches.

TABLE 7.—Grassland of the Mistbelt: an ecological basis for the recognition of five habitat types (4.1–4.5) and 12 communities (c.35–c.46), confer Table 8

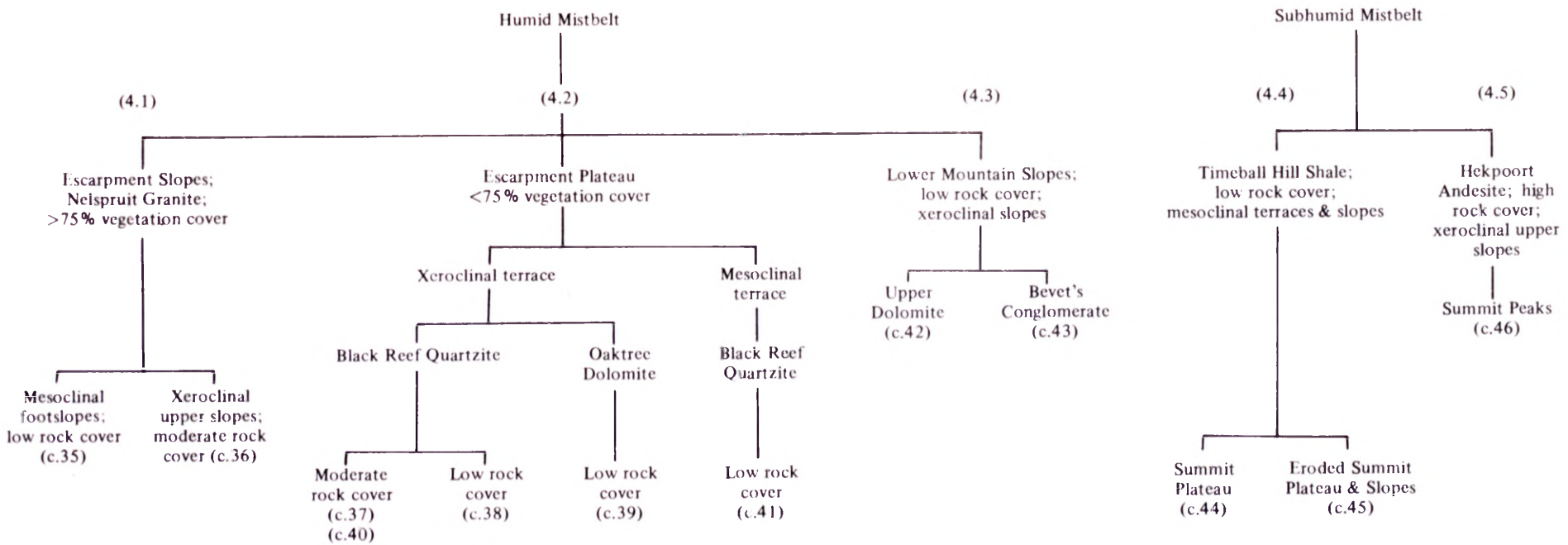


TABLE 8.—Floristic classification of Grassland of the Mistbelt

Habitat type	4.1		4.2					4.3		4.4		4.5
Community number	35	36	37	38	39	40	41	42	43	44	45	46
Total relevés per community	4	2	3	5	5	2	4	6	6	10	8	3
A. Differential species of Community 35												
* *Gladiolus densiflorus* (FB)	4				2							
Indigofera sp. (FB)	5											
Lopholaena disticha (FB)	4				1							
Aster comptonii (FB)	3							1				
Selago atherstonei (FB)	3								1			
B. Differential species of Community 36												
* *Cliffortia repens* (SH)		5										
Monopsis decipiens (FB)		5		1								
Styppeiochloa gynoglossa (GR)		5										
* *Helichrysum mimetes* (FB)		5						1			1	
Pycreus muricatus (CY)		5										
C. Differential species of Community 37												
Tephrosia elongata (FB)			4									
Microchloa caffra (GR)			4	1		3						
D. Differential species of Community 38												
Helichrysum cephaloideum (FB)				3								
Commelina sp. (FB)				4								
Senecio erubescens var. *crepidifolius* (FB)				3								
Senecio gerrardii (FB)				3								
Inulanthera calva (FB)				2				1				
Nidorella auriculata (SH)				2								
Drosera sp. (FB)				2								
Euphorbia striata (FB)				2								
E. Differential species of Community 39												
Wahlenbergia huttonii (FB)					4		2					2
Acrotome hispida (FB)					4		2		1			
Hyparrhenia hirta (GR)					4	3		1				
Brachiaria subulifolia (GR)					4							
Digitaria maitlandii (GR)					3							
Eriosema cordatum (FB)					3					1	1	
Hibiscus aethiopicus var. *ovatus* (FB)					3			1				
Pearsonia aristata (FB)					2		2					
Sonchus integrifolius (FB)					2							
Helichrysum harveyanum (FB)					2							
Senecio latifolius (FB)			2		4							
Triumfetta welwitschii var. *hirsuta* (FB)					3							
Hermannia lancifolia (FB)					3					1		
Scabiosa columbaria (FB)					2						1	
Hypoxis multiceps (FB)					2							
Gladiolus sp. (FB)	2				2							
Rhynchosia totta (LN)					2							
Raphionacme elata (FB)					2							
Sphenostylis angustifolia (LN)					2							
F. Differential species of Community 40												
* *Digitaria monodactyla* (GR)						5			1			
Anthericum galpinii (FB)						5						
Linum thunbergii (FB)						5						
Desmodium setigerum (FB)						5						
Ceratotheca triloba (FB)						5						
G. Differential species of Community 41												
Asclepias crassinervis (FB)					1		5	1				
Lopholaena segmentata (FB)							4	1				
Eriosema gunniae (FB)	2						3	1				
Pseudarthria hookeri var. *hookeri* (FB)							3	1				
Oxalis depressa (FB)							3	1	1			
Eriosema nutans (FB)							3					

* Dominant species. Digits 1–5 in matrix denote constancy values. For explanation of 'complex' see Deall & Backer (1989). Growth forms: TR = Tree; SH = Shrub; LN = Lianoid; EP = Epiphyte; FB = Forb or herb; CY = Sedge; GR = Grass; PT = Fern.

TABLE 8.—Floristic classification of Grassland of the Mistbelt (continued)

Habitat type	4.1		4.2					4.3		4.4		4.5
Community number	35	36	37	38	39	40	41	42	43	44	45	46
Total relevés per community	4	2	3	5	5	2	4	6	6	10	8	3
H. Differential species of Community 42												
Lippia javanica (SH)								5				
Flemingia grahamiana (FB)							2	5				
Rhus discolor (SH)							2	4				
Aristea woodii (FB)			4					3				
Rhus dentata (TR)						3		2				
Indigofera hilaris (FB)								3				
Cyphia elata 'complex' (FB)								2		1		
Crassula natalensis (FB)								2				
Heteromorpha pubescens (SH)								2				
Acalypha caperonioides (FB)								3		1		
Leonotis 'complex' (FB)								2				
Helichrysum mixtum (FB)								2				
I. Differential species of Community 43												
Indigofera sp. 1 (FB)									5			
**Protea caffra* (TR)	2								4	1		
Dicoma anomala subsp. *cirsioides* (FB)									2			2
Rhynchosia anguiosa (FB)									4			
Acalypha angustata var. *glabra* (FB)								1	4			
Cyperus obtusiflorus var. *flavissimus* (CY)									2			
Faurea speciosa (TR)	2								2			
J. Differential species of Community 44												
Helichrysum wilmsii (FB)		3								2		
Drosera burkeana (SH)										2		
Helichrysum glomeratum (FB)										1		
Helichrysum spiralepis (FB)										2		
Helichrysum subluteum (FB)										2	1	
Scleria dieterlenii (CY)										1		
Monsonia transvaalensis (FB)										2		
Clerodendrum triphyllum var. *triphyllum* (SH)										1		
K. Differential species of Community 45												
Eriosema kraussianum (FB)										1	3	
Protea gaguedi (TR)			2								2	
Gladiolus longicollis var. *platypetalus* (FB)										1	2	
Gnidia caffra (FB)											2	
Oxalis obliquifolia (FB)										1	2	
Sporobolus centrifugus (GR)											2	2
Vernonia thodei (FB)											2	
L. Differential species of Community 46												
**Erica atherstonei* (SH)												4
Hypoxis galpinii (FB)		3										4
Alepidea sp. (FB)												5
Hebenstretia comosa (FB)											1	4
Peucedanum sp. (FB)												4
Psammotropha myriantha (FB)												4

* Dominant species. Digits 1–5 in matrix denote constancy values. For explanation of 'complex' see Deall & Backer (1989). Growth forms: TR = Tree; SH = Shrub; LN = Lianoid; EP = Epiphyte; FB = Forb or herb; CY = Sedge; GR = Grass; PT = Fern.

c.40 *Digitaria monodactyla–Loudetia simplex* Low Closed Grassland

Notable in Sabie vicinity on xeroclinal terraces overlying Black Reef Quartzite with moderate rock cover. Differential and dominant species are indicated in Table 8 (Group F). Non-differential dominants include *Eragrostis capensis*.

c.41 *Asclepias crassinervis–Andropogon schirensis* Short Closed Grassland

Situated on mesoclinal terraces overlying Black Reef Quartzite with low rock cover, notably in Spitskop Forest Reserve. Differential species are indicated in Table 8 (Group G). Dominant species include *Themeda triandra*.

4.3 Humid Mistbelt grasslands of Lower Mountain Slopes

c.42 *Lippia javanica–Loudetia simplex* Short Closed Grassland/Tall Open Shrubland

Occurring on xeroclinal slopes overlying Upper Dolomite with low rock cover, Vertroosting Nature Reserve. Differential species are indicated in Table 8 (Group H). Dominant species include *Themeda triandra* and *Hemizygia transvaalensis*.

c.43 *Indigofera* sp.–*Monocymbium ceresiiforme* Low Closed Grassland/Sparse Woodland

Notable in Vertroosting Nature Reserve on xeroclinal upper slopes overlying Bevet's Conglomerate with low

FIGURE 16.—*Helichrysum wilmsii*—*Andropogon schirensis* Low Closed Grassland of Summit Plateau (c.44). *Sopubia cana* var. *cana* is the dominant forb.

rock cover. Differential and dominant species are indicated in Table 8 (Group I). Non-differential dominants include *Themeda triandra*, *Loudetia simplex* and *Eriosema ellipticifolium*.

4.4 Subhumid Mistbelt grasslands overlying Timeball Hill Shale with low rock cover and mesoclinal aspect

c.44 *Helichrysum wilmsii*—*Andropogon schirensis* Low Closed Grassland

Situated on terraces and slopes of the Summit Plateau, Hartebeestvlakte (Figure 16). Differential species are indicated in Table 8 (Group J). Dominant species include *Festuca costata* var. *costata*, *Themeda triandra*, *Alloteropsis semialata* subsp. *eckloniana*, *Loudetia densispica* and *Sopubia cana* var. *cana*.

c.45 *Eriosema kraussianum*—*Rendlia altera* Low Closed Grassland

Occurring on eroded terraces and slopes of the Summit Plateau and Summit Slopes, Hartebeestvlakte (Figure 17). Differential species are indicated in Table 8 (Group K). Dominant species include *Alloteropsis semialata* subsp. *eckloniana*, *Andropogon schirensis*, *Festuca costata* var. *costata*, *Monocymbium ceresiiforme* and *Loudetia densispica*.

4.5 Subhumid Mistbelt grasslands overlying Hekpoort Andesite with high rock cover and xeroclinal aspect

c.46 *Erica atherstonei*—*Harpochloa falx* Low Closed Grassland/Open (grassy) Shrubland

Confined to upper slopes of the Summit Peak, at Mount Anderson. Differential and dominant species are indicated in Table 8 (Group L). Non-differential dominants include *Rendlia altera*, *Festuca costata* var. *costata*, *Protea parvula* and *Erica cerinthoides* var. *cerinthoides*.

CONCLUSION

At the finest level of detail, the classification of vegetation in the Sabie area has elicited 46 floristic entities

FIGURE 17.—*Eriosema kraussianum*—*Rendlia altera* Low Closed Grassland of eroded terraces and slopes, Summit (c.45).

(communities), defined on the basis of differential species. Environmental correlation enhances the descriptive and predictive value of the classification. As a planning and management tool, however, it is obviously incomplete. Aspects such as causality and community function must yet be investigated in association with relevant key questions. The floristic classification presented here should provide a basis for such investigation.

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