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NEWS-LETTER OF THE SOUTH AFRICAN ASSOCIATION OF BOTANISTS  
NUUSBRIEF VAN DIE SUID-AFRIKAANSE GENOOTSKAP VAN PLANTKUNDIGES

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7TH ANNUAL CONGRESS OF S A A B: The 1981 Congress was held at the University of Port Elizabeth, from Wednesday 21st – Friday 23rd January. The Congress took place in the anonymous Building No. 35, while delegates were accommodated in the Xanadu Residence. Prof S J Schoeman, Principal of U P E, welcomed delegates to the Congress. In his opening speech he stressed the importance of the search for knowledge for its own sake and said that science today is the victim of some professions that are not interested in basic research. The main theme of this congress was "Reproduction in Plants". The guest speaker was the Embryologist and Developmental Botanist, Prof William A Jensen from the University of California in Berkeley who gave an excellent illustrated talk on "Fertilization in Flowering Plants". He reported on the results of workers in his laboratory over some years. Two parallel sessions were held almost throughout the whole Congress with about 90 oral papers and about 25 poster papers on the following topics: Ecology, Taxonomy, Palaeobotany, Anatomy, Morphology, Genetics, Ecophysiology, Seed Physiology, Water Relations, Mineral Nutrition, Nitrogen Assimilation and Metabolism, Photosynthesis, Marine Botany and General.

The Annual General Meeting of S A A B was held on the Friday at 16h00 when the new Council was announced (Listed in the previous issue of Forum Botanicum). The President, Prof J G C Small, and the Treasurer, Dr P Kok (both from the Botany Department, University of Pretoria), and the Secretary, Miss W G Welman (Botanical Research Institute, Private Bag X101, Pretoria) will hold office for 1981/82. S A A B will join the AETFAT Congress in Pretoria in January next year. A one-day S A A B Congress, accommodating physiology papers, will precede the AETFAT Congress. The 1983 Congress will be held at the University of the Witwatersrand, the 1984 Congress at the University of Cape Town and the 1985 Congress at the University of Potchefstroom. The by-laws were amended so that in future the annual subscriptions shall be as follows: Life Member (one payment) 20 times Ordinary Member, Ordinary Member R10, Affiliate Member R8, Student Member R4, Institutional Member R40. The annual subscription shall become due on the 1st January in each year. The Secretary reported that application forms for income tax reduction for post-graduate studies are available direct from the Associated Scientific and Technical Societies of South Africa (P O Box 61019, Marshalltown, 2107) and that it is not necessary for members to apply through S A A B.

The Annual S A A B Dinner was held in "The Kraal" on the campus on Friday, 23rd January. The master of ceremonies was Prof S C Seagrief while the guest speaker was Prof G C Bate, newly appointed head of the Botany Department at U P E who spoke on the "Future of Botany in South Africa". Two S A A B awards were made on this night; Prof E A C L E Schelpe received the S A A B Senior Medal for Botany and Mr L C Leach the S A A B Certificate of Merit. During the Congress there were two other occasions during which delegates could meet socially, namely a cocktail party presented by the University of Port Elizabeth and the Civic Reception in the Walmer Town Hall. The local organising committee, headed by Dr B L Robertson who also acted as Secretary and Treasurer, must be thanked for their excellent organisation and hard work in making this Congress such a great success. The other committee members were Mr D S Grierson, Mrs H Malan, Dr M C Olivier and Mr B H Whiting.

A one-day post-congress excursion to the Gamtoos Valley was organised for Saturday, 24th January. Unfortunately, the torrential rains which caused the disastrous Southern Cape floods, reached Port Elizabeth on that day. The result was that the very disappointed visitors and guide (Dr M C Olivier) rarely got out of the bus to investigate the wide range of vegetation in this area where four floras and two veld types meet. Non-botanical highlights of this trip were the Van Stadens bridge, the Philips tunnel and the Paul Sauer dam where the braai-vleis-lunch was most welcome on a very cold and wet day. Naturally the bus got stuck on a muddy road! Nevertheless, many thanks are due to Dr Olivier and her helpers for a well-planned excursion. (W G W)

JAARVERSLAG (1980) VAN DIE VRYSTAATSE TAK VAN DIE S A G P: Die bestuur vir die termyn 1980/1981 was soos volg saamgestel:

Voorsitter	Dr R L Verhoeven
Ondervoorsitter	Mnr D B Müller
Sekretaresse/Tesouriere	Mev A M Joubert
Addisionele lid	Prof J A Coetzee

Die ledetal het konstant gebly met die weggaan van ou lede en die byvoeging van nuwe lede en is tans 34. Namens die bestuur wil ek graag die nuwe lede wat in 1980 aangesluit het, van harte verwelkom en hul die versekering gee dat ons uitsien na hul aktiewe deelname by toekomstige vergaderings.

Gedurende 1980 is die volgende lesings gereël:

20 Maart	Dr H J T Venter – Filogenie van <i>Monsonia</i> en <i>Sarcocaulon</i> – genera van die Geraniaceae, bekende "potmalva"-familie.
12 Junie	Dr G H J Krüger – Koolstofmetabolisme van <i>Microcystis</i> by lae ligintensiteite.
17 September	Dr K M F Brix – Reproduksie by diploïede en poliploïede grasse.
12 November	Dr S W Baard – Perforasie-lise van oorlewingstrukture van plantpatogene fungi in die grond.

Die reëlings het goed verloop met 'n gemiddelde bywoningsyfer van 14 persone.

Verder het 8 lede van die Vrystaatse tak van die S A G P voordragte gelewer tydens die verrigtinge van die afdeling Biologie van die Suid-Afrikaanse Akademie wat op 23 en 24 Junie 1980 in Bloemfontein gehou is.

Die werkswyse van die tak het soos in die verlede voortgegaan met gereelde aandlesings gevolg deur 'n besprekingsessie waarna gesellig verkeer is met 'n koppie tee en verversings.

Die finansiële toestand van die tak is gesond. Die ledegeldsubsidie van R34,00 vir die jaar 1980 is ontvang. Gedurende die jaar is R35,59 bestee aan verversings vir byeenkomste, fotokopieë en kennisgewings en posgeld. Die saldo is tans R124,94 waarvan R0,70 in die kleinkas is.

Die volgende instansies en persone word hartlik bedank vir hulp wat in een of ander vorm verleen is om van die jaar se verrigtinge 'n sukses te maak: Die Universiteit van die Oranje-Vrystaat, prof J N Eloff en dr P C Keulder, sprekers wat gedurende die jaar opgetree het en lede van die bestuur.

ANNUAL REPORT (1980) OF NORTHERN TRANSVAAL BRANCH OF S A A B:

Committee:	Chairman	Mr T H Arnold
	Vice-Chairman	Mr R Ellis
	Secretary	Mr S de Meillon
	Treasurer	Mr R Westfall
	Members	Miss L Smook
		Miss W Welman
		Mr F Botha

Membership: Membership increased by 32 from 116 in 1979 to the present 148.

Lectures: The following six lectures were arranged during the year:

6 March	Dr T Soderstrom – Smithsonian Institute, Washington. “Bamboos”
17 April	Mr H A van der Sijde – Department of Forestry. “Boomveredeling”
26 June	Dr B de Winter – Botanical Research Institute. “Grass – The staff of life”
21 August	Dr P J Weisser – Botanical Research Institute. “Mining: A threat to the Zululand dune vegetation”
23 October	Mr B Peckover – Pretoria Photographic Society. “An introduction to plant photography”
27 November	Dr H A van de Venter – Weed Research Section of Plant Protection Research Institute. “Biological control of Weeds in South Africa”

In addition to the abovementioned lectures a special invitation was extended to our members by the Seminar Committee of the Botanical Research Institute, to attend a lecture by Prof J Hanks then from the University of Natal – titled “The Institute for Natural Resources for Natal and KwaZulu”. The lecture took place on 13 March at the Botanical Research Institute.

Attendance at lectures, which was fractionally higher than for 1979, was generally seen to be satisfactory. The figures for the respective meetings were as follows:

Speaker	Members	Visitors	Total
Dr T Soderstrom	30	7	37
Mr van der Sijde*	33	28	61
Dr de Winter	27	13	40
Dr Weisser*	12	9	21
Mr Peckover	32	9	41
Dr van de Venter	20	8	28
Average Attendance	26	12	38

\* Meetings held in conjunction with the Biological Society.

A special attempt was made when organising lectures to see that these included topics of a more general as well as specialised nature. The rationale behind this being not only to try and increase the attendance at lectures but also to try and extend the appeal of some of the lectures to include people whose interest in plants is not necessarily only at the professional level. That this approach was, at least in part, successful is demonstrated by the attendance of visitors being highest at the lecture “Grass – The staff of life” by Dr B de Winter.

Two lectures held during the year were organised in conjunction with the Biological Society, namely those by Mr van der Sijde and Dr Weisser. Co-operation of this type between S A A B and other biological societies, provided it is not given precedence, was strongly supported by this year’s committee. It was felt that combined meetings of this nature provided a necessary forum for scientists with related interests to meet and exchange ideas.

Other activities: A meeting which should be given special mention is that of the “Members slide evening” held in conjunction with Mr Peckover’s lecture – “An introduction to plant photography”. The idea of having such an evening developed as a result of the committee feeling that there was a need to introduce into the year’s programme an additional new activity, other than the customary 4–5 lectures. As most botanists are involved, in one form or another, with the photographing of plants, it was decided that a members’ slide evening would probably be well received by the members.

At the evening a total of 115 slides were entered in the three selected categories, namely:

1. Single flowers, groups of flowers and compound inflorescences.
2. South African veld types.
3. General.

Each slide was judged by two judges on the basis of Scientific and Artistic merit. To make the evening educational as well as entertaining each slide had to be accompanied by a scientific note of approximately 10 words. This also served as a guide-line for the judging of the scientific qualities of the slides. The evening was well supported and received by our members and it is hoped will be repeated again in the future.

**Committee meetings:** The committee met on 8 occasions during the year to discuss and organise the year's activities. The venue for all meetings was the Botany Department, University of Pretoria.

**Acknowledgements:** The assistance and co-operation of the following persons and institutions are gratefully acknowledged:

1. The Botany and Boukunde Departments of the University of Pretoria for crockery and venue respectively.
2. The Botanical Research Institute for photocopying services.
3. Our speakers during the year's programme.
4. The local committee of the Biological Society for their keen co-operation in joint ventures.
5. All members of the Northern Transvaal S A A B Committee for the enthusiastic manner in which they assisted with the year's activities.

**ARTHUR ALLMAN BULLOCK:** Mr Bullock was born in Grimsby, Lincolnshire on 8 February 1906. He was educated at Wintringham Secondary School, Grimsby and University College, Nottingham, and graduated B.Sc. Hons. from London University (External) in June 1928. His botanical career began with his appointment as a Temporary sub-Assistant in the Royal Botanic Gardens Herbarium, Kew, on 5 October 1929. On 30 June 1936 he was established in the post of Assistant Botanist. During the Second World War he served with the R A F from September 1939 to September 1946. He returned to the herbarium on 27 September 1946 as a Senior Scientific Officer. Between September 1949 and September 1951 he visited Tanzania and Zambia (then Tanganyika and Northern Rhodesia, respectively) in connection with anti-locust research. In 1952 he was promoted to the rank of Principal Scientific Officer, and was placed in charge of the then South African section of the herbarium.

His research interests as reflected by his publications were many and various. They included myrmecophily, South African poisonous plants, East African Iridaceae and Rubiaceae, Burseraceae in both Old and New Worlds, Asclepiadaceae and nomenclature. South African botanists present and future will no doubt have much cause to use his last-published major work, the Bibliography of South African Botany published as a supplementary volume of the Flora of Southern Africa. In assessing the likely impact of this work on South African botany, one would be hard-pressed to improve upon the following quote from the foreword:

“Bullock’s bibliography will join the series of standard works on South African botany which have become ‘tools of our trade’. Botanists owe much to the compiler, who invested many years of work in the preparation .....

His interest in nomenclature resulted in the publication of a number of papers about the Code in general, effective and valid publication, and various other difficult or at least emotive problems in this field. A colleague who knew him well recalls that he enjoyed a good argument, particularly if his opponent held firm opinions. Despite this, he is remembered as a very kindly man.

He retired on 1 May 1968, first to Exeter, and later to Credition, Devon. In his retirement he visited the Herbarium occasionally, and the Herbarium and Library News of Kew records a number of visits and goodwill messages, up to his final visit in June 1980. He died on 24 October 1980.

I should like to thank Mr D Meikle of Kew for his assistance in supplying some of the information reported above. (H F Glen)

UNIVERSITEIT VAN PRETORIA: Gedurende Augustus 1980 het die Honneursstudente in Plantkunde en Natuurlewebestuur aan die Universiteit van Pretoria, onder leiding van prof J du P Bothma van die Departement Dierkunde; dr G K Theron en mnr N van Rooyen van die Departement Plantkunde en mnr W van Riet van Argitektuur, ’n besoek gebring aan die Chobe Nasionale Park in Botswana. Die primêre doel van die besoek was om die omvang van die skade wat die groot troppe olifante aan die plantegroei aanrig te evalueer. Tydens die besoek is daar eerstens langs die Savutikanaal gekamp. In die omgewing was dit veral opvallend dat die olifante die plantegroei in die omgewing van water erg verniel, en veral *Colophospermum mopane* en *Lonchocarpus nelsii* word op ’n hoogte van een en ’n half meter afgebreek en ’n oorspronklike boomsavanne in ’n struiksavanne omskep. Die *Acacia tortilis*-gemeenskap is feitlik heeltemal vernietig deurdat al die bome omgestoot is. ’n Mens kry eerder die indruk van ’n ontbossingsproses vir die maak van landerye. Opvallend was dat die olifante nie *Acacia erioloba* omstoot nie. Die enkele bome van *Albizzia* sp wat op die rantjies voorkom toon almal olifantbeskadiging.

Hierdie gebied is ideaal vir ’n studie van die wisselwerking tussen olifante en die habitat. Die gebied van beskadiging van die plantegroei is gekorreleer met beskikbare water en voldoende weiding.

Die tweede deel van die besoek was verder noord langs die Choberivier waar ons by Serandelas gekamp het. In die gebied kom daar groter getalle olifante voor en is die plantegroei langs die rivier verdwerg tot ’n gebroke struiksavanne. Wat veral opvallend was, is die skade aan *Adansonia digitata* waarvan slegs volwasse bome omgestoot is. Feitlik al die individue van *Sterculia africana* is ontbas en kwaai gebreek.

Oor die algemeen kan gesê word dat die gebied intensief bestudeer sal moet word. Daar is reeds onderhandelings deur die Bedreigde Wildlewe Trust met die Regering van Botswana aan die gang vir 'n navorsingprojek(te) in die gebied.

Van die interessantste nuwe plantegroeitipes waarmee ons kennis gemaak het, is die uitgestrekte *Baikiaea plurijuga* boomveld op diep sandgronde.

Die besoek is afgesluit met 'n besoek aan die Victoriawaterval.

Mej Sandy Fourie het die Margaretha G Mes-prys vir Plantkunde van die Pretoria-tak van die Suid-Afrikaanse Universiteitsvrouevereniging ontvang. Hierdie prys word jaarliks toegeken aan die beste derdejaardamestudent in Plantkunde aan die Universiteit van Pretoria.

Prof N Grobbelaar van die Departement Plantkunde, het aan die begin van Desember 1980 die Vierde Internasionale Simposium oor Stikstofbinding bygewoon wat in Canberra, Australië gehou is. Die simposium is deur 350 persone uit baie lande bygewoon en was 'n besonder suksesvolle en stimulerende byeenkoms. Tydens die simposium het prof Grobbelaar oor die werk gerapporteer wat hy en prof J G C Small en 'n nagraadse student, mej L Grobler op die koraalwortels van broodbome doen.

Vir die res van Desember het prof Grobbelaar saam met prof J Pate van die Universiteit van Wes-Australië in Perth navorsing op die koraalwortels van 'n lokale broodboom, *Macrozamia riedlei* gedoen.

Die besoek aan Australië was deur geldelike bystand van die W N N R en die Universiteit van Pretoria moontlik gemaak.

S A A B MEDALS & CERTIFICATE OF MERIT: The Secretary has recently sent out notices requesting nominations for the annual award of the above as follows:

South African Medal for Botany. This gold medal is the premier award for Botany which is made by S A A B as recognition for outstanding merit in research.

S A A B Senior Medal for Botany.

S A A B Certificate of Merit. This is awarded to persons not in possession of a university degree in botany.

Nominations together with curricula vitae should reach the Secretary at Private Bag X101, Pretoria by 10th July.

#### FORTHCOMING MEETINGS IN SOUTH AFRICA:

South African Wildlife Management Association

“Wildlife ecology theory research and practice” – University of Pretoria: 29 June–3 July

Limnological Society of Southern Africa

University of O F S, Bloemfontein: 7–10 July

Zoological Society of Southern Africa

“Environmental physiology, zoogeography and speciation” – University of Durban-Westville:  
7–10 July

Terrestrial Ecosystems section of National Programme for Environmental Sciences

3rd Annual Fynbos Biome Project Research Meeting – University of Cape Town: 29 June –  
1 July

Fynbos Biome Vegetation Mapping and Classification Study Group – University of Stellen-  
bosch: 26 August

Fynbos Biome Nutrient Cycling Study Group – University of Cape Town: 28 November

**PHYTOGEOGRAPHY OF AFRICA:** This publication is a modern analysis of the flora of the African continent by four leading researchers in African botany. For each of four areas, southern Africa, tropical Africa, northern Africa, and Madagascar, the characteristics, origin, and relationships of the flora are examined in detail. This publication will be of great interest to anyone engaged in the study of African phytogeography.

THE FLORA OF SOUTHERN AFRICA, Peter Goldblatt, St. Louis

THE PHYTOGEOGRAPHY OF TROPICAL AFRICA, J. P. M. Brenan, Kew

THE FLORA OF MEDITERRANEAN AND SAHARAN AFRICA, P. Quézel, Marseilles

THE MADAGASCAN VASCULAR FLORA, Jean-F. Leroy, Paris

“Phytogeography of Africa” is the botanical portion of the 24th Annual Systematics Symposium held at the Missouri Botanical Garden in October 1977 under the title “Systematic Studies in Africa”. It is being made available as a reprint from the Annals of the Missouri Botanical Garden, Vol. 65, No. 2, 223 pages, softbound, \$US 6.00.

Send order to:           Garden Gate Shop  
                                  Missouri Botanical Garden  
                                  P O Box 299  
                                  St. Louis, MO 63166  
                                  U S A

**DISTRIBUTION MAP OF SOUTHERN AFRICA, SUITABLE FOR TERRESTRIAL OR AQUATIC ORGANISMS:** The freshwater fish section of the Albany Museum have produced in conjunction with the Cartographic Unit at Rhodes University, a map suitable for plotting animal distributions of southern Africa on a quarter degree basis. Unlike previously available maps of this kind the new map includes the drainage of the sub-continent and is thus more suited for recording the distribution of aquatic organisms or animals closely associated with aquatic systems.

The monochrome maps are printed on A3 size sheets, to a scale of approximately 1:8 000 000. Political boundaries are discreetly included and the maps are label free so that they can be turned to the individual's requirements.



Copies are available at a cost of 5c/sheet (minimum orders, 25 sheets) plus 30c for postage, from Dr P H Skelton, Curator Ichthyology, Albany Museum, Somerset Street, Grahamstown, 6140.

NEW MEMBERS OF S A A B: The following have been admitted as members of S A A B since the membership list was distributed in September 1980:

Ordinary members:

Mr F A Brusse, B R I, Private Bag X101, Pretoria, 0001  
 Mrs G D Court, Department of Plant Sciences, Rhodes University, Grahamstown, 6140  
 Mrs P Craven, P O Box 839, Otjiwarongo, 9000  
 Miss P M Drennan, Department of Biological Sciences, University of Natal, Durban, 4001  
 Mrs V M Engelbrecht, B R I, Private Bag X101, Pretoria, 0001  
 Miss L Henderson, B R I, Private Bag X101, Pretoria, 0001  
 Mej N Louw, Nightingale Close B202, Nightingale Way, Pinelands, 7405  
 Mev J Marshall, Adonisweg 4, Edleen, Kemptonpark, 1620  
 Mnr H J Meyer, Keurboom 404, Schoemanstraat 714, Pretoria, 0002  
 Mr A Nicholas, Botany Department, University of Natal, Pietermaritzburg, 3201  
 Mnr J G J Oosthuizen, Meeustraat 59, East Lynne Uitbr. 1, Pretoria, 0186  
 Mrs A I Peckover, P O Box 29191, Sunnyside, Pretoria, 0132  
 Mr S D Phalatsé, Botany Dept, University of the North, P/Bag X5090, Pietersburg, 0700  
 Mnr C F Reinhardt, Euclea 201, Walkerstraat 315, Pretoria, 0002  
 Mnr J C Roos, Strydomhuis, Posbus 1234, Bloemfontein, 9300  
 Mej A S Rossouw, St. Martini Gardens A537, Koningin Victoriastraat, Tuine, Kaapstad, 8001  
 Mr C J Straker, Botany Department, University of Cape Town, Rondebosch, 7700

Affiliate members:

Lt.-Commander R Geary-Cooke, 6 Murray Rd, Kenilworth, 7700  
 Miss P L Perry, Karoo Botanic Garden, P O Box 152, Worcester, 6850

Student members:

Mej H Bouwer, Bus 134, Hendrina, 1095  
 Miss S C Fourie, 373 Lawley Str., Waterkloof, Pretoria, 0181  
 Mej R Human, Lydia, Stellenbosch, 7600  
 Mnr J F le Roux, Indwe Hotel 616, Rellystraat, Sunnyside, Pretoria, 0002  
 Mej L Loubser, Huis Erika, Prospectstraat 1059, Hatfield, Pretoria, 0083  
 Mej S Ludick, Ontario 404, Adcockstraat 579, Gezina, Pretoria, 0084  
 Mr A Mostert, P O Box 15, Strand, Cape Province, 7140  
 Miss H J Phelines, Botany Department, University of Stellenbosch, Stellenbosch, 7600  
 Mej M Smit, Huis Erika - Op't Hoek, Prospectstraat 1059, Hatfield, Pretoria, 0083  
 Mr R H Stadler, 24 Gerard Street, Observatory, Johannesburg, 2198  
 Mej A van den Heever, Liberator 202, Webbstraat, Queenswood, Pretoria, 0186  
 Mnr P A van Eeden, N I P, Privaatsak X101, Pretoria, 0001

Institutional member: Dept of Biological Sciences, University of Natal, Durban, 4001

FAUNA AND FLORA PRESERVATION SOCIETY: This society was founded in Britain in 1903 as the Society for the Preservation of the Wild Fauna of the Empire and as such is the oldest international wildlife conservation body in the world. It had considerable influence in the establishment of the first game reserves in Africa.

After the Second World War the Society played a leading role in the Foundation of the International Union for Conservation of Nature and Natural Resources (I U C N). In 1950 it changed its name to the Fauna Preservation Society. In 1961 the F P S was involved in setting up the World Wildlife Fund. In 1980 it took on wild plants also and changed its name to the heading above.

The Society's constant task is to act as a watchdog for all endangered wildlife, both fauna and flora. It also aids wildlife projects through its Oryx 100% Fund – so called because 100% of all money accrued goes to projects anywhere in the world. It makes grants of up to R1000 to help urgent projects quickly.

The Society publishes an international wildlife conservation journal, O R Y X, three times a year. The Society's headquarters are at the London Zoo in Regent's Park, London NW1 4RY.

CAPE DEPARTMENT OF NATURE AND ENVIRONMENTAL CONSERVATION: The Department is considering a new approach to private nature reserves. One of the conservation ideals of this department is to have a chain of viable reserves representative of all veld types and ecosystems indigenous to the Cape. With its present small budget (0,45% of the provincial budget) it would be impossible to buy enough land to fulfill this ideal, nor is it essential that all reserves should be state-owned.

According to the Director, Mr W O Morsbach, the department is looking at a system currently in operation in the United Kingdom and Europe, with a view to implementing it here. For some time now local authority nature reserves have been subsidised and there is a need today for the private landowner to be encouraged to set aside land for conservation – especially in the sensitive fynbos areas.

At present, the owner of a private nature reserve derives little benefit from his reserve. He has to bear the total cost of establishing and maintaining it. Should the new system be applied, the department would assist with the management and maintenance of a reserve where, for example, an endangered species occurs and thereby help to ensure its survival in its natural habitat. Departmental assistance might then also be given where alien vegetation has to be cleared – a very costly aspect of reserve management.

The department's recent activities are summarized in the latest Annual Report (No 36) which has just been released. FREE copies are available on request from the Cape Department of Nature and Environmental Conservation, P/Bag 9086, Cape Town, 8000, or phone number 45-0227.

**S A A B ANNUAL CONGRESS, JANUARY 1981:** The following are the abstracts of the papers, including poster papers, delivered at the above congress:

AKEN, M. E. & PIENAAR R. N.

**Observations on the reproduction of *Pyramimonas parkeae* Norris & Pearson (Prasinophyceae)**

*Pyramimonas parkeae* is a unicellular quadriflagellate green alga belonging to the Prasinophyceae. This organism has been isolated from tidal pools occurring along the Natal and Cape coasts.

Under optimal conditions *P. parkeae* reproduces asexually by repeated bipartition (binary fission) approximately once every 24 hours. The cells are unusual in that they remain motile throughout the cell division cycle. It has been established that the cells commence division during the dark phase of a 16L:8D cycle. The early stage of cell division is characterized by the division of the chloroplast and associated pyrenoid; this is followed by replication of the flagellar bases, the division of the other cell organelles, e.g. dictyosomes, and lastly the division of the nucleus. Mitotic stages were only observed once the two daughter cells had commenced what one would normally refer to as cytokinesis. Cell division was completed within 90 minutes (corresponding to halfway through the dark phase).

In exponentially growing cultures two types of cells were observed. These could be separated according to their size and storage material. Towards the end of the exponential stage large circular cysts were observed. These were characterized by the possession of a well defined wall occurring external to the plasma membrane. When cysts were placed into fresh medium excystment stages were observed within two weeks. The contents of the cyst were found to divide and produce four motile cells which were identical to the small motile cells. At the present time it is not yet clear whether these stages are part of a sexual or an asexual stage.

The results of this investigation are discussed and compared with information that has been reported for other prasinophycean organisms.

AMORY A. M. & CRESWELL C. F.

**Metabolism of (1-<sup>14</sup>C) Glycolic Acid, (1-<sup>14</sup>C) Glyoxylic Acid and (1-<sup>14</sup>C) Formic Acid by *Themeda triandra* under different inorganic nitrogen treatments in the light and dark**

An attempt was made to determine the effect of inorganic nitrogen ions on the utilization of photorespiratory pathway intermediates. (1-<sup>14</sup>C) glycolic -, (1-<sup>14</sup>C) glyoxylic -, and (1-<sup>14</sup>C) formic acid, with and without inorganic nitrogen, were vacuum infiltrated into nitrogen starved *Themeda triandra* leaf tissue. The tissue, after receiving both light and dark treatments, was analysed for the amount of <sup>14</sup>C label in the sugars, sugar phosphates, amino acids, and organic acids fractions, which were separated by ion exchange chromatography. The results obtained suggest that inorganic nitrogen ions affect the utilization of the photorespiratory intermediates. The results are discussed in relation to the role of inorganic nitrogen ions (NO<sub>3</sub><sup>-</sup> and NH<sub>4</sub><sup>+</sup>) in regulating the photorespiratory pathway in *Themeda triandra*.

ANDERSON R. J.

***Desmarestia firma* (C. Ag.) Skottsb. (Phaeophyceae, Desmarestiales) — an understory alga in western Cape kelp beds**

Results of a biological study of *D. firma*, an understory alga common in the lower subtidal, are presented. Taxonomic and nomenclatural problems pertaining to this species are described in some detail. The natural history of this annual seaweed is briefly described and its relative importance in the kelp beds is discussed.

ARIOVICH D. & CRESWELL C. F.

**An investigation into the C<sub>3</sub> photosynthetic pathway of the dominant grasses of the Nylsvley study site**

The photosynthetic enzyme activities and fine structural characteristics of *Panicum maximum*, *Digitaria eriantha* and *Eragrostis pallens* were determined in an attempt to classify these species into the C<sub>3</sub> photosynthetic subgroups. *P. maximum* had high aspartate amino transferase activity having typical Pck-type fine structure. *D. eriantha* exhibited high activities of both Aspartate amino transferase and NADP-malic enzyme, and ultra-structurally appeared to be a NADP- E type. *E. pallens* was found to have high Pck activities although its ultrastructure suggest a NAD- E type. These results are discussed in relation to the savanna ecosystem habitats. These results suggest that plants do not necessarily fit the rigid division of C<sub>3</sub> subgroups commonly accepted in the literature.

BATE G. C. & WALKER B. H.

**An estimate of the evaporative and transpirational water loss from the Kuseb River Aquifer, SWA.**

Transpiration rates for four species growing in the Kuseb River aquifer were measured using the cut-off mass loss method. *Acacia albida* had a mean maximum rate of 1,50 g H<sub>2</sub>O.gdmass<sup>-1</sup>.h<sup>-1</sup>; *A. erioloba* 1,03 g H<sub>2</sub>O. gdmass<sup>-1</sup>.h<sup>-1</sup>; *Euclea pseudebenus* 0,54 g H<sub>2</sub>O.gdmass<sup>-1</sup>.h<sup>-1</sup> and *Tamarix usneoides* 1,07gH<sub>2</sub>O.gdmass<sup>-1</sup>.h<sup>-1</sup>. These species were estimated to account for 80 % of the leaf biomass and the remaining 20 % was arbitrarily given a rate of transpiration of 1g H<sub>2</sub>O.gdmass<sup>-1</sup>.h<sup>-1</sup>.

Evaporative water loss from the sand was maximal immediately after the annual flood and decreased as the water level receded deeper into the sand.

Assuming that the aquifer is approximately 300 m in width with a depth of 10 m, we calculate using a simulation model that the total water loss by both vegetation and evaporation is a maximum of 2,6 x 10<sup>6</sup>m<sup>3</sup> of water per km of river per annum. This usage constitutes some 24 % of the total water which can be held in the aquifer.

BERJAK P. & DRENNAN P.

**Some effects of salinity on post-abscission propagule development in *Bruguiera gymnorrhiza* (L) Lam.**

It appears for *Bruguiera gymnorrhiza* that increased succulence does not accompany increased substrate salinity over the range 50% — 100% sea water. Development of this particular mangrove species is, in fact, retarded by a substrate salt concentration of 34‰ (as compared with 17‰). The evidence suggests that not only excess salt, but the essential elements too, are being blocked from reaching the leaves. Furthermore, the relatively small degree of intercellular space formation (at the higher salinity) implies an increased mesophyll resistance and a lowered transpiration rate, which might, in turn, further account for the relatively low foliar levels of essential elements.

BOSMAN A. & JOOSTE J. H.

**Kalium opname en die invloed van kalium op pirodruivesuursintese by die tamatie mutant, *Lycopersicon esculentum*, met 'n hoë kalium vereiste**

Epstein het 'n mutante tamatie (*Lycopersicon esculentum*) verkry met 'n besonder hoë kaliumbehoefte — minstens tien keer hoër as die van die normale tamatie.

Hierdie mutant groei heeltemal normaal by 'n hoë kaliumkonsentrasie, maar wanneer oorgeplaas in 'n oplossing bevattende die kaliuminhoud van 'n volledige voedingsoplossing ontwikkel dit besonder vinnig — binne twee dae — ernstige gebreksimptome wat heeltemal ooreenstem met dié van 'n kaliumtekort.

'n Logiese verwagting was dat hierdie mutant moontlik nie in staat is om kalium doeltreffend op te neem en te versprei nie. Dit is egter bevind dat hierdie mutant kalium tot dieselfde mate opneem en versprei as die normale tamatie waaruit dit afkomstig is.

Kalium is feitlik in al die ensiemsteme van glikoliese betrokke. Daar is gevolglik besluit om te probeer vasstel of hierdie mutant nie dalk 'n besonder hoë kaliuminhoud vereis ten einde hierdie reaksie-wee, wat tot die vorming van pirodruivesuur lei, doeltreffend te laat verloop nie.

'n Proef is uitgevoer waarin die plante by drie kaliumgehaltes gekweek is, naamlik sogenaamde hoë kalium (20 mM), lae kalium (2mM) en geen kalium. By al drie kaliumgehaltes het die helfte van die plante pirodruivesuur in die groeimedium ontvang (10 mM).

Daar is gevind dat kalium wel pirodruivesuursintese gestimuleer het. Toegeediende pirodruivesuur kon deurgaans in die materiaal aangetoon word. Nekrose het stadiger en tot 'n geringer mate voorgekom waar die hoogste waardes vir pirodruivesuurinhoud in die bodele verkry is. Die resultate dui dus daarop dat die ontwikkeling van gebreksimptome deur pirodruivesuurtoediening vertraag en verminder word.

BOTHA A. T.

**Die invloed van verskillende grondvogregimes op die groei, waterverhoudings en chemiese samestelling van 'n *Leucospermum*-hibried.**

Die daaglikse patroon van wisseling in blaarwaterpotensiaal toon 'n ooreenstemming met die wisselings in atmosferiese toestande — veral in die nag, wat daarop dui dat die huidmondjies waarskynlik gedurende die nag oop was. Die vroeë-oggend blaarwaterpotensiaal van plante wat elke tweede, vierde en agtste dag besproei is, het saam met die atmosferiese toestande gewissel, terwyl die blaarwaterpotensiaal van dié wat elke sestiende dag besproei is, 'n aanduiding van hul lae grondvoginhoud was. Alhoewel die plante wat elke agtste dag besproei is die maksimum hoeveelheid beskikbare water verbruik het, was daar blykbaar voldoende water in hul weefsels sodat hul huidmondjies direk op veranderinge in die relatiewe humiditeit kon reageer.

Die diffusieweerstand van die blare is bepaal en dit is gevind dat die weerstand van die abaksiale epidermis heelwat hoër as dié van die adaksiale epidermis was. Plante wat vooraf aan 'n aantal dragingsiklusse blootgestel was, het na besproeiing meer sensitief op lae relatiewe humiditeite gereageer.

Plante wat elke tweede en vierde dag besproei is, het ongeveer dieselfde reaksie getoon wat hul blaarwaterpotensiaal en lootlengtes betref, maar ten opsigte van blaarweerstand en totale blaaroppervlakte verskil. Laasgenoemde twee parameters mag meer sensitiewe indikatoren van vogspanning as die eersgenoemdes wees.

Chlorofil, glukose en sukrose het by die droë behandelings opgehoop, terwyl pralies, wat dikwels onder droë toestande in plante ophoop, nie in die huidige studieplant aangetref is nie.

BOTHA C. E. J., EVERT R. F. & CROSS R. H. M.

**Distribution, Structure and Regulation of Transport by Plasmodesmata in Kranz tissue of *Themeda triandra* Forsk.**

The structure-function relationship of plasmodesmata in between bundle sheath and mesophyll, bundle sheath and vascular parenchyma and vascular parenchyma and the living components of xylem and phloem is discussed. Histochemical evidence of the control of solute flux between mesophyll and vascular tissue by the plasmodesmatal pit fields of the suberised bundle sheath is presented and discussed in relation to current ideas on the symplast/apoplast continuum.

BOTHA, F. C., GROBBELAAR N., & SMALL J. G. C.

**Saadkieming van *Citrullus Lanatus* (Thunb.) Matsumura & Nakai**

Wanneer sade aan die einde van die groeiseisoen uit *Citrullus lanatus* vrugte geïsoleer word is die sade bykans 100% kiemkragtig, maar verkeer die sade in 'n aanvanklike rustoestand. Geïsoleerde sade wat in die luggedroogte toestand by kamertemperatuur geberg word kom binne 10 weke heeltemal uit hierdie aanvanklike rustoestand. In die natuur word hierdie rustoestand na 'n winterperiode verbreek. Nadat die sade uit die aanvanklike rustoestand gekom het, is hulle liggevoelig deurdat wittig kieming heeltemal onderdruk. Die sade is ook besonder sensitief vir waterspanning en kieming word deur 'n waterpotensiaal van -500 kPa heeltemal onderdruk.

Verwydering of beskadiging van die nusselêre vlies verbreek die aanvanklike rustoestand en hef die liggevoeligheid en gevoeligheid vir waterspanning op.

BOUCHER C. & LE ROUX A.

**Strand plant communities of the Western Cape Province**

The Strand vegetation between the Orange River and Table Bay was sampled during late spring in 1978.

Four main vegetation zones, which correspond with the increase in rainfall from north to south, are recognized. Further distinctions are made within these zones based on the stability of the substrates.

Some concluding thoughts about conservation will be presented.

BRIX, K. M. F. B.

**The isolation of sexual reproducing plants from the offspring of facultative diplosporic apomicts by selecting morphologically deviating plants- a hypothesis**

The difference between sexual reproduction and diplosporic apomixis is caused by genes which are responsible for the synthesis of the necessary proteins to induce meiosis in the megaspore mother cells. Mutations of such genes inactivate their respective proteins and meiosis cannot begin. The megaspore mother cells can however be induced mitotically and diplosporic embryosacs are formed.

If two genes A and B responsible for the beginning of meiosis, undergo mutations, different combinations of dominant and recessive alleles are possible and therefore different percentages of sexual and diplosporic embryosacs will be formed in tetraploid facultative apomicts.

Whilst a genotype AAAA BBBB reproduces sexually and aaaa bbbb is an obligate apomict, a genotype AAaa BBbb can form about 50% sexual embryosacs. During meiosis AABB gametes can be formed amongst others. If two such gametes fuse a sexual reproducing plant is formed which will differ morphologically from the apomictic offspring and can be recognised and selected.

BUZER J.

**Variations in soil diatoms from the margins of a Highveld Pan**

The distribution of diatoms in soils from the margins of a highveld pan has been monitored over the period of one year 1979 — 1980. Soil diatoms appear to migrate towards the pan margin as the water level drops. There is a distinct flora at the waters edge. Variations also occur in the distribution of diatoms down the soil profile and size of the diatom frustules. All variations seem to correlate with changing water levels in the pan and surrounding soils.

CANOTILHO P. & BATE G. C.

**The movement of carbohydrates and nitrogenous substances out of pre-abscising cotton bolls**

Cotton bolls appear to draw a high proportion of their nitrogen and carbon substrates from only a few leaves of the whole plant. When plants were water stressed sufficiently to cause young developing bolls to abscise, these leaves were shown to decrease their nitrate reductase activity from about 6 nMoles nitrite g<sup>-1</sup>mass<sup>-1</sup>h<sup>-1</sup> to zero in three days. After the water stress was applied, total nitrogen in the bolls fell to 30 % of what was there in only one day. Hence, nitrogen was rapidly mobilised out of the boll. <sup>14</sup>C, however, rose from 1,3 % of total DPM in the plant to 3,6 % at the same time. Hence, while carbon was still being imported following a stress sufficient to initiate abscission, nitrogen was already being exported.

From these data it is deduced that when cotton bolls are triggered to abscise following a period of water stress, nitrogen is mobilised before carbohydrates and may therefore be a causal mechanism in the changes which ultimately result in the fruit falling from the plant. The possible importance of these data in the prevention of yield loss in the field is discussed.

CHOVEAUX N. A. & VAN STADEN J.

**The effect of auxin of cytokinin levels on *Salix Babylonica* L.**

The cytokinin content of internodal bark segments rapidly increased during six days of aseptic culture. This increase was accompanied by the proliferation of a callus from the exposed cambial region. The addition of naphthylacetic acid to the culture medium decreased the production of cytokinins during six days of culture without affecting the proliferation of the callus. When the effect of a graded serial dilution of naphthylacetic acid on cytokinin levels was examined, the decrease in cytokinin levels was proportional to the increase in naphthylacetic acid concentration. The possible effect of auxin on cytokinin synthesis and its implications in apical dominance will be discussed.

COLLINS M. & CRESWELL C. F.

**The uptake of nitrate and ammonium nitrogen by the roots of young maize plants.**

The effect of the concentration of nitrogen supplied as either nitrate or ammonia on the rate of uptake of these ions was investigated using two weeks old seedlings of *Zea mays* var. Kahalari Early Pearl. The plants were grown in a controlled environment in liquid culture supplied with 50 ppm N; after a two week period they were transferred to 50, 100, 150, 200 ppm N and the rate of uptake monitored at 2 hourly intervals over a ten hour period. Total nitrogen of the nutrient medium, roots and leaves was estimated using the Kjeldahl technique. Results will be discussed.

COWLING R. M. & CAMPBELL B. M.

**Structure, diversity and phytogeographical affinities of fynbos and non-fynbos communities along parallel gradients.**

Fynbos and non-fynbos communities were sampled along parallel altitudinal gradients in the S. E. Cape. The study site comprises a point of contact between Cape fynbos (temperate heath) and the westwards extension of the subtropical Indian Ocean vegetation. Rainfall increased from 400 mm per annum at the lower end of the gradient, to over 900 mm at the upper end (500 m). Five matching sites were located in fynbos and non-fynbos communities at approximately 100 m altitudinal intervals along the gradient. Vegetation was sampled (four 10 x 10 m plots at each site) in order to test hypotheses concerning the delimitations of fynbos and tropical derived communities, the manner in which these communities respond to identical climatic gradients, and the respective histories of their floras in the region. In addition to full floristics, data were collected on structural-functional attributes of each species. Diversity statistics were computed and the geographical distribution and phytogeographical affinities of the samples species were determined. Soil samples from each site were analysed for texture, selected nutrients and organic matter.

COWPER B. & GARNETT H. M.

**Title: The Isolation and Serological Characterization of viruses associated with *Phaseolus* spp. In South Africa.**

Viral diseases cause loss of productivity among susceptible varieties of beans grown in South Africa. A study is presently being conducted to characterize these suspected viral etiological agents with regard to morphology, serological relatedness, protein and nucleic acid composition.

Infected material was obtained from major bean producing regions in South Africa, and was subjected to a variety of purification procedures for the isolation of possible virus. The identity and characteristics of each isolated virus was determined using transmission electron microscopy, polyacrylamide gel electrophoresis, and serological techniques, including the enzyme linked immunosorbent assay (ELISA). The ELISA technique is widely used in plant virology because of its high degree of sensitivity and relative ease of operation, and in the present study, low concentrations of virus have been detected in infected bean leaf sap using the ELISA.

Owing to the high incidence of infection from seed — borne virus in bean plants, it is hoped that the ELISA technique may also be used for the detection of virus in bean seed prior to planting.

DODD M. C. & VAN STADEN J.

**Cytokinins in the Germinating seeds of *Podocarpus henkelii* stapf.**

Plant hormones in general have long been considered important in the regulation of the metabolic events resulting in the germination of seeds. There is however, little understanding of this control. A study was made of the cytokinins in the germinating seeds of *Podocarpus henkelii* in order to establish their presence and function in these gymnospermous seeds.

The epimatium was the first tissue to show a peak of cytokinin activity three days after scarification. By six days 10 % of the seed had germinated and the cytokinins dropped back to their original levels; whereas in both the female gametophyte and the embryo sporophyte the cytokinin levels had increased to a maximum, with the level in the sporophyte being particularly high. These peaks of activity fell back to their original levels at day nine by which time 45 % of the seed had germinated.

DRENNAN P. & BERJAK P.

**Comparison of glandular status and function in three species of *Avicennia***

Ultrastructural similarity is found between the gland cells on the young leaves of *Avicennia marina*, a pioneer species in the Old World swamps, and *Avicennia germinans* and *Avicennia schaueriana*, secondary colonizers in New World swamps. It is suggested that in all three species, salt export is in accordance with the endomembrane concept. Typical excretory glandular ultrastructure is lost in *A. marina* and *A. germinans* as the leaf matures. This glandular loss correlates with a shift to a stomatal pathway of excretion. In *A. schaueriana* glandular structures persist in the mature leaf. Such interspecific variations in glandular status, and hence physiology of salt tolerance, may reflect the difference in distribution of these species within the mangrove communities.

DU PREEZ D. & BATE G. C.

**Mineral cycling in the *Burkea* savanna**

The contents of calcium, magnesium, potassium, phosphorus and sulphur were analysed in the soils, vegetation and rainwater of the *Burkea* savanna.

The exchangeable contents of Ca, Mg and K in the surface layers of the soil were between three and four times the content lower down in the profile. However, at bedrock (113cm) the contents of all these minerals was almost as high and sometimes higher than the surface soils.

The mineral contents of the various plant parts appear to be quite different hence the biomass of the components and the spatial distribution of nutrients within the plant parts is necessary in order to assess the standing mineral biomass.

The mineral content of rainwater collected in open sites and from undercanopy sites showed that the Ca content of 2.03 ppm in rainwater from open sites rose to 5.87 ppm under the edge of a *Burkea* canopy.

These data are interpreted with respect to nutrient cycling dynamics.

DRY P. & BOTHA C. E. J.

**Vascularization in *Lycopersicon esculentum* seedlings**

Use was made of longitudinal and transverse sections to study the ontogeny of the vascular tissue, with emphasis on the internal phloem. The phloem in the hypocotyl consists of an anastomosing network of strands, culminating finally in external phloem only in the apical regions of young seedlings.

UYER C. & WALKER B. H.

**Bush encroachment in semi-arid and grazing systems**

This is a preliminary account of a project aimed at understanding the mechanisms of bush encroachment in the semi-arid ranching areas of South Africa. The approach is to examine a large number of sites, covering the range of soil type and rainfall, in which encroachment has and has not occurred. On each site the vegetation composition and a set of site characteristics are measured, including such factors as

soil depth, soil nutrient distribution, and water infiltration rate. Particular attention will be paid to fence-line contrasts where management differences have induced bush on one side but not on the other. The eventual aim is to determine the conditions under which bush encroachment occurs, and to produce a sensitivity map of the country with respect to potential encroachment. Some initial results are presented.

EDGCUMBE, D. J.

**The morphology and ultrastructure of hydrophilous pollen and pollen tubes of the submerged macrophyte *Zostera capensis* Setchell.**

The hydrophilous pollen of *Zostera capensis* is remarkably adapted to fulfil its submarine role. Its unusual filiform morphology is in contrast to the dry, somewhat granular pollen of terrestrial angiosperms. Ultrastructural studies have shown that apart from an adaptive reduction of exine in the pollen wall, there is a marked difference in the cytoplasmic organisation of young and mature microspores. This difference contributed to the identification of pollen tube initiation, penetration and growth down the stigma after artificial pollination.

FORSYTH C. & BROWN N. A. C.

**Germination of dimorphic fruits of *Bidens pilosa* L.**

Dimorphic fruits of *Bidens pilosa* were tested separately for differences in germinability, coat structure and seedling development. The large achenes were found to germinate readily under almost any conditions while the small achenes showed fairly exacting germination requirements. Germination of the small achenes was found to be enhanced by red light treatment, scarification, applied hormones, leaching and increased oxygen tensions. Conversely, their germination was strongly inhibited by far-red irradiation, nitrogen treatment and ethylene. An examination of coat structures revealed the thinner, barbed coats of the large achenes and the thicker and relatively smooth coats of the small achenes. Seedlings originating from small achenes showed lower survival rates and initially slower development than those originating from the large achenes. The implications of the morphological differences and differences in germination and development of the two achenes are discussed.

FREAN M. L. & CRESWELL C. F.

**Starch grain breakdown in leaf sheaths of *Alloteropsis semialata* (R.Br.) Hitchc. ( $C_4$  form).**

This paper describes the sequence of *in vivo* starch grain hydrolysis during growth of the leaf sheath in the  $C_4$  photosynthetic form of the grass *Alloteropsis semialata* (R. Br.) Hitchc. This grass is unusual in that both  $C_3$  and  $C_4$  photosynthetic and anatomical forms occur in what is regarded as one species, and within the same environment. The  $C_3$  form does not store starch in its leaf bases. The transformation of the mesophyll from storage tissue containing amyloplasts to photosynthetic tissue with functional chloroplasts is traced in the  $C_4$  form. Development of bundle sheath chloroplasts is described and comparison is made with the ontogeny of analogous tissues in the  $C_3$  form.

FURNESS H.

**Growth and nutrient content of seasonally inundated *Cynodon dactylon* (L) Pers. meadows under conditions of decreasing soil moisture.**

Studies on *Cynodon dactylon* were carried out on the seasonally inundated area of the Pongolo river floodplain. Immediately after exposure, when soil moisture content was high, growth of *Cynodon dactylon* was rapid and there were marked changes in nutrient concentrations. As exposure period increased, soil moisture content decreased while vapour pressure deficit increased. This had the effect of subjecting *C. dactylon* to increasing moisture stress as evident by changes in xylem pressure potential. This increase in moisture stress adversely affected growth and resulted in changes in nutrient concentration. The effects of these changes on the functioning of the Pongolo floodplain system are discussed.

GIBBS RUSSELL, G. E.

**An annotated list of Southern African grasses**

There are about 1 000 species and subspecific taxa of grasses in Southern Africa. As a preliminary to work on the volume for Poaceae in the *Flora of Southern Africa*, an annotated list of grass taxa is in preparation. Each species is listed with its recent synonyms, most important common names, distribution in the Flora area by countries and provinces, an abbreviated description conveyed by symbols, and a quoted specimen. In order to assist identification keys are given to tribes, genera and species. So far the panicoid subfamily, containing the tribes Paniceae and Andropogoneae, has been completed. This covers about 40% of our species. The entire list will be completed by the end of 1981.

GRAY V. M. & CRESWELL C. F.

**Interrelationships between nitrate assimilation and respiratory metabolism in maize roots.**

The possible electron donor sources for the reductive assimilation of nitrate and the role respiratory metabolism plays in this process has been investigated under both *in vivo* and *in vitro* conditions in maize roots. The accumulation of nitrite in the presence of respiratory inhibitors or under anaerobic conditions suggests that a relationship between respiratory electron transport and nitrite reduction may exist.

GROBBELAAR N. & ELLER B. M.

**Ekofisiologiese aspekte van *Ledebouria ovatifolia*.**

Aangesien *Ledebouria ovatifolia* in die Pretoria-omgewing dwarsdeur die somer blare dra wat styf teen die grondoppervlak druk, skep hierdie geofilliese groeiwyse potensieel 'n groot hitteprobleem vir die plant.

Stralingsmetings sowel as temperatuurbepalings en gaswisselingsbepalings is vir die blare en onderliggende grond gedoen. Die resultate wat verkry is sal bespreek word en die skynbare voor- en nadele van die geofilliese groeiwyse sal kortliks uitgewys word.

GUNTON C. & BATE G. C.

**Sampling techniques for nitrate, ammonium and total nitrogen in *Burkea* savanna**

Previous reports on the content of nitrogen in the soils of *Burkea* savanna have distinguished between "open" and "under" sites, where "open" referred to sites with a grass cover and "under" referred to sites under a *Burkea africana* canopy. Analyses for nitrogen in the soil showed large variations over short time intervals, eg over a period of one month; total-N 325—1025 ppm, nitrate-N 3—11 ppm and ammonium-N 5—40 ppm.

The magnitude of the overall variance suggested that spatial and temporal variances were confounded in both soil and vegetation samples.

Part of the variance in *Burkea* stems could be removed by analysing heartwood (0,5 % N) separately from bark where the content of N can be as high as 2 %.

The variance in soil nitrogen is discussed relative to different forms of disturbances observed in the field. Ants caused a significant increase in soil ammonium levels and both ants and the burrows of various animals could be associated significantly with soil nitrate.

HARDCASTLE J. & SCHÜTTE K. H.

**Factors influencing root aerenchyma development**

The formation of root aerenchyma is classically associated with low oxygen tension and related to anaerobic root environments. Recent research has indicated that this is an oversimplification of the phenomenon and that several factors appear to influence aerenchyma development. These include, amongst others, nitrate availability, ethylene production and microbial activity. Some of these have already been experimentally investigated under controlled conditions in this study using mesophytic plants.

Aerenchyma formation is well documented in taxonomic studies of the Restio component of the Fynbos. Research is being conducted in order to determine the factors that regulate the formation of aerenchyma in these plants.

HARTE, M. J. & PAMMENTER N. W.

**Senescence and mineral nutrient and soluble protein content of the leaves of the dune pioneer *Scaevola thunbergii***

The dune pioneer *Scaevola thunbergii* shows sequential leaf senescence. Na was accumulated throughout the life of the leaf and both Ca and Mg were accumulated up to the stage of full expansion, with no marked import or export thereafter. K, N and, to a lesser extent, P were accumulated up to full leaf expansion and thereafter the leaf contents of these nutrients declined, indicating export and internal recycling. Leaf soluble protein, on the other hand, exhibited a maximum at a later stage of leaf development.

HEMM G.

**Root growth stimulation of wrenched *Pinus radiata* D. Den. seedlings.**

Commercially, the possible stimulation of root growth of transplanted, open-rooted pine seedlings used for afforestation has great potential to increase establishment rates, reduce weed control costs and boosts productivity. A sweeping, preliminary experiment was designed to see the effects of various applied plant growth regulators and nutrients on root growth of wrenched (i.e. stress conditioned) *Pinus radiata* seedlings. It has provisionally been found that foliar applications of indolebutyric acid and kinetin are promotive to root growth. Likewise, stimulation of new root production is achieved by direct root applications of ethrel, and a combination of sucrose, KNO<sub>3</sub>, and a cocktail of vitamin Bs. The hormonal role of the mycorrhizal fungi present was also superficially investigated.

HENDRY N. S. & VAN STADEN J. — Poster session

**Cytokinin fluctuations in Valencia orange during the growth of a shoot flush**

In order to test for their possible involvement in the difference of vigour between adult and juvenile citrus plants, cytokinin fluctuations were monitored in nursery trees having scions of different physiological age. Comparisons were made during the emergence of a growth flush after a cold-induced dormant period.

The fibrous roots, upper mature leaves, the buds and developing new shoots were extracted for cytokinins. The former two organs yielded lower detectable non-polar cytokinin activity in juvenile plants during new shoot growth, than adult plants. Polar cytokinins were only detected in mature leaves after bud burst was completed and shoot extension growth had commenced.

Polar cytokinins predominated in both adult and juvenile buds at removal from the cold treatment. Total cytokinin activity was higher in buds of juvenile plants at this stage. There was some indication that upper leaves and buds competed for root synthesized cytokinins. The data support the hypothesis that low cytokinin levels in actively growing tissue may reflect dynamic utilization or metabolism of the compounds. Total cytokinin activity was lower in juvenile tissues during the time of most active bud swelling and during the period of most active leaf expansion.

HERMAN P., ROBBERTSE P. J. & GROBBELAAR N.

**Die anatomie van *Pavetta* L.**

Die genus *Pavetta* behoort aan die familie Rubiaceae, een van die grootste families in die klas Dicotyledoneae. Hoewel heelwat fisiologiese werk reeds op die bakterieë en bakterieknoppies wat in die blare en groeipunte van *Pavetta*-soorte voorkom aan die Universiteit van Pretoria gedoen is, is die presiese aard van hierdie "symbiose" nog baie onduidelik. Baie min is bekend in verband met die morfologie en anatomie terwyl die taksonomie van die genus *Pavetta* ook veel te wense oorlaat. Die anatomie van die blaar, stingel en vegetatiewe groeipunt van enkele *Pavetta*-spesies word tans op die ligmiroskoopvlak ondersoek om 'n bydrae te lewer tot die taksonomiese hersiening van die genus. Standaard metodes is vir die inbed en sny van die materiaal asook vir die bestudering van blaarepidermisse en blaaroppervlakte gebruik. Die resultate word bespreek.



HODGKISS D. H. & SEAGRIEF S. C.

**Algal Epiphytes on certain seaweeds from the Eastern Cape Coast**

Some seaweeds seem more susceptible to colonisation by epiphytes than others. Seaweeds with epiphytes were deliberately collected and an analysis was made of the "host" and epiphyte distribution. One species *Halimeda cuneata*, had as many as 25 different species of epiphytes attached to it, but not all of them on the same plant. The red algae were by far the most common epiphytes. Some epiphytes appear to disrupt the tissues of the host and one wonders if they are not acting as partial parasites.

HUTTON M. J. & VAN STADEN J. — Poster session

**Endogenous Cytokinins in Germinating seeds of *Phaseolus vulgaris* L.**

Ethanol extracts from the cotyledons of mature dry *Phaseolus vulgaris* L. seed yielded cytokinin-like activity which co-chromatographed with zeatin and ribosylzeatin. Under conditions which stimulated germination and cotyledon expansion, the level of these cytokinins decreased rapidly in both intact embryos and excised cotyledons. In the excised cotyledons the decrease was continuous resulting in very low levels of cytokinin being detected after four days of incubation. With the embryonic axis present the initial decrease was, however, arrested and reversed after three days. This suggests that the cotyledons do not synthesize cytokinins but that these hormones are imported from the embryonic axis, particularly once radicle growth is well underway.

JARMAN M. L. & BOSSI L.

**The feasibility of mapping large scale landuse categories throughout the whole Fynbos Biome using satellite data.**

Vegetation mapping and classification is a basic requirement for the early stages of any environmental programme. The Fynbos Biome Project has as a stated Phase I base-line study objective, "the definition of the geographical distribution and extent of the major vegetation types of the biome". The remote sensing project within the Fynbos Biome Project aimed to achieve this objective. Successful experimentation with the application of computer classification techniques to Landsat I imagery and vegetation mapping was carried out at 1:20 000 scale in three test areas within the Fynbos Biome. In order to meet the objective of mapping at 1:250 000 scale, a feasibility study was embarked on using the UCT Image Processing Unit system. This study was designed to answer the following questions:

- (a) is it possible to recognize and map vegetation types with consistency at different scales of operation;
- (b) in this process, how critical is the choice of test area; size of test area and degree of topographic variation present;
- (c) what is the effect of alteration of various programme parameters in this operation?

A procedure was developed which was basically the same at each scale of operation. Methods used were consistent with those used in standard air photo interpretation, that is: choice of representative areas and subsequent extrapolation of the knowledge and experience gained by working in those areas, throughout a particular study area. Landsat I Computer comparable tape (CCT) 1055-08064 of 16 September 1972 was used to illustrate the 1:250 000 scale mapping. Classification maps were generated and successive carried out until a classification map was achieved which was acceptable. The results of this investigation are presented.

JOHNSON C. T., CYSTER L., SPANGENBERG J. A.

**Taxonomic characteristics of *Muraltia* (Neck) Juss. and *Nylandtia* Dum. (Family: Polygalaceae)**

Levyns 1949 stated that the floral morphology of *Muraltia* and *Nylandtia* are essentially the same. In order to get a more complete picture of the morphology of these genera it is necessary to include a study of the leaves and wood. The preliminary data shows overlapping in their distribution. Although the leaf anatomy of *Muraltia* shows great variation, that of *N. Spinosa* and *M. Rigida* overlap with regards to stomata and vascular structure.

JOUBERT, J. C. & SMALL J. G. C.

**Aspekte van die kiemingsfisiologie van nassellapolgras (*Stipa trichotoma* nees).**

Die grootste probleem verbonde aan die beheer van hierdie belangrike onkruid, is dat die saad vir tot 20 jaar kiemkragtig kan bly. Daar is in hierdie projek gesoek na 'n oplossing. Die optimum kiemingstemperatuur is bepaal en daar is gevind dat die saad onder hierdie toestand liggevoelig is. Die fitochroomsisteem wat hier van toepassing is, is waarskynlik nie LER nie, moontlik wel HIR. Die rol wat die verskillende vrugomhulsels in die rustoestand en liggevoeligheid speel is ondersoek. Rustoestand by konstante temperatuur kan verbreek word deur groeistowwe, veral sitokiniene.

By wisseltemperatuur is daar gevind dat sekere stowwe bv. nitraat kieming stimuleer en die moontlike praktiese toepassing hiervan word bespreek.

KAISER J. J. & LEWIS O. A. M.

**Enzymes of nitrogen assimilation in *Helianthus annuus* L.**

It has been reported in the literature that nitrate reductase activity is restricted to the roots in *Helianthus*. With improved extraction techniques however, the leaves of *Helianthus* show a greater nitrate reductase activity than the roots.

Glutamine synthetase and glutamate dehydrogenase activities were also determined. Very little glutamate dehydrogenase activity was found whereas glutamine synthetase activity was high, showing greatest activity in the leaves.

KEEGAN A. B. & VAN STADEN J.

**The response of Manketti nuts (*Ricinodendron Rautanenii* Shinz) to applied ethylene**

The oil rich seeds (nuts) of the Manketti tree are dormant, a fact which has frustrated research on these potentially useful plants. Our investigations have now shown that applications of ethrel (2-chloro ethane phosphonic acid) or pure ethylene gas initiated high germination percentages. The range of effective ethylene concentrations is extremely broad although germination does not occur below critical exposure period. This critical period appears to be related to the water status of the seeds. Some aspects of lipid mobilisation and seedling growth in response to applied ethylene will also be discussed.

KEMP G. & BATE G. C.

**The influence of nitrate content in the rooting medium on rates of growth, photosynthesis and transpiration of cotton.**

High nitrate grown plants (250 ppm-N) had a greater growth rate than low nitrate grown plants (30 ppm-N). After 8 weeks, the high nitrate grown plants had a dry mass of 2,34 g compared with 1,4 g for the low nitrate plants. Despite this difference in rate of carbon accumulation, net rates of photosynthesis for the two treatments were similar (9,29 mg CO<sub>2</sub> dm<sup>-2</sup>h<sup>-1</sup> for high-N v's 10,35 mg CO<sub>2</sub>dm<sup>-2</sup>h<sup>-1</sup> for low N)

The transpiration rates for plants grown with low nitrogen were higher (500 mg H<sub>2</sub>O dm<sup>-2</sup>h<sup>-1</sup>) than for plants grown under high nitrogen (330 mg H<sub>2</sub>O dm<sup>-2</sup>h<sup>-1</sup>)

In vivo nitrate reductase activity was higher in the high nitrogen leaves (89,5 nMoles NO<sub>2</sub> gmass<sup>-1</sup>h<sup>-1</sup>) than in the low nitrogen leaves (34,7 nMoles gmass<sup>-1</sup>h<sup>-1</sup>).

Plants grown under low nitrogen status partition proportionately more of their fixed carbon into roots than do high nitrogen status plants.

These data indicate that plants under nitrogen "stress" have the ability to increase transpiration and root growth in order to balance C:N ratios during photosynthesis. Further, the primary function of transpiration appears to be more related to mineral nutrition than to leaf cooling. The implications of this possibility are discussed.

KNOX M. D. E. & BRUSSE F. A.

**Chemical and morphological variation in the *Xanthoparmelia hypoleia* (Nyl.) Hale group (Lichenes)**

The *Xanthoparmelia hypoleia* (Nyl.) Hale group is characterised by narrow, often linear lobes, a largely ascending growth form, a black undersurface with usually sparse rhizines, and particularly an effigurate-maculate upper cortex.

Nine species are distinguished in the group, using criteria of chemical constituents, morphology and distribution. These are: *Parmelia* (*Xanthoparmelia*) *burmeisteri* Elix, *X. cedrusmontana* Brusse, *X. dysprosa* Brusse et Knox, *X. halei* Brusse, *X. hypoleia* (Nyl.) Hale, *X. hypoprotocetrarica* (Kurok. et Elix) Hale, *X. karoo* Brusse, *X. notata* (Kurok.) Hale and *P.(X.) pseudohypoleia* Elix.

Possible relationships, on the basis of chemistry and morphology, are shown to exist between *X. burmeisteri*, *X. hypoprotocetrarica*, *X. karoo* and *X. notata*, and between *X. hypoleia* and *X. pseudohypoleia*.

The world distribution of these species is discussed, and the suggestion is made that several further species in this group may still be undiscovered.

KRÜGER G. H. J.

**Ligintensiteit en die CO<sub>2</sub>-fikseringsmeganisme by *Microcystis aeruginosa*.**

Die invloed van ligintensiteit op CO<sub>2</sub>-fiksering, asook die <sup>14</sup>C-merkpatroon, in die blougroenalg *M. aeruginosa*, is ondersoek. Fiksering van CO<sub>2</sub> het 'n minimumwaarde vertoon by 10 lux. Die <sup>14</sup>C-konsentrasie in verbindings wat ontstaan vanaf PEP-karboksilasie, het 'n minimum vertoon by 'n ligintensiteit net benede die ligkompensasiepunt. By lae ligintensiteit is 'n toename in die persentasie <sup>14</sup>C in lg. verbindings, en 'n afname in dié van die suikerfosfate en PGA waargeneem. Met toenemende ligintensiteit is die sintese van suikers begunstig met betrekking tot dié van aminosure. Hierdie beheer van die CO<sub>2</sub>-fikseringspatroon mag 'n belangrike rol speel in die oorlewing van die organisme onder ongunstige omgewingstoestande.

LEWIS O. A. M. & WITHERS J. P.

**Glutamate dehydrogenase and ammonium assimilation in barley roots**

Since the discovery of the GS-GOGAT pathway of N assimilation in higher plants, the rôle of glutamate dehydrogenase (GDH) in this process has been obscure.

The rôle of GDH in the assimilation of fed ammonium (as opposed to nitrate produced ammonium) has been investigated in barley roots after blocking glutamine synthetase activity with methionine sulphoximine, to explain the high activity of the enzyme in this organ.

LOW A. B.

**Phytomass of coastal fynbos vegetation occurring in the Western Cape**

Above and below ground phytomass was determined in four ages (3, 6, 11 and 17 year old) of coastal fynbos vegetation occurring in the Western Cape.

Total above ground masses, were compared with those obtained for stands of similar ages in other heathlands. Root: shoot ratios in the first three ages were among the highest reported for Mediterranean vegetation. This appeared to be attributed to a high incidence of resprouters in the early stages of the post-fire succession as well as the presence of deep sand. The oldest community exhibited a low root: shoot ratio presumably due to the dominance of *Protea neriifolia*, a seed regenerator.

LUBKE R. A., RAYNHAM G. L. & REAVELL P. E.

**A reassessment of plant succession on spoil heaps along the Boro River, Okavango Delta, Botswana**

The lower reaches of the Boro River were dredged in the early 1970s to increase water flow from the Okavango Swamps. Colonization of the spoil heaps was originally studied in 1972 and 1974 and during the 1979 expedition to the Okavango the Rhodes University team resurveyed the vegetation cover along the river. This study shows that the revegetation of spoil heaps and the dredged channel in the river is very slow and it could take many years for the floodplain vegetation to return to the natural situation.

MARSHALL D. M., BOTHA C. E. J., EVERT R. F. & CROSS R. H. M.

**Comparative Anatomy of *Themeda triandra***

Aspects of the anatomy of mature *T. triandra* leaves were investigated at the light and electron microscope level, in three provenances, Fish River, Alice and Hogsback. The leaves contain four recognisable vein orders, each of which is surrounded by a variably lignified, single layered thick walled Kranz bundle sheath. Outer tangential and radial walls of bundle sheath cells contain a suberin lamella, which is traversed by plasmodesmata which are aggregated into primary pit fields. The terms Kranz bundle sheath and Kranz mestome sheath are evaluated with reference to the findings in *Themeda*.

MASKREY, H. L. & SMALL J. G. C. (CANCELLED)

**The involvement of cyanide-insensitive respiration in seed germination**

Cyanide-insensitive respiration has been implicated in a wide range of plant physiological phenomena, and reports have appeared in the literature which indicate that it could play a role in seed germination. However, there are conflicting results as to the extent and duration of this process.

This paper describes current knowledge on this relevant and interesting topic as well as outlining attempts to follow the relative proportions of respiratory path activity during imbibition and germination of bean seeds (*Phaseolus vulgaris* L.).

MOLL E. J. & GUBB A. A.

**Aspects of the ecology of *Staavia dodii* bolus (Bruniaceae) in the South Western Cape, South Africa**

The obligate seed regenerating species *S. dodii* is one of the 1 244 threatened plant species in the Cape Floral Kingdom. The 14 known populations of the species are confined to rocky, sandstone ridges in the Cape of Good Hope Nature Reserve and in the past have been subjected to pressures from flower-pickers and frequent bush fires. The species has a definite vegetative growth season in early spring to summer, it flowers from late spring to late winter, and the seeds are shed in spring. Germination is apparently fire stimulated and seedling mortality in the first year is very high. The first flowers are produced some 5 to 8 years after fire with maximum flower production occurring on 12 to 16 year old plants. Individuals >20 years old have usually started to senesce, and about 30 years is apparently the maximum age the species can attain. As individuals age they produce fewer, progressively shorter shoots, hence fewer inflorescences which contain fewer flowers and fewer seeds.

The Cape of Good Hope Nature Reserve is subjected to a fire management programme which, if *S. dodii* is to be properly conserved, must aim at a fire frequency of 10 years or more.

MURRAY, K. & LINDER, P. W. — Poster session

**A computer simulation of metal ion equilibria in soil solutions.**

In an endeavour to study optimum conditions for maintaining the availability of metal ions to plants a computer model has been developed to simulate the equilibria that exist between metal ions and ligands in soil solutions.

A complex major component of the soil organic matter viz. fulvic acid, has been included in the above equilibria. Since the detailed molecular structure of fulvic acid is unknown, a simple statistical model has been developed in order to deduce the concentrations of the various metal binding sites that occur in this complex mixture of molecules.

Uptake of metal ions has been experimentally determined by suspending tomato plants in specific nutrient solutions, subjecting the solution to increased pressures and collecting the sap exuded from the stem of the plant cut through a few centimetres above the root system. The approach has been to compute the predominant forms of each metal ion in the nutrient solution and then to investigate correlations with the experimentally determined uptake of the metal.

NEL E. ROBBERTSE P. J. & GROBBELAAR N.

**'n Ontogenetiese studie van die saad van *Dichapetalum cymosum***

Twee anatrope saadknopprimordiums ontwikkel per vrughok, en wel uit die apikale plasentale weefsel sodat die saadknoppe in die vrughok afhang. In die saadknop ontwikkel die argesporiumsel hipodermaal en funksioneer sonder verdere verdelings direk as die megasporoemoedersel om 'n tenuinusellêre tipe saadknop te vorm. Die binneste integument word eerste aangelê en daarna die buitenste integument. Tydens megasporogeenese word vier kruisgewysgerangskikte megaspore gevorm. Dié megasporoer naaste aan die mikropilum ontwikkel tot 'n monosporiese Polygonum-tipe embriosak. Die binneste integument funksioneer as 'n integumentêre tapetum en nukleêre endosperm kom voor. Die saadhuid word deur die buitenste epidermis van die buitenste integument gevorm en is dus eksotestaal. Die buitenste epidermis asook 2 tot 3 onderliggende sellae van die vrugbeginselwand gee aan die eksokarp oorsprong. Die mesokarp strek vanaf die eksokarp na binne en grens aan die endokarp wat 'n harde veselagtige laag is en deur die binneste epidermis van die vrugbeginselwand gevorm word.

NICHOLSON, H. B.

**Local Herbaria. Functions and uses.**

The value of small collections can be gauged to some extent by the record of three local herbaria in Natal. The Natal Parks Board herbarium at the Hluhluwe Reserve, the Natal Parks Board herbarium at the Oribi Gorge Reserve, and the Skyline herbarium at Uvongo.

The interest generated by having a fairly accurate record of the local vegetation has been utilized by a number of professional botanists, both from the R.S.A. and from overseas. Students from our universities have made regular use of the collection.

Two new generic records for South Africa have resulted from explorations carried out in S. Natal over the last 18 years. Fourteen new

species have been established. Ten new records for the area have been noted, and twelve rare species have been re-collected after a lapse of many years in the records.

Monitoring of doubtful species and those under scrutiny is another practical work carried out, as is the collection and dissemination of properly named seeds. A regular monthly meeting has been held to identify and record any indigenous plants collected in the area by any interested parties.

PALMER A. R.

**Comparative total floristic survey of three east cape nature reserves**

The majority of nature reserves in the eastern Cape Province has been established on land previously used for pastoral agriculture. The attitude of agriculturalists towards vegetation conservation is extremely variable and has resulted in significant changes in the structure and composition of the vegetation.

Three provincial nature reserves situated between 32-34°S and 24-28°E have been surveyed using the Braun-Blanquet phytosociological technique. The reserves range in size from 56 km<sup>2</sup> to 147 km<sup>2</sup>, and are situated in the arid savannas of the Zambezi Domain and the Karoo-Namib dwarf shrublands.

Phytosociological tables of the vegetation of the three reserves are presented, communities identified and the ranges of species collected are compared. Present trends in vegetation change are discussed, with special reference to changes due to previous management. Management practices, recommended to halt the retrogressive trends in the vegetation, are proposed.

PARKINSON B. M.

**Spore wall development in *Psilotum nudum* (L.) Beauv.**

Light and electron microscope studies have been carried out to study spore wall development in *Psilotum nudum* and the structural observations have been supplemented by histochemical tests at light microscope level.

The period of development studied includes the formation of the spore mother cell wall prior to meiosis and the nature of the wall at the tetrad stage, through to the formation of the peripheral layer around each spore. The exospore appears to develop by means of two distinct processes and is then followed by the formation of a perispore, a peripheral layer and finally a pseudo-endospore is produced. The terminology employed for the various wall layers will be discussed as well as comparing the spore wall development with angiosperm and gymnosperm microspore wall development, without implying any homology. The features of the spore wall structure will be discussed in relation to the controversial inclusion of the Psilotaceae within the Filicales.

PENDLE B. G. & BATE G. C.

**The heterogeneous cell and its water potential components; approaching reality**

Fresh and freeze killed leaves were used to obtain pressure/volume curves for these leaves. The curves were then analysed to give the osmotic and turgor potentials for the vacuole/cytoplasm and the matrix potential and modulus of elasticity of the cell wall at different water potentials and water contents.

This method of analysis gives a more realistic structure to water potential analysis though several simplifications still remain which must affect the results obtained.

PENDLE B. G. & BATE G. C.

**Field measurements for the loss of water by transpiration from trees of the *Burkea* savanna**

A whole tree cuvette for the measurement of transpiration was designed and constructed. The cuvette was calibrated for its absolute measurement of water loss by comparison with water loss measured gravimetrically from wet towels. The cuvette was also calibrated for its effect on the rate of transpiration of *Ochna pukhra* as determined by the cut shoot mass loss method used inside and outside the cuvette.

With a mass air flow of 1,2 m<sup>3</sup>s<sup>-1</sup> through the cuvette (1,5m square by 3m high) the absolute calibration gave 107,3% ± 4,0(SEM, N = 9) of the water loss accounted for. Therefore the system appears to be slightly overestimating real water loss. Various sensors were placed inside and outside the cuvette to assess the effect the cuvette has on the environment of the shrub. Temperatures inside were higher than outside on the average.

The cut mass loss method used in the cuvette showed transpiration to be about 13% higher than outside, indicating that the method may be affected by the higher temperature of shade leaves.

The rates of transpiration estimated as a whole by the cuvette and the cut mass loss methods were compared and an assessment is made of the accuracy of the two methods versus the cost and effort involved.

PIENAAR R. N.

**Preliminary observations on tidal pool and inshore dinoflagellates occurring off the Natal and Cape Province Coastline**

During a more detailed investigation into the marine nanoplankton associated with inshore waters of South Africa it became obvious that the dinoflagellates (Dinophyceae) were well represented both as part of the nanoplankton and as important components in tidal pools. Many of these dinoflagellates are euryhaline and can withstand great fluctuations in temperature and salinity. This paper gives preliminary results as to the most important genera found, their taxonomy, distribution and ecology.

In some instances the ultrastructure of these organisms will also be discussed and some unusual features reported such as the occurrence of dinoflagellate taxa possessing well defined thecae and an external covering of ornate scales.

To date the important genera identified include *Amphidinium*, *Prorocentrum*, *Peridinium*, *Gymnodinium* and *Gyrodinium*.

RETIEF E.

**Die taksonomiese posisie van die genus *Lightfootia* L'Herit.**

Bykans al die genusse van die familie Campanulaceae wat tot die subtribus *Wahlenbergia* sensu Schönland behoort, kom in Afrika voor. Die genusse *Lightfootia*, *Wahlenbergia* en *Cephalostigma* van hierdie subtribus het heelwat kenmerke in gemeen en skeiding tussen die genusse het nog altyd aansienlike probleme veroorsaak. Verskeie navorsers is van mening dat die genus *Lightfootia* as 'n sinoniem van die genus *Wahlenbergia* beskou moet word. Die wenslikheid van so 'n stap word bespreek.

RUSSELL, D. A.

**Field and laboratory methods for measuring soil-water flow, with computer solutions, for ecological studies.**

Water is considered to be a major factor governing plant growth and to some extent species distribution. The current approach to determining plant response to the soil water potential is to simulate water cycles in the field. This approach is discussed under four heads.

1. Modelling of the soil-plant atmosphere continuum.
2. Model outputs, namely soil water content or potential, and flow in the profile, root water extraction and surface evaporation and in some cases seasonal dry matter production.
3. Model inputs, namely profile hydraulic characteristics, plant rooting characteristics, precipitation, depth to water-table, profile salinity and potential evapotranspiration.
4. Standard field and laboratory methods for input data acquisition.

RYCROFT H. B.

**A Botanic garden for the Eastern Cape**

The National Botanic Gardens of South Africa with headquarters at Kirstenbosch has been engaged for a number of years in establishing Regional Gardens in various parts of the Republic and they are now situated in each of the Provinces.

Most Gardens are located near large towns or cities.

At present there is no Garden for the eastern Cape and negotiations are taking place for a garden in the Baakens River valley in Port Elizabeth.

Considerable public and academic interest has been shown in the project which is also receiving strong local support.

Most of the land required for the undertaking belongs to the Municipality but a small area is still to be purchased by the City Council for the transfer of control to "Kirstenbosch".

It will be known as the Eastern Cape Garden.

SHELPE E. A. & ANTHONY N. C.

**Problems in the systematics of the fern genera *Cheilanthes* and *Pellaea* in Southern Africa.**

Past and present circumscriptions of the fern genera *Pellaea*, *Cheilanthes*, *Notholaena* and *Doryopteris* are reviewed in relation to the Southern African species. Characters found useful in the delimitation of species in this group are discussed. Apogamy is thought to be of significance in some species complexes.

SCHÜTTE K. H.

**The water relations of plants in the dawn twilight**

In the ever increasing illumination of the early twilight, plants start to respond to changes in their environment long before sunrise. Transpiration is active in many plants before sun-up, and this is advantageous to plants, especially those in hot arid locations.

The relationship between the light quality, light intensity, and transpiration and stem girth as determined experimentally, will be discussed for a number of species and the ecological implications indicated.

SCHÜTTE, K. H. & PRESSINGER, F. M.

**Comparison of the stem contractions and transpiration of monocotyledons and woody plants.**

There is a daily pattern of stem contractions which is common to both woody and monocotyledonous plants. It has been observed that superimposed upon this diurnal cycle, there is a series of characteristic short-period micro-oscillations which occur in monocotyledonous plants, and which is absent in woody plants. It is proposed that this difference in the behaviour of the two systems may be related to differences in their vascular anatomy.

Periodicity of the stem oscillations in the monocotyledons, as exemplified by the bamboo, maize, and banana, is strongly influenced by light intensity, water availability and time from onset of illumination.

The pattern of transpiration in monocotyledons closely follows that of the stem contractions with a very short lag of approximately 5 minutes.

SMALL J. G. C. & ONRAET A.

**The effect of respiratory inhibitors on germination of *Strelitzia juncea* seeds**

*Strelitzia juncea* seeds are dormant. Oxygen is a potent dormancy breaker. At concentrations below 0,1 mM KCN, SHAM and DNP have a fair dormancy breaking action. In Oxygen these substances inhibit germination; KCN and DNP give almost complete inhibition at a concentration of 1 mM whereas SHAM requires concentrations above 3 mM for complete inhibition.

Both CN-sensitive and CN-insensitive respiration functions in these seeds and appears important for germination. The alternate respiratory pathway appears relatively more important during the initial period of inhibition.

At least part of the DNP inhibitory effect appears linked to ATP production.

SMART R.

**Hydraulic Models of Water Flow in Plants**

Fluid flow in plants involves a complex of processes which present such difficulties in formulating mechanistically that the flow is usually modelled via a crude electrical analogy. Certain parts of the fluid flow can however be reasonably regarded as hydraulic flow through a system of tubes and reservoirs. Flow along xylem vessels is considered from the hydraulic aspect and in particular its properties of initiating and transmitting vibrations are investigated.

SMITHIES S. J.

**Puzzle of the past — interpretation of Ottokarioid Glossopterid Fructifications**

Much of the controversy has arisen from the interpretation of ottokarioid glossopterid fructifications. The discovery of new material from Lower Permian beds at Hammanskraal and study of specimens from Vereeniging and Brazil offered a chance to further morphological knowledge of two genera, *Ottokaria* Zeiler and *Hirsutum* Plumstead. Interpretations of both minor and major structures are reviewed and new ones are developed. Reconstructions are put forward and the implications thereof are mentioned.

STEINKE T. D. NAIDOO G. & CHARLES L. M.

**Degradation of mangrove leaf and stem tissues *in situ* in Mgeni Estuary**

*In situ* rates of degradation of mangrove litter were obtained from regular harvests of submerged material contained in nylon-mesh bags. Litter components comprised leaves and stems of *Avicennia marina* (Forsk.) Vierh. and *Bruguiera gymnorhiza* (L.) Lam. and stems of *Rhizophora mucronata* Lam. Leaves were broken down more rapidly than stems and after six months *Avicennia* and *Bruguiera* leaf debris comprised only 9.5 per cent and 15.3 per cent respectively of their initial mass. At the end of this period approximately 80 per cent of the initial mass of the stems of each species remained. The material from each harvest was analysed for N, P and total C. The significance of litter breakdown in the contribution of nutrients to this estuarine ecosystem is discussed.

STEINKE T. D. & CHARLES L. M.

**Productivity and phenology of *Avicennia Marina* (Forsk.) Vierh. and *Bruguiera Gymnorhiza* (L.) Lam. In Mgeni Estuary.**

Estimates of productivity of mangroves were obtained with the use of litter baskets placed at random in two communities; one dominated by *Avicennia Marina* and the other comprising an almost pure stand of *Bruguiera gymnorhiza*. Average litter production for the *Avicennia* community was 2.65 g dry matter m<sup>-2</sup> day<sup>-1</sup>, while that for the *Bruguiera* stand was 2.66 g dry matter m<sup>-2</sup> day<sup>-1</sup>. Highest values were recorded at the time of seedling abscission in autumn. Woody material formed a relatively low proportion of the total litter yields. In the *Avicennia* community leaf fall was high in the dry, cool months. In the *Bruguiera* stand leaf appearance was high and leaf fall low in the wet, warmer months, while during the cool, dry period figures for leaf fall were higher than those for leaf appearance. The significance of the results is discussed in terms of the distribution of the communities in a sub-tropical region approaching the southernmost limit of these mangroves.

STOCK W. D. & LEWIS D. A. M.

**Distribution and seasonal variation of soil nitrogen in a fynbos community**

The distribution and seasonal variation of the different forms of soil nitrogen was studied in a coastal fynbos community. Total nitrogen content of the Clovelly soil form examined was low. Mineral nitrogen, namely nitrate and ammonium, contributed little to the total nitrogen content.

The vertical distribution of nitrogen shows a decrease in nitrogen with depth, which corresponds to organic matter distribution.

Horizontal distribution of nitrogen revealed that the soils were locally very variable and no significant differences in nitrogen content of rhizosphere regions of different species were apparent.

Preliminary investigations of seasonal variations in organic and mineral nitrogen indicate little change in nitrogen content and a low seasonal nitrogen turnover.

STRAKER C. J. & MITCHELL D. T.

**Acid phosphatase activity and polyphosphate accumulation in ericoid mycorrhizas**

Endomycorrhizal fungi have been isolated from the root systems of *Vaccinium macrocarpon* Ait., *Rhododendron ponticum* L. and *Calluna vulgaris* L. from the United Kingdom, and *Erica hispidula* L. (Western Cape). Each endophyte was fractionated into soluble, insoluble and extracellular components and the acid phosphatase of each component was assayed using p-nitrophenyl phosphate as the substrate. The insoluble component of all the endophytes was found to contain the most active acid phosphatase. The endophyte of *E. hispidula* had the highest activity compared with the other isolates. Using metachromatic staining techniques, polyphosphate granules were observed in the hyphae of all four endophytes. Granules were found to increase in abundance during the exponential phase of mycelial growth. Numbers of polyphosphate granules in the hyphae were correlated with levels of both organic and inorganic phosphate in the growth medium.

TALBOT B. M. M. & SMALL J. G. C.

**Aspects of N<sub>2</sub> Fixation in the Swartkops estuary**

Nitrogenase activity (C<sub>2</sub>H<sub>4</sub> reduction) was found in several habitats within the intertidal reaches of the Swartkops estuary. Significant variation in acetylene reduction activity (ARA) was recorded along the following transects; (a) a marsh transect with stations ranging from subtidal sediments to dune and terrestrial vegetation bordering the salt marsh, (b) a *Spartina maritima* (Curtis) Fernald transect and (c) an estuarine transect.

Several abiotic parameters were measured at each station, including temperature, percentage moisture, carbon content, inorganic and total nitrogen and salinity. An attempt was made at relating some of the above conditions to gradients in ARA.

TAYLOR H. C.

**Strand plant communities of the southern Cape.**

A phytosociological study of littoral vegetation in the southern Cape from the Cape Peninsula to the Sunday's River mouth revealed a series of communities along a gradient of substrates from wet to dry. There are two major subdivisions. Communities of stable substrates

occur as established vegetation on soil over bedrock, and communities of unstable substrates as pioneer vegetation on marine-derived sand of dunes or beaches. Between these extremes is an overlap of communities on intermediate or mixed substrates such as shallow sand over limestone, shelly beaches, rocky strands, or semi-stabilized dunes inland of the foredune; here species of both "rock" and "sand" occur together in distinct assemblages. It is concluded that the Braun-Blanquet method reveals valid plant communities in the study area and efficiently portrays the relationship of these communities to one another and to the habitat.

TEW A. J.

**The effect of flooding time and salt concentration on the rate of water utilization by Mangrove seedlings**

It was reported last year from data collected in the Umgazana estuary that different mangrove communities have been identified and associated with different positions on the flood profile. Following this it was shown that the seedling distribution was also patterned and their densities varied considerably.

It was hoped in the same paper to propose that light tolerance was an important factor in such mangrove distribution, but due to a lack of time this was not achieved.

These data will therefore be presented in conjunction with further data on the effect of flooding time and salt concentration on the rate of water utilization.

These results will be linked and discussed in the light of those factors considered to explain the observed seedling pattern and how the mature community develops.

THERON G. K., MORRIS J. W. & VAN ROOYEN N.

**'n Ordeningstudie van die kruidstratum in die Nylsvley-natuurreservaat**

Die doel van die studie was om die ekologiese posisie van kruidsorte te bepaal asook om te bepaal of die kruidstratum homogeen is, dat *Setaria perennis* moontlik die klimaks grassoort is en dat *Eragrostis pallens* 'n laer posisie in die suksessiereeks het as *Digitaria eriantha*.

VAN STADEN J.

**The effect of photoperiod and gibberellic acid on flowering and cytokinin levels in *Bougainvillea***

*Bougainvillea* 'San Diego Red' plants, subjected to nine 8-h photoinductive cycles, showed a decrease in endogenous cytokinin levels. This decrease occurred in all plant tissues but was least pronounced in the shoot tips, establishing them as the primary site for active nutrient mobilization. The decrease could be correlated with flower development. Application of GA<sub>3</sub> to plants growing under short-day conditions reversed the flowering response and caused an increase in endogenous cytokinin levels similar to those detected in vegetative plants grown under long-day conditions. This suggests that gibberellins may play an important role in maintaining *Bougainvillea* plants in a vegetative state.

VAN DE VENTER H. A.

**A new weeds research unit in the department of agriculture and fisheries**

The Department of Agriculture and Fisheries (ATS) has decided to establish a weeds research unit within the Plant Protection Research Institute. Basically the unit will have the following functions:

- (1) Technical advice to the Registrar (Act 36 of 1947) on the registration of herbicides, pesticides and fungicides.
- (2) Pesticide and herbicide dynamics (a study of the molecules from time of application to final residue).
- (3) Biological control of weeds.
- (4) Research on the control of invasive plants.
- (5) Fundamental research on weeds.
- (6) Research on botanical aspects (taxonomy, ecology, etc.)

The establishment of this unit is seen as a major advance as research on invasive plants is being placed on a sound, co-ordinated footing for the first time.

VATSHA, N. P. & OWER, J.

**Quantifying proteins for nutritional assessment of maize kernels**

The quantities of the four major groups of proteins in maize endosperm are indicative of the nutritional value of the grain. Valid evaluation of these quantities requires successful fractionation and separation of the proteins from the endosperm. Traditional techniques for grain protein fractionation (based on solubility separations) depend on extraction duration and repetition, and thus yield qualitative separations unsuitable for nutritional assessment. Variation in fractionation data using modifications of the traditional techniques is discussed, and a rapid method for separation based on molecular sieving is proposed. Data obtained for a 'normal' and a 'high lysine' maize will be presented.

VISSER J. H.

**Die invloed van die wortelparasiete *Alectra*, *Orobancha* en *Striga* op die groei van hulle gasheer**

Die relatiewe groeitempo, blaaroppervlakte-indeks en netto assimilasiestempo van gasheerplante van ses verskillende soorte wortelparasiete is ondersoek. Dit is vasgestel dat die relatiewe groeitempo en blaar-oppervlakte-indeks van geparasiteerde gasheerplante in vergelyking met ongeparasiteerde gasheer verlaag is, terwyl die netto assimilasiestempo in sommige gevalle verhoog is. Die moontlike rol van die parasiete in hierdie verband word bespreek.

VON TEICHMAN I. & ROBBERTSE P. J.

**Die ontogenie en morfologie van die saad van *Pavetta Gardeniifolia* A. Rich**

*Pavetta gardeniifolia* was vroeër onder die sinoniem *P. assimilis* bekend. Die variëteit *P. gardeniifolia* var. *gardeniifolia* is ter sprake. Bakterieë kom in die blare, groeipunte en vrugbeginsel voor en word deur die saad van een generasie na die volgende oorgedra. Die blomknoppimordiums differensieer in November en die vrugte word ongeveer 18 maande later ryp. Die vrugbeginsel is onderstandig en tweehokkig met een unitegmiese anatropiese saadknop per vrughok. 'n Opvallende funikulêre uitgroei (strofiol of obturator) wat uit klieragtige selle bestaan kom voor. 'n Baie gereduseerde nuseil en 'n Polygonum-tipe embriosaak met 'n goed ontwikkelde hipostase word aangetref. Die bevrugting is porogamie en stem die embriogenie met die Solanaceae-tipe ooreen. 'n Proteienagtige endosperm en tannienhoudende epidermisselle van die integument en testa is kenmerkend. Die vrug is 'n besvug en bevat gewoonlik slegs een ontwikkelde saad.

URTON, N. R., OLIVIER M. C. & ROBERTSON B. L.

A revisionary study of *Rhoicissus* in Southern Africa has been undertaken in order to determine which species occur here and in particular whether any infraspecific taxa should be recognised in the case of the polymorphic *R. tridentata*. The study is based on herbarium specimens, plants in their natural habitats and, in the case of *R. tridentata*, plants in cultivation under controlled conditions. Five basic variants of the latter are recognisable based largely on gross leaf morphology but intermediate forms occur. Propagation of these variants has been achieved mainly from seeds because of difficulty in rooting of cuttings. Their cultivation under controlled conditions shows that their differences are largely under genetic control.

WALKER B. H. & BATE G. C.

**An assessment of the impact of water extraction from the Kuiseb River Aquifer on the Associated Riverine Woodland**

The Kuiseb river rises in the Khomas Hochlands of S.W.A. and runs west across the Namib desert to its present delta just south of Walvis Bay. Farm dams in the catchment have reduced inflow by c. 40 % and water is pumped from the sands to supply Walvis Bay, Swakopmund and the Rossing Mine. In most years surface flow reaches to below Gobabeb (c. 70 km inland), but it no longer reaches the sea. Under existing conditions, without pumping, the trees easily survive the rate of decline in the water table. Pumping reduces water in the sand to a potential of 0 MPa, at which point the trees begin to use water. At present, trees remove water from the capillary fringe, causing the gradual decline in the water table. A rapid decline, due to pumping would leave about  $5,22 \times 10^6 \text{ m}^3$  of water (at field capacity) per km of river, which is about 49 % of what would normally be there. Based on our estimate that trees use up to 24 % of the total volume each year, this means that the water will be completely depleted at the end of a year without recharge (as opposed to the normal three year's grace), and trees will begin to suffer. Two years with no recharge would lead to a significant die off. Even in normal years with floods the accelerated rate of decline in the water table may have differential effects on seedling survival. *A. albida* seedlings are capable of extending their roots at a rate which exceeds the normal rate of decline in the water table ( $10 \text{ cm wk}^{-1}$  as opposed to  $6 \text{ cm wk}^{-1}$ ) whereas *A. erioloba* roots grow much more slowly ( $1,75\text{-}2,5 \text{ cm wk}^{-1}$ ) and apparently require exceptional years for establishment. The changed pattern of water table decline may well result in a reduction in tree replacement. The validity of our estimates is discussed with reference to future required research.

WATTS, J. E.

**Die metabolisme van 2,4,5-TP in Packham's Triumph per-bome**

Die peer-cultivar Packham's Triumph lewer, ten spyte van goeie blomvorming en optimale kruisbestuiving, onbevredigende oeste. Bespuiting met 2,4,5-TP ( $\alpha$ -2,4,5-trichlorofenoksi)-propioonsuur gedurende die herfs verhoog vrugset die volgende lente betekenisvol. 'n Direkte effek van 2,4,5-TP op vrugset sou dus impliseer dat dié verbinding teen metaboliese afbraak bestand is. Die vermoë van blaar- en vrugweefsel om ring- en karboksielgemerkte 2,4,5-TP  $^{14}\text{C}$  te dekarboksileer is ondersoek, asook die teenwoordigheid van gevormde radio-aktiewe metaboliese produkte in die weefsel. Uit die resultate blyk dat sowel blaar- as vrugweefsel in staat is om 2,4,5-TP te metaboliseer.

WEIGHILL W. & WALKER B. H.

**Interactions of woody and herbaceous vegetation with respect to water uptake at nylsvlei**

Walter in 1971 proposed that the balance between woody and herbaceous vegetation in semi-arid savannas is determined by competition for water: herbaceous vegetation has shallow roots and obtains water from the upper portion of the soil profile, while the deeper rooting woody vegetation has access to water over the whole profile although it is the weaker competitor in the herbaceous root zone. An experiment has been set up, in *Burkea africana* savanna, to evaluate the above hypothesis and to extend it so as to include the effects of soil nutrients. The experiment and the problems of working in a natural ecosystem are described. Preliminary results and their implications are discussed.

WEISSER P. J. & PARSONS R. J.

**Monitoring *Phragmites Australis* increases from 1937 to 1976 in the Siyai Lagoon (Natal, South Africa) by means of air-photo interpretation**

The colonization of the Siyai Lagoon by *Phragmites australis* was studied by means of air-photo interpretation. It was possible to locate and estimate *P. australis* areas for 1957 (0,74 ha), 1965 (1,65 ha), 1969 (1,93 ha) and 1976 (2,94 ha). The 1937 photos do not provide conclusive evidence. *Phragmites australis* first inhabited the shores of the middle section of the lagoon followed by a fast expansion in the lower section. The upper section was colonized only at its lower end by expansion from the middle section. It is hypothesized that *P. aus-*



*tralis* was unsuccessful in this section because of competition by the *Hibiscus tiliaceus* — *Barringtonia racemosa* Lagoon-Fringe Forest. This same community is outshading *P. australis* in some places. The notable increase of the rate of terrestrialization and littoral vegetation of the Siyai Lagoon was caused by the sugar farming activities leading to erosion and sedimentation in the lagoon. Apart from *P. australis*, no other macrophytes were found. The colonization of most of the Siyai except the immediate mouth zone by *P. australis* Reedswamp and *Hibiscus tiliaceus* — *Barringtonia racemosa* Forest can be expected before the turn of the century. Dredging and mechanical control of vegetation will become necessary if major open water spaces are to be maintained.

WITKOWSKI E. T. F. & WALKER B. H.

**Towards an ecological basis for the management of Klaserie Nature Reserve**

Management of the Klaserie Private Nature Reserve is aimed at maintaining a high diversity of existing plant and animal communities. To achieve this, we submit that it is necessary to know (i) the minimum number and nature of spatial units which provide the degree of spatial heterogeneity needed to maintain the animal communities, and (ii) the dynamics of the essential (keystone) plant and animal species within each unit. An understanding of the dynamics will point to the likely occurrence of thresholds in the amounts of these species, beyond which the system cannot recover. This study aims to provide a fairly detailed account of the spatial heterogeneity, and a graphical analysis of the dynamics of one of the units. Preliminary results of vegetation composition, utilization (by game) and associated site conditions are presented, based on an analysis of transects.

WOLFSON M. M. & CRESSWELL C. F.

**The effect of night temperature on photosynthetic activity in selected C4 species.**

The effect of low night temperatures ranging from 12°C to 17°C on (i) the enzymes RuBPC: PEPC: NAD/NADP malic enzyme; NAD/NADP malic dehydrogenase; Aspartate amino transferase; Alanine amino transferase and PEP carboxykinase and (ii) the photosynthetic rate, was investigated in the following plants: *Themeda triandra*; *Hyparrhenia hirta*; *Eragrostis curvula* and *Zea mays*, after 5, 10 and 15 days and compared with the activity in control-plants grown in night temperatures of 25°C.

## PLAKKAATSESSIE/POSTER SESSION

BOTHA C. E. J.

### Evaluation of a Rapid FITC-labelled Antibody Technique for Determination of C<sub>3</sub> and C<sub>4</sub> Photosynthetic Systems.

Free-hand sections treated with antisera to purified ribulose 1,5 diphosphate carboxylase, and fluorescein isothiocyanate (FITC)-labelled anti-rabbit immunoglobulin were examined with a Zeiss epifluorescence microscope. This technique is illustrated, discussed and evaluated.

BOTHA C. E. J., EVERT R. F. & MARSHALL D.

### Epi- and Transmitted Microscopy — An aid in Plant Cell Wall Histochemistry?

Fluorescence microscopy has been used in conjunction with conventional histochemical techniques as controls, in an attempt to identify the principal components in various plant cell walls. Various fluorochromes are evaluated with respect to their relative usefulness in cell wall histochemistry.

BROWN G, JONGENS-ROBERTS S. M. & MITCHELL D. T.

### Variations in soil phosphorus in coastal fynbos

Variations in organic matter, pH and total, organic, inorganic, Bray no 2 and resin bag extractable phosphorus of soils of coastal fynbos were examined at Pella (Fynbos Biome Intensive Study Site). All the soil forms had profiles deeper than 2 metres and root systems excluding the tap roots of proteoid and ericoid elements were confined to 0—60 cm depth. Soils of the Clovelly form were studied at bi-monthly intervals and a general survey of the Constantia, Griffin, Lamotte and Longlands/Westleigh forms was also undertaken. In the Clovelly soil forms total phosphorus levels declined from 35 ug Pg<sup>-1</sup> dry weight at the surface to 20 ug Pg<sup>-1</sup> dry weight at 40 cm but then increased further down the profile. Similar trends were observed for Bray no 2 phosphorus with changes from 5 ug Pgm<sup>-1</sup> dry weight at the surface to 1,5 ug Pg<sup>-1</sup> dry weight at 40 cm. Resin bag-extractable phosphorus and organic matter levels declined with depth. The greater proportion of inorganic phosphorus was in the ferric bound form with the highest percentage at the lowest depth. The variations of phosphorus in the rhizosphere of proteoid elements (*Leucospermum parile*, *Protea repens*), ericoid (*Phylica cephalantha*) and restioid (*Staberoha distachya*) growing in the Clovelly soil form were investigated and there were no differences in Total and Bray no 2 phosphorus. However, the levels of resin bag extractable phosphorus were lowest in the rhizosphere of *S distachya* compared with the rhizosphere of the other elements. Pot trials were also designed to study the growth and distribution of phosphorus in seedlings of *Leucadendron lauroleum*, *Felicia melloides* and *Lolium perenne* growing in the Clovelly soil form. There appeared to be differences in phosphorus accumulation if the results are expressed on a dry weight basis.

CAMPBELL B.

### Growth form changes at the geographical limits of mountain heathland in the fynbos biome

At the geographical limits of the heathlands of the mountains of the Fynbos Biome the set of heathland growth forms is replaced by forest, grassland, or arid-zone growth-forms. The changes that occur are examined in terms of changes in climatic factors (increasing aridity, increasing summer rainfall) and edaphic factors (increasing soil fertility).

COLEY P. G. F, OLIVIER D. L, MITCHELL D. T.

### Plant litter production and decomposition in the coastal fynbos at Pella

Fynbos vegetation of the Cape Province, South Africa, has a characteristic physiognomy consisting predominantly of proteoid, ericoid and restioid elements, and produces a diversity of plants with various leaf morphologies. In studying leaf litter production and decomposition at Pella (the Fynbos Biome Intensive Study Site), equipment has been specially designed to accommodate the discrete physiognomy of the following:

<i>Proteoid element:</i>	<i>Protea repens</i>
	<i>P. burchellii</i>
	<i>Leucospermum parile</i>
<i>Ericoid element:</i>	<i>Phylica cephalantha</i>
<i>Restioid element:</i>	<i>Thamnochortus punctatus</i>

Fine meshed traps have also been randomly distributed to assess general litter production. Both litter traps and decomposition bags are harvested at monthly intervals. Preliminary results of biomass changes and chemical analyses will be presented. Random quadrats (1 x 1 metre) have been distributed to monitor litter standing crop at six monthly intervals. Tethered leaves and wood blocks of specific shrubs have been left under parent plants and their mass loss is being assessed.

One of the major criticisms of decomposition bag designs is that they exclude the majority of detritivores. Experiments suggest that fauna excluded by a mesh aperture of 1,5 mm may not be important in the decomposition of certain proteoid elements of the fynbos.

COWLING R.

### Floristic and structural diversity of Fynbos and non-Fynbos vegetation along parallel altitudinal gradients

Matched sites in fynbos (nutrient-poor soils) and non-fynbos (base-rich soils) vegetation along an altitudinal gradient in the South Eastern Cape are contrasted. Communities are analyzed for total floristics, structural-functional attributes, species diversity relations and phyto-geographical affinities. (Data at present being analyzed.)

GARDNER A. J. & DAY J. A.

**Preliminary study on black waters in the fynbos region**

Low-nutrient soils often support a sclerophyllous flora which contains high concentrations of "secondary compounds". These chemically-complex compounds are high in polyphenolic groups and include tannins, flavenoids, coumarins and tannic and humic acids, together known as "humic substances". All are toxic to some degree and retard or inhibit decomposition of litter. These compounds are said to be produced by plants as anti-predator devices but may in fact play an equally important role in retarding decomposition and thus reducing loss of nutrients from the system. "Humic substances" leach into the soil and subsurface waters and eventually reach vleis and rivers. Their dark colour is imparted to the water and their acid nature results in low pH values in most waters where they occur in quantity.

The following questions were asked:

1. Are levels of polyphenols particularly high in fynbos-influenced waters?
2. Are polyphenol levels correlated with pH, colour and/or nutrients?
3. If correlations do exist, do they influence the distribution of zooplankton?

In ten local vleis, nutrients were found to be very low. There was a positive linear correlation between polyphenol levels and colour intensity ( $r = 0,99$ ); with two exceptions there was an exponential relationship between pH and colour ( $r = 0,94$ ) and a power relationship between polyphenol level and zooplankton diversity ( $r = 0,86$ ). Generally the number of species is inversely proportional to polyphenol concentration.

The vleis can be grouped into "black" fynbos-dominated waters which have low nutrients and pH, and high colour and polyphenol levels, and "white" waters with higher nutrients and pH, and lower colour and polyphenol levels. These occur in alien vegetation or are disturbed in other ways.

GUBB A.

**The vegetation of the Northern Cape**

**SUMMARY:** Upon PRELIMINARY survey investigation, Acocks Veld Types for this region can be subdivided to produce approximately 15 distinct types. The veld type which can undergo major reclassification is Kalahari Thornveld and Shrub Bushveld (16). — the poster presentation will display examples of each of these new subdivisions, in photographic form, and a detailed map of the Northern Cape showing their distribution (approximate).

Necessary footnotes will accompany each of the photographs and there will be a brief description of the contents of the presentation.

JARMAN M. L., BOSSI L. & SOMMERVILLE J.

**Satellite Images: an accurate and instant reflection of community structure and functioning**

Computer classification of Landsat data in the Langebaan-Saldanha area, Cape Province has produced spectral map classes which show good correlation with vegetation mapping carried out by classical techniques. An attempt was made to relate spectral reflectance classes to surface features along a gradient running east from the sea to the Langebaan Lagoon.

The satellite appears to distinguish classes on the basis of aspect, substrate and ground cover differences.

Results showed seasonal differences in cover status in certain communities. In June the extent of dense cover consolidated sand and limestone communities was 580 pixels (56 x 79 m), in September it was 615 pixels and in December 566 pixels. The increase between June and September is attributed to the effect of the spring annual vegetation component on ground cover, and the decrease in the same communities between September and December is attributed to the effect of leaf fall in the drought deciduous component on ground cover.

JONGENS-ROBERTS S. M., LAMONT B. B., MITCHELL D. T.

**The distribution of Phosphorus and Biomass in a proteoid element of fynbos vegetation**

The seasonal distribution of phosphorus and biomass in the proteoid, restioid and ericoid elements of coastal fynbos is being investigated. *Leucospermum parile* (Proteaceae), a conspicuous shrub at Pella (the Fynbos Biome Intensive Study Site) is receiving most attention at present. Coastal fynbos occurs on sandy soils of low nutrient status, including phosphorus, and water availability in the uppermost 40 cm of soil is negligible during the summer flush of vegetation growth.

Plants of *L. parile* are selected from burnt areas containing one year old seedlings (Clovelly soil form) or 4—5 year old mature plants (Constantia soil form). They are sampled at 2—3 monthly intervals, including times of flowering and new shoot and root growth. The one year old seedlings are removed intact from the soil after a preliminary search for proteoid roots in the upper 15 cm of soil. The canopy of the 4—5 year old shrubs is harvested, and 25 cm diameter soil cores are taken on a north-south transect centred on the stem axis to a depth of 90 cm. After removal of sand, the roots are separated under water into *L. parile* and other species. Curve-fitting is then used to derive an estimate of total root mass for the plant.

Plants are divided into leaves, stems, tap and lateral roots, and new and old proteoid roots. The mature plants are divided further into growth flushes (stem and leaf), buds, new and old flowers, and senescent leaves. Early indications are that the flush of shoot growth (summer) is out of phase with the flush of root growth (winter). The oven-dried parts are weighed and analysed for phosphorus by the tri-acid digestion procedure.

LAMBERT, G.

**Animal, vegetable or mineral?**

The upper sector of the littoral zone of the rocky shore at Umdoni Park, Natal South Coast, apparently supports a sparse, species deficient macroscopic community because of the long periods of emergence between tides.

Scanning electron micrography has revealed that this community is complemented by a diverse microflora of autotrophic and heterotrophic organisms. They, in turn, are preyed upon by the dominant grazer, *Littorina africana* (Gastropoda).

Micrographs, in this poster, show structures of possible plant origin which occur in microscopic hollows in the Table Mountain Sandstone

on this rocky shore. They are visible to the naked eye as tiny green spots. High magnification suggests they are filamentous or fibrous, and they have an interesting surface texture.  
Can anyone suggest what they are?

LAMBERT G.

**The role of a diverse microflora within a rocky shore community at Umdoni Park, Natal South Coast.**

The upper sector of the littoral zone of the rocky shore at Umdoni Park, Natal South Coast, apparently supports a sparse, species deficient macroscopic community because of the long periods of emergence between tides.

Scanning electron microscope studies have revealed that this community is complemented by a diverse flora of autotrophic and heterotrophic organisms, including algae, fungi and bacteria. They, in turn, are preyed upon by the dominant grazer, *Littorina africana* (Gastropoda).

The widespread distribution of the dominant autotrophs, members of the Cyanophyceae, is attributed to their unpalatability to *Littorina africana*.

LE ROUX A. & PARSONS R.

**The biology and status of the Groen River Nature Reserve Namaqualand**

The suggested boundaries of the Green River Nature Reserve Namaqualand are outlined; some habitat, vegetation and fauna composition are shown and the current conservation status of the reserve is discussed.

LINDER H. P.

**A comparison of the initial stages of post-fire regeneration in *Protea laurifolia* scrub and Renosterveld on the Piketberg**

The first three years of the regeneration of the vegetation after a severe summer fire on the Piketberg was recorded. Although the sites are only two km apart and almost at the same altitude, the one is on shale with Renosterveld as the mature vegetation, while the other is on soils derived from sandstone, with *Protea laurifolia* as the mature vegetation. The sites were sampled every six months. For each species the number of individuals, total cover, average height, mode of regeneration and the reproductive state was recorded. The species richness, total vegetation cover and vegetation structure was also noted. The data show that there are basic differences between the Renosterveld and the *P. laurifolia* shrub, and indicate some complex patterns of interreactions between the seed regenerating and the coppicing plants.

LOW A. B.

**Aspects of soil and plant nutrient status in fynbos vegetation of the Western Cape**

Major and micro elemental contents of sandstone parent material and soils in the Western Cape were shown to be amongst the lowest in the world. Variation in soil nutrient status in several localized areas was positively correlated with soil organic matter, a phenomenon presumably typical of a low nutrient system, where most elements are bound up in the organic fraction.

Implications of net differences in soil nutrient pools between different communities as well as seasonal fluctuations in nitrogen and phosphorus levels are discussed; high C/N and C/P ratios found are related to possible microbial and plant response.

Some data from podzolised sands under coastal fynbos are included, and variation with depth, and the presence of a ferruginous B horizon is dealt with.

Plant tissue nutrient concentrations were also shown to be low, with trends apparent within certain families.

Individuals tolerating lower nutrient levels in their photosynthetic tissue may be better disposed to survive in areas which are nutrient depleted due to fire, leaching and other effects.

LOW A. B. & RICKETTS M. H.

**Community characterization in fynbos vegetation**

Preliminary observations in certain fynbos communities with specific structural (and floristic) properties appear to indicate the presence of intrinsic leaf, soil and arthropod characteristics. Specific plant communities display narrow ranges in soil nutrient levels while the same phenomenon may be true of nutrient concentrations in various leaf forms. Arthropod composition appears also to be specific to certain plant communities. With a knowledge of the basic structure and floristics of a community, non apparent properties such as soil and leaf nutrient levels and possibly arthropod composition may be extrapolated from previously acquired data.

MOLL E. J.

**Is Fynbos being burnt to death? — *Stavia Dodii* as an example.**

A study of the biology of *Stavia dodii* bolus, a member of the Cape endemic family Bruniaceae, indicates that it is an obligative seed regenerating species following fire. A fire frequency of less than 10 years would cause the eventual extermination of the species, which today survives in 14 known populations in the Cape of Good Hope Nature Reserve.

Regular, fairly short cycle firing of Fynbos has been a feature of the management of this heathland vegetation type since the arrival of European settlers. Today much of the Fynbos is managed by the State and the recommended fire regime is on a cycle of less than 12 years. There is some evidence to suggest that some areas should be protected from fire for considerably longer periods, and that the present research findings are inadequate to answer even some of the most basic conservation problems.

MOLL E. J.

**Table Mountain conservation: fiction or reality**

The conservation status of Table Mountain has, and still is, causing considerable concern amongst conservationists despite recent promising developments. In 1951 the area (5 300 ha) was proclaimed a national monument. In 1974 the Cape Town Section of the Mountain Club of South Africa published a report on the preservation of Table Mountain, drawing particular attention to the increasing threat of soil erosion, alien plants and alien animals. In 1976 Moll and Campbell reported on the "Ecological status of Table Mountain" and in 1977 McLachlan and Moll compiled a "Path and recreation survey" of the Mountain. It was the 1976 report that finally precipitated central government action which resulted in the appointment of Dr. D. Hey as a one man commission of enquiry to report on the "Future Control and Management of the Table Mountain and the Southern Peninsula Mountain Chain." The "Hey" report was completed in 1978 and the recommendations which were accepted gave conservationists grounds for considerable optimism. However, conservation has been defined as "wise management" and until the present we have yet to see any effective conservation action — so far it has all been talk.

PUTTICK G. M. & GLYPHIS J. P.

**Herbivory in Strandveld**

We examined relative levels of arthropod and ungulate herbivory in Strandveld and assessed this in relation to nutritive and secondary compound levels present in the plants.

Data are presented relating amount of herbivory to leaf total polyphenol levels, protein and fibre content.

RAITT, L. M.

**The floral biology of *Moraea*.**

The flowers of many species of *Moraea* are short lived, opening at relatively constant times during late morning to early afternoon, and fading late the same day. The opening time appears to be unaffected by normal variations in light, temperature, humidity and wind. Flowering is strongly synchronous, but the mechanism is as yet unknown. Specialised floral structure and characteristic opening times suggest specific pollinators.

SCHÜTTE K. H. & ACHLEITNER K.

**Protea water relations: Dendrographic studies**

The diurnal stem contractions of *Protea* species studied so far differ from those of typical woody plants such as poplar, especially in that they continue to expand or rehydrate all night. *Protea repens* is taken as an example of a protea. The relationship between the evaporating power of the air (V.P.D.), transpiration and stem contraction (strain) is depicted. The details of the diurnal cycle are also shown.

The basis of strain-gauge dendrograph construction and use is depicted.

SIEGFRIED W. R. & CROWE T.

**Patterns of bird and vegetation diversity in fynbos: classical bird/vegetation hypotheses don't always work**

Patterns of bird and plant distribution and diversity are described, using uni- and multi-variate statistical methods, for 11 sampling sites situated in four main vegetation types in the Fynbos Biome (Strandveld, Coastal Renosterveld, Coastal Fynbos and Mountain Fynbos). The flora and avifauna of these sampling sites is composed of two suites of species which inhabit montane and lowland areas respectively. Although lowland sampling areas tend to harbour twice as many bird species as montane sites, unlike most studies of bird/vegetation relationships, patterns of bird species diversity cannot be predicted by changes in site vegetation floristic or structural diversity. However, the lowland avifauna occurs in a greater variety of vegetation types (e.g. Strandveld, Coastal Renosterveld and Coastal Fynbos) than the montane avifauna, which is restricted to Mountain Fynbos. Moreover, species which characterize the lowland avifauna tend to occur in only one or two vegetation types. Bird species diversity at montane sampling sites is apparently independent of time since the plant community was affected by fire, once the post-fire plant community is four years old. However, during the six-month period following a fire, the species richness at a montane site was depressed significantly, and the composition of the avifauna was transformed into a distinctly non-fynbos one.

SOMMERVILLE J. & MOLL E. J.

**Community growth studies**

The seasonal growth of some 60 % of species in each of four communities was observed for 14 months. The communities chosen represented the four major vegetation types in the mediterranean region of South Africa. These were two heathland communities; mountain and coastal fynbos and two non-heathland (shrubland) communities; coastal renosterveld and W coast strandveld. The results showed that the heathlands exhibited a summer growth peak while the shrublands had a large summer deciduous component. Soil data indicate that the heath communities grow in acid sands with a low phosphorus content, the shrub communities grow in more alkaline soils with a higher phosphorus content. These growth and soil data support Specht's mediterranean heathland-shrubland dichotomy.

STOCK W. D. & LEWIS O. A. M.

**Distribution and seasonal variation of soil nitrogen in a fynbos community**

The distribution and seasonal variation of the different forms of soil nitrogen was studied in a coastal fynbos community. Total nitrogen content of the Clovelly soil form examined was low. Mineral nitrogen, namely nitrate and ammonium, contributed little to the total nitrogen content.

The vertical distribution of nitrogen shows a decrease in nitrogen with depth, which corresponds to organic matter distribution. Horizontal distribution of nitrogen revealed that the soils were locally very variable and no significant differences in nitrogen content of rhizosphere regions of different species were apparent. Preliminary investigations of seasonal variations in organic and mineral nitrogen indicate little change in nitrogen content and a low seasonal nitrogen turnover.

STRAKER C. J. & MITCHELL D. T.

**Phosphatase activity and polyphosphate accumulation in ericoid mycorrhizas**

The endomycorrhizal fungi have been isolated from root systems of *Vaccinium macrocarpon* Ait., *Rhododendron ponticum* L. and *Calluna vulgaris* (L) Hull in the United Kingdom (by Dr D J Read, University of Sheffield) and isolates from South African ericas at Kirstenbosch, South Africa. These isolates grow on a malt extract agar and Norkrans medium. Using a modified Norkrans medium containing sodium inositol hexaphosphate as the sole phosphorus source, all five cultures were fractionated into insoluble, soluble and extracellular components and these fractions were tested for acid phosphatase by measuring the rate of conversion of p-nitrophenyl phosphate to p-nitrophenol. Insoluble acid phosphatase was the most active enzyme and its rate of activity was concomitant with dry mass mycelial growth and protein content. An active soluble and extracellular acid phosphatase was found in the *V. macrocarpon* and *R. ponticum* mycorrhizal fungi but the activities of these were lower than the insoluble phosphatase. Using toluidine blue-stained hyphal mounts, polyphosphate metachromatic granules were detected in the ericoid mycorrhizas of *V. macrocarpon* and *R. ponticum* and granule numbers increased during the lag phases of mycelial growth.

VORSTER P.

**Plakkaatreferaat: "Pelargoniums of Southern Africa, Vol. 2"**

Een van die doelstellings van die biosistemiese ondersoek van die genus *Pelargonium* (fam. Geraniaceae) wat onderneem word aan die Departement Plantkunde by die Universiteit van Stellenbosch, is om 'n reeks geïllustreerde boeke oor *Pelargonium* op te stel. Die eerste hiervan het in 1977 verskyn onder die titel "Pelargoniums of Southern Africa" en het 'n verskeidenheid van 50 spesies behandel. Die tweede volume, wat 'n verdere 50 spesies behandel, is tans in voorbereiding. Daar is besluit om die teks uit te brei en te intensifiseer sodat dit 'n omvattende naslaanwerk kan wees vir lesers met 'n verskeidenheid van belangstellings. Vir die taksonoom word beskrywings vir elke spesie voorsien, asook die basiese inligting met betrekking tot nomenklatuur en tipifisering. Vir die plantgeograaf word die verspreiding en natuurlike groeitoestande bespreek. Vir die leser met 'n meer algemene belangstelling asook mense wat die plante sou wou kweek, word interessantheite oor die geskiedenis en verwantskappe vertel, en voorstelle gemaak oor hoe die plante vermeerder en gekweek kan word na aanleiding van ons ondervinding. Die teks word toegelig met 'n lewensgroot waterverftekening van elke spesie wat behandel word.

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