

A SURVEY OF THE WORK OF THE ROYAL BOTANIC GARDEN EDINBURGH IN 1982

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GENERAL REVIEW

In spite of ever-present difficulties in shortage of staff due to Government policies, there were many bright achievements in 1982. Much of the hard work on rhododendrons came to fruition. The second and major part of the revision of the genus was published and the International Rhododendron Conference was held successfully in May. The Conference was well attended with considerable parties from Australia and the United States.

It is pleasant to note also that the working facilities and the first staff house at Dawyck came into use so that much of the disruptive construction work is finished and attention can be concentrated on horticulture.

Work on various Floras has progressed well, but both the Arabian and Bhutan projects had their disappointments. The hoped-for arrangement with Arabian countries in relation to preparing a Flora for them has not been finalised and the first part of the Bhutan Flora, although written some time ago, suffered from printing difficulties which were at last overcome towards the end of the year.

At a time when unemployment runs at a very high level, it is worth noting that our training programme for students in amenity horticulture seems to find acceptance by the industry for, by the autumn, our small output in July had all found jobs.

The Garden has always benefited from outside workers visiting Edinburgh to study our collections. This has continued at the same high level and we have continued to benefit from the scientific work and the plant introductions of Mr B. L. Burt in his retirement. The Edinburgh Botanic Garden Trust has also materially contributed in small but important ways to the arrangement of the Garden's botanical archives and by supporting younger botanists in travels abroad.

The exceptionally cold winter which began well before Christmas caused much damage to plants normally regarded as hardy and brought outside work to a halt for lengthy periods. Planned projects had to be postponed or

abandoned so that winter damage and losses could be made good. Most surprising was the loss of many *Daboecia*, *Calluna* and *Erica* cultivars.

The public have continued to support the gardens. Attendance in Edinburgh is comparable to 1981 at over 600,000. The outstations suffered small falls which, however, were generally less than the average for other country gardens open to the public, and reflected the general drop in the tourist industry.

TAXONOMIC RESEARCH

SOUTH WEST ASIA: FLORISTIC STUDIES

1982 saw the publication of the seventh volume of P. H. Davis' *Flora of Turkey* and also the 2-partite Labiatae volume of K. H. Rechinger's *Flora Iranica*. Several members of the herbarium staff had, over a number of years, been involved in one or both these works as contributors of accounts or of artwork, or in handling loans. With these two major works published there is now much curation of SW Asiatic material to be done in order to bring it into line with these and other Floras of the region.

Early in the year there were no fewer than six Turkish botanists working in the herbarium, mostly naming up their collections; at least in this instance the increased number of people using the collections for reference and research had a direct connection with the progress of the Turkish Flora. Before the Flora project started, i.e. in the late 1950s, there were few visiting botanists from Turkey—and indeed there were relatively few Turkish botanists.

Because of the continued troubled situations in Iran and Afghanistan, hardly any new collections have come in from there and our active contacts are much fewer than in the past. However Miss J. M. Lamond completed accounts of various genera of Umbelliferae for *Flora Iranica*.

Our Arabian collections expanded appreciably during the year, especially from W and E Saudi Arabia, N Yemen, Oman and the United Arab Emirates. Keeping up-to-date with handling and naming the specimens was often difficult. In the course of a few years we have built up our collections from minimal to relatively comprehensive. This has come about both through mostly UK-based collecting trips and, just as important, the enthusiastic activities of expatriates in different parts of the peninsula. South Yemen remains the botanically least known area. Rose King had a profitable 3 weeks' collecting trip in N Yemen in November and December; she travelled with a small group from Bayreuth University. Although relatively little was written up for publication in the year, an illustrated field-key and check-list of the c. 50 Arabian genera of Cruciferae was submitted to a new Riyadh-based journal.

LEVEILLE CATALOGUE, ETC.

Part XVI of the Catalogue containing, among others, the large families Euphorbiaceae (D. McKean) and Urticaceae (L. A. Lauener) is in press. Work has been concluded on Part XVII which is the final part of the dicotyledons and includes Betulaceae, Fagaceae and Salicaceae. This part has now gone to press together with Errata & Emendata II. A complete

index of all the Lévillé dicotyledons published in the 17 parts is now being compiled for publication. Following this it is hoped to reproduce all parts of the Catalogue and the index in a comb-bound edition.

A paper by Mr Lauener and Miss Paul on Robert Graham type specimens has been completed but is being held over temporarily in view of the discovery of some types at Florence.

ERICALES, ETC.

Dr Chamberlain's revision of the non-scaly species (subgenus *Pontica*) of *Rhododendron* was published during the year, completing taxonomic work on the hardy species of true rhododendrons. Dr Chamberlain is continuing research on some of the minor groups of the genus still outstanding, in particular, one of the 'Azalea' groups (subgenus *Tsutsusi*) and, in collaboration with Mr C. M. Hu, has begun a revision of *Berberis*, of which an account of section *Wallichianae* has already been prepared. Dr Argent has continued to study the tropical representatives of the genus (subgenus *Rhododendron* section *Vireya*) and other tropical Ericaceae generally, making extensive use of the large collections of living material now assembled at the Garden. The Second International Rhododendron Conference was held in Edinburgh during May; many members of staff attended the various sessions, and Dr Chamberlain, Dr Argent and Mr Bennell presented papers. In November, Dr Cullen and Dr Chamberlain attended a meeting of the Royal Horticultural Society's Rhododendron group, to explain the new classification to interested growers and breeders. Dr Cullen gave a paper on the use of herbaria and libraries at a Systematics Association meeting held at Reading University in July.

THE EUROPEAN GARDEN FLORA

Taxonomic work on the first volume to be published (which will actually be volume II of the whole) was completed during the year, and Dr Cullen, Miss Matthews and Dr Alexander (the project's Research Associate) spent much time editing the final typescript, which will be submitted to press in January 1983. Volume II contains taxonomic accounts of 17 families, 402 genera and 1,663 species of cultivated monocotyledons. The large typescript was prepared by Miss Linda McGhee of the St Andrew's House typing pool, who worked at the Garden from October to December.

ZINGIBERACEAE

Miss R. M. Smith has completed an account of the family for the new Flora of Australia. Work has now commenced on an annotated check-list of the gingers of Borneo as a whole. A steady flow of requests for identifications, advice and material occupies much of Miss Smith's time.

BHUTAN FLORA PROJECT

Mr Grierson and Mr Long made their third expedition to Bhutan from the end of January to the beginning of May 1982. It was largely devoted to collecting in the subtropical forests in the south of the country, which have been less thoroughly explored botanically. The collection which numbers almost 2,000 specimens has yielded some valuable new records.

Technical problems during the first half of 1982 continued to dog the

production of the first part of the *Flora of Bhutan* and eventually necessitated changing both type-setters and printers. Publication is now set for March 1983. Work on the preparation of Part 2 is well advanced.

CONIFERS & PTERIDOPHYTES

A steady flow of international requests for identification, advice, editorial work, and scientific refereeing continues on both groups, including cultivated, conservational and palaeobotanical aspects, as well as taxonomic ones. Conifer and pteridophyte accounts and illustrations have been completed for the 'European Garden Flora', and those on conifers for 'The Families and Genera of Seed Plants and Ferns' have commenced. It is heartening that increasing external interest dictates that both pteridophytes and conifers are now almost always included in such international contributions, but this makes increasingly heavy demands on the very few appropriate staff anywhere to do this.

Dr Page's teaching commitments have continued to maintain close links with the University of Edinburgh, involving him in lectures, practicals, fieldcourse projects and joint-supervision at PhD level of the research programme on bracken biology, as well as external liaison with undergraduate and postgraduate pteridophyte and conifer projects at other universities. British pteridophyte fieldcourses to the Field Studies Council also continue.

Jointly with the University, Dr Page has been involved in the planning of the International Symposium on Pteridophyte Biology, to be held in Edinburgh from 12-16 September 1983.

A close liaison has been maintained between scientific and horticultural conifer interests in relation to outstation development. The acquisition of Dawyck has meant considerably more work in this area, but almost all existing conifers at Dawyck have now been identified and future conifer development and outline planting plans drawn up. This brings conifer proposals for Dawyck into line with those for other outstations, so species can be grouped in the most appropriate sites in the very different climates, minimising duplication.

Lastly, liaison with overseas botanical and forestry bodies over many years has resulted in a valuable flow of conifer seed materials from wild origin sources, often of considerable scientific interest. Our resulting living conifer collections are now probably the most comprehensive anywhere. These are being used both experimentally and to back up the herbarium, where seedling and juvenile stages can be particularly valuable. Continuing co-operative hormone-injection experiments with this new material (jointly with ITE's Institute of Tree Biology) has resulted in some spectacular successes at inducing pollen and cone production in species in which this is seldom seen. These facets, plus Dr Page's techniques for preservation of conifers, have resulted in the amassing of considerable additional conifer herbarium material, but with other commitments and in the absence of supporting scientific staff, incorporation of herbarium material and the basic taxonomic and experimental research resulting from it has come to a virtual standstill.

BRAZILIAN FLORA STUDIES, CYTOLOGY, ETC.

Dr Ratter's research time was spent in the identification of the collection made in Belize during 1981, and in the preparation of a Portuguese version of his guidebook to the vegetation of the ecological reserve of Fazenda Água Limpa. He also visited Brazil for nine weeks in August and September, financed jointly by the Royal Society and the Brazilian CNPq, and gave fieldcourses for post-graduate students of the University of Brasília in both the Federal District and in NE Mato Grosso. In addition a paper was given to the VI Reunião Nordestina de Botânica at the Federal University of Paraíba in João Pessoa, and a visit made to the University of Campinas.

As in the previous year, virtually no time was available for cytological work because of lack of assistant staff.

BRITISH HERBARIUM

Mr D. McKean and Miss H. Paul continued to deal with queries from the public, as well as with specimens sent for determination in connection with the Flora of the Lothians project.

As in previous years survey work was carried out in conjunction with the Nature Conservancy Council. This year the Sutherland mountains of Ben Hope, Foinaven and Ben Loyal were covered.

The work of sorting through the Mackechnie herbarium has now been completed, but it will probably be some time before the specimens are incorporated into the herbarium.

BASIDIOMYCETES

Studies on agarics (Dr Watling) particularly those in the Bolbitiaceae and Boletaceae and the genus *Armillaria* have continued, the last in collaboration with Dr Glen A. Kile, CSIRO, Division of Forest Research, Stowell Avenue, Hobart, Tasmania, Australia. Work is also well underway with the next part of the *British Fungus Flora: Agarics and Boleti: Pluteaceae* whilst Part IV *Lactarius* is still being prepared by R. Rayner.

Extremely useful studies have resulted from collaboration with members of the Forensic Science Unit, Department of Pharmaceutical Chemistry, University of Strathclyde, where particular attention has been paid to the toxic members of the genus *Cortinarius*. Close ties with Scottish Office, Department of Home and Health, and the Poisons Bureau, Royal Infirmary, Edinburgh, have been maintained and strengthened especially now poisoning through ingestion of mushrooms is increasing.

Dr Watling undertook a very successful visit during April, May and June to Australia, collecting and lecturing in several centres; a report has been submitted to the British Council who funded his travels. Courses on the identification of fungi have been conducted at Sheffield University, and Kindrogan, and one on culturing agarics at the University of East Stroudsburg, Pennsylvania. Lectures have been given to local organisations and a paper was read at the Symposium on 'Data bases in Systematics' held at the University of Southampton.

Experimental work is minimal because of staff shortages, and even maintenance and curation of the main herbarium collections is threatened.

Norma Gregory continues to work with Dr Watling for half her time. All British records of Gasteromycetes from the herbarium, a Scottish literature survey, and manuscript lists have been collated in connection with the British Mycological Mapping Scheme.

P. D. Orton (Associate) has completed a further part of his ongoing revision of British Agarics.

Mr Bennell has continued to work towards a revision of the rust genus *Chrysomyxa*. His associated studies of the pathology of *C. rhododendri* were reported in a paper given at the Second International Rhododendron Conference in May.

Mr Bennell has also made EM studies of fungal spores, including a cytochemical study of wall development in *Puccinia prostii* with Mr Jeremy Grierson (visiting research student), and an examination of spore walls in the genus *Armillaria* in collaboration with Dr R. Watling.

Janis Sweeney (vacation student) assisted Dr Watling in a developmental and anatomical study of agaric primordia.

ASCOMYCETES & LICHENS

Dr Coppins completed his revision of the lichen genus *Micarea* in Europe, and has begun studies on the genus in other regions. Various miscellaneous studies on lichenized and non-lichenized fungi are continuing. Some of these are in collaboration with Prof. P. M. Jørgensen who is visiting the Garden on sabbatical leave from the University of Bergen. Prof. Jørgensen has also undertaken studies on British oceanic lichens, the genera *Belonia* and *Leptogium*, and the Pannariceae of Australasia.

Dr Watling's interest in members of the Xylariaceae continues and a study of the distributions of British members has been prepared.

GENERAL MYCOLOGY

Dr Watling, B. J. Coppins and A. Bennell with Dr C. S. Millar (Department of Forestry, University of Aberdeen) prepared surveys of larger fungi, lichens and fungal pathogens of British arborescent birches respectively. The results were summarised for presentation to the Botanical Society of Edinburgh Birch Symposium in September. A comprehensive catalogue of fungi on *Betula* in the United Kingdom is now being prepared by the same contributors.

LABORATORY

As a supplement to the survey of pollen in the genus *Lysimachia* which was completed in 1982, Mr Bennell and Mr C. M. Hu (Canton, China) described two new species in the genus.

Mr Bennell is collaborating with Mr R. McCullagh of the Central Excavation Unit in the establishment of a reference collection of wood and charcoal specimens for archaeologists.

The installation of a replacement Scanning Electron Microscope, a Jeol T200, in November, has not only revitalised ultrastructural studies, but also, as a multi-user instrument, constitutes a valuable tool at the disposal of all staff.

THE HERBARIUM

ACCESSIONS, LOANS & SPECIMENS MOUNTED

Exchange accessions in 1982 came from 37 sources and amounted to 3,130 specimens, including a set of 570 Schlechter South African collections from Zurich. Although our 'distributions' were well down this year, exchanges have continued with Erevan, Leiden, Canberra, various Chinese Institutes, Ankara, etc. Not included in the distribution total are the c. 10,000 specimens (mostly British) from the R. Mackechnie herbarium which went to the Kelvingrove Museum, Glasgow.

Gifts or collections by staff members numbered c. 8,237, almost half of which were specimens from the Arabian peninsula collected by Sheila Collenette, Michael Gallagher, Robert Western, Ken Naylor, John Grainger, Andrew Podzorski, John Maconochie, Klaus Müller-Hohenstein and K. Stanley-Price. The steady flow of important collections from southern Africa (O. M. Hilliard & B. L. Burt) continued (c. 1,200 specimens).

	1981	1982
Accessions	15,648	12,010
Distributions	12,114	919
Loans: in	4,065	6,000
Loans: out	6,922	5,869
Specimens mounted	14,351	14,239

CURATION

Following the installation of 243 new steel herbarium cabinets in 1981 and some rather complicated sums (at least for botanists), the much-needed and major easing-out of the collections was completed in the first quarter of the year. It involved moving the contents of each shelf on both herbarium floors (c. 30,000 shelves in all), loosening out where necessary, splitting covers and re-labelling most cabinet doors. Although another major move-round of the phanerogams should not be necessary, as far as can be anticipated, for another 8-10 years, there could well be areas of local pressure before then. Twelve empty cabinets were left interspersed throughout the top floor and 13 on the lower floor.

The move gave the opportunity to note areas of the herbarium in special need of curation. Certainly there is much curation needed throughout the phanerogams and yet this fundamental necessity of herbarium work can all too easily be neglected in favour of more original research.

One of the herbarium ASOs, Mrs L. A. Gibb retired early in the year and was replaced in June by Miss Allison McRitchie; a further staff change resulted from the sudden death in February of our Senior Paperkeeper, Mr Jimmy Adams—his replacement was Mr Bill Nicholson.

PHOTOGRAPHIC SLIDE COLLECTION

About 900 slides were added to the collection, including over 100 from China photographed in the wild by Mr R. J. Mitchell (University of St Andrews) and about 500 of fungi, mosses and liverworts from the bequest of Miss H. Melville.

VISITORS

Our longer-term visitors in 1982 were: Mr Hu Chi-ming (Kweichow) who left in September after almost two years with us; the Turkish botanists Drs Tuna Ekim (Ankara), Ali Engin (Erzurum), Sadik Erik (Ankara), Adil Güner (Ankara) and Mecit Vural (Konya); Prof. O. M. Hilliard (Pietermaritzburg); and Prof. P. M. Jørgensen (Bergen) who arrived in June for a 10-month visit to work mainly on lichens.

Dr Musa Doğan, from Ankara, left in the summer after spending almost five years in Edinburgh, during which he completed his PhD on Turkish grasses.

Other regular users of, or residents in, the herbarium were Drs Kit Tan and R. R. Mill of the Flora of Turkey unit, together with Prof. P. H. Davis, Mr Anton Doroszenko (PhD student), and our two evergreen (nominally retired) staff members, Mr B. L. Burtt and Mr H. H. Davidian.

There were the customary close links with botanists at the Universities of St Andrews, Aberdeen, Stirling and Edinburgh and visits by their students. Not included in the following list are the numerous botanists who participated in the spring *Rhododendron* symposium.

Other visitors:

Dr C. D. Adams (at British Museum), Dr J. R. Akeroyd (Reading), Prof. A. Al-Rawi (Kuwait), Dr R. K. Brummitt (Kew), Dr P. F. Cannon (Kew), Dr S. Chaudhary (Riyadh), Dr Chen Yi-Lin (Beijing), Mrs S. Collette (Sway, Hants), Dr T. Cope (Kew), Dr R. Corner (Penrith), Mr P. Cox (Glendock), Dr M. D. Crisp (Canberra), Mr A. C. Crundwell (Glasgow), Dr F. Davies (Kew), Dr & Mrs M. Dittrich (Geneva), Dr J. Edmondson (Liverpool), Prof. H. Ern (Berlin), Dr C. Ferreira (NCC), Prof. B. W. Fox (Manchester), Prof. A. C. Gabrielli (Unicamp, Brazil), Dr O. L. Gilbert (Sheffield), Dr J. Grainger (Jeddah), Dr C. Grey-Wilson (Kew), Mr E. W. Groves (British Museum), Dr Z. Gvinianidze (Tbilisi), Dr A. P. Hamilton (North London Polytechnic), Miss D. Hillcoat (British Museum), Dr C. J. Humphries (British Museum), Dr P. W. James (British Museum), Dr C. Jermy (British Museum), Prof. C. A. Joly (Unicamp, Brazil), Dr W. M. Klein (Philadelphia), Dr S. Kurucu (Ankara), Mr A. Lamb (Sabah), Dr J. Maconochie (at Muscat), Mr J. P. Mandaville (Dhahran), Dr R. B. Marx (Rio de Janeiro), Prof. R. Monteiro (Rio Claro, Brazil), Mrs B. Murray (Fairbanks), Mr I. B. Oliver (Bloemfontein), Dr A. C. Podzorski (Sweden), Prof. D. Porter (Virginia), Mr J. Shah (at Aberdeen), Dr Shang Chih-bei (at Paris), Prof. G. Shepherd (Unicamp, Brazil), Dr & Mrs Stanley-Price (Oman), Mrs O. Stewart (Edinburgh), Prof. N. Taroda (Unicamp, Brazil), Prof. S. Taylor (Connecticut), Mr R. Western (Abu Dhabi), Mr R. Whitcombe (Durham), Dr H. Willcox (at British Museum), Mr J. R. I. Wood (Liss, Hants), Prof. K. Yamamoto (Unicamp, Brazil), Dr J. Zarucchi (at British Museum).

THE LIBRARY

In addition to the normal purchases, exchanges and gifts, the library received from the Gifts and Exchange Section of the British Library Lending Division a considerable quantity of back numbers of journals to fill gaps in holdings, as well as some other books. Interlending was deliberately curtailed to gain some staff time to attend to preparing journals and books for binding and repair. More volumes were sent to the binders than in the previous year, but nowhere near the number required. The backlog of binding has grown even further. A new periodicals holding list was prepared and it should be available to staff early in 1983. The number

of visitors using the library rose again. Staff shortage continues to prevent the performance of necessary 'housekeeping' jobs and curtailed other work.

Statistics of library transactions were fairly similar to 1981 (the figures for which are in brackets): acquisitions 2,911 (2,837), indexing 3,746 (4,228), exchanges 1,054 (1,039), interlibrary loans 824 (1,039), binding 233 (91), and visitors 783 (741).

PUBLIC EDUCATION & SCIENTIFIC LIAISON

1982 saw the final removal from the Exhibition Hall of all the old exhibits, some of which had been in use since 1970, and their replacement by new exhibitions.

The 2nd International Rhododendron Conference was held at the Botanic Garden in May and was supported by a major exhibition on the background to rhododendrons in cultivation.

The Conference was organised by Dr C. C. Wood (who has since left the Botanic Garden for the National Vegetable Research Station at Wellesbourne) and attracted over 100 specialists from all over the globe. It was a considerable success and the proceedings are to be published at a later date.

The other major exhibit prepared for the Exhibition Hall was entitled 'Plants of Edinburgh' and dealt with the problems faced by plants growing in a city environment. It emphasised the success of plants well adapted to urban areas. Smaller exhibits on *Diapensia lapponica* and the flowering of six bamboos were also mounted.

From September to November the Exhibition Hall played host to an exhibit prepared by the Philadelphia Tercentenary Gardens Collaborative. Entitled 'Penns Woods and Fields Revisited' it dealt with the links between British and North American horticulture.

The Garden contributed to two 'Interlink' programmes during 1982, one in January on deserts and the other in November on water and plants.

Several members of staff helped the BBC with a television series 'Mr Smith's World of Flowers' which dealt in 10 programmes with different groups of plants. The Garden was closely involved with the programmes on alpinism, rhododendrons and primulas. The series was broadcast between January and March 1983.

PUBLICATIONS

Three parts of *Notes RBG Edinb.* were published during 1982: vol. 39(2): 209-486; 40(1): 1-246; and 40(2): 247-424. These contained a total of 29 papers and 7 book reviews. Volume 39(2) was devoted to Dr Chamberlain's revision of *Rhododendron* subgenus *Hymenanthes* and an extra two thousand copies of this part were printed to meet expected demand. In addition, vol. 40(3) went to press during the later part of the year and is due for publication in the spring of 1983.

PUBLICATIONS BY MEMBERS OF STAFF IN 1982

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THE GARDEN, EDINBURGH

Total admissions to the Edinburgh Garden were 670,606—an increase of nearly 30,000 on the 1981 figure. The highest day total was 15,650 on Sunday, 30 May.

ARBORETUM DEPARTMENT (Mr. G. Broadley)

At the end of April the first stage of the project to accommodate the lepidote rhododendrons in the M areas (Old Herbarium) was completed. The second stage which was started in November should be complete by the end of March 1983.

In December the remnants of the old azalea plantings were removed. This was followed by preparation for a new scheme. The new layout will endeavour to explain the development of modern azaleas. They will be planted in type groups linked by the species used in their hybridisation. Explanatory notes will be supplied for public use. The main work should be complete by the end of April 1983.

During the summer many trees and shrubs died as a result of damage caused by the preceding severe winter.

Preparatory work was carried out prior to the re-organisation of *Rhododendron* subgenus *Hymenanthes* scheduled to start in the winter of 1983–84.

GLASS DEPARTMENT (Mr L. Buchan)

In January PSA started a major maintenance programme in the Plant Exhibition Houses. Scaffolding had to be erected in each house to allow engineers to replace and service components of the ventilation system. The project lasted throughout the year (except for the months of July to September—kept free to allow the public to visit the Houses in the main holiday season). The Temperate House proved to be the most difficult to complete and the scaffolding remained in position there for three months. In May the sandblasting and painting of the Temperate and Tropical Palm Houses was started—the project, involved scaffolding in both Houses, lasted until December.

In the Exhibition Hall area a building site was created to display the natural flora of wasteground areas in the City of Edinburgh. Help was given in the supply of plant material and mounting exhibitions; material was also supplied for decoration in the Exhibition Hall throughout the year.

Displays of pot plants were mounted at the DAFS buildings at The Royal Highland Show Ground, The Royal Scottish Academy, and The Royal Caledonian Horticultural Society Flower Show at Meadowbank Stadium.

The orchid *Paphiopedilum sanderiana* flowered for the first time at Edinburgh and was the centre of much botanical, photographic and painting interest.

Visits were made to the Glass Department by the Minister of State, Lord Mansfield, Dr Roberto Burle Marx, the well-known Brazilian landscape gardener, Ernest Shamir of Geneva Botanic Garden, and the BBC Film Unit (Pebble Mill at One).

HERBACEOUS & ALPINE DEPARTMENT (Mr A. Evans)

So many heathers were killed or badly damaged during the winter that the whole Heath Garden had to be replanted in the autumn.

Work on the Rock Garden held back by inclement weather earlier in the year reached a satisfactory stage by Christmas. A large area in the SW corner of the Rock Garden now accessible from grass paths has been renovated and will be open to the public by the spring of 1983.

The lepidote rhododendron project extended into borders containing herbaceous and bulbous plants which had to be transferred to newly cleared areas in the Woodland Garden and north of the West Gate entrance.

The Rose Garden and the Demonstration Garden, still under development, took up a great deal of time. Hopefully the work will result in an attractive and interesting feature during the years ahead, as will the construction work on a stream course that will permit the future development of a water garden extending from the Rock Garden to the Pond.

PROPAGATION DEPARTMENT (Mr J. A. R. Kerby)

Temperate Section. The work on rhododendron propagation as a back-up to future plans to resite the collections formed the main part of the winter propagation programme. Cultivation of *Rhododendron* from seed, mainly from the Sino-British Expedition to Cangshan, China, Mr McBeath's visit to Nepal, and other expeditions in 1981, continued.

The purchase of a small tractor with implements and trailer has mechanised cultivation techniques and transportation in the nursery.

The severe winter weather killed plants of borderline hardiness such as pittosporums and griselinias, in an unheated glasshouse; nerines in cold frames were also killed.

Tropical & Study Collections. *Gnetum gnemon* was successfully propagated. Adventitious shoots arising from the stem were selected and inserted in a closed case in 1981. Rooting took place slowly. Established plants are now between six and nine inches high. A plant of *Boswellia sacra*, 'Frankincense', collected by A. G. Miller in the Sultanate of Oman in 1979 was successfully propagated.

An interesting collection of *Nepenthes* has been built up following various expeditions to Sarawak and Sabah. Most of our existing collections were of unknown origin but they are being replaced with wild-origin plants of *Nepenthes villosa*, *N. rajah*, *N. rafflesiana*, *N. fusca* and *N. veitchii*. Thin hair-like *Nepenthes* seed take two months to germinate and growth from the seedling stage is very slow.

Rhododendrons of section *Vireya* new to cultivation have flowered successfully. *Rhododendron bagobonum* collected by Dr Argent on Mt Kinabalu, Sabah, in 1980 produced small orange flowers. Of particular note are the yellow-flowered *Rhododendron nieuwenhuisii* and the white-flowered *Rhododendron himentoides*, both collected in Mulu National Park, Sarawak in 1978.

The Zingiberaceae collection continues to expand with wild origin introductions from Nepal, Guyana and Borneo.

Biological Control. Due mainly to the increased cost of fumigants, biological control was tried in a number of areas. Both *Phytoseiulus persimilis*, for control of red spider mite, and *Encarsia formosa* for white fly control were used very successfully. A trial using *Cryptolaemus montrouzieri*, a predator on mealy bug, was less successful.

Notable Plants. *Crossosoma bigelovii*, a small twiggy shrub from the deserts of Arizona and California, produced small terminal flowers. *Stylidium brunonianum* from Australia, a rather delicate short-lived member of the Stylidiaceae, flowered successfully. Other plants of note that flowered were *Heteromorpha arborescens*, a woody member of the Umbelliferae from South Africa, the yellow-flowered climber *Tristellateia australasiae* in the Malpighiaceae and *Macrosiphonia vellame*, a member of the Apocynaceae with grey foliage, collected by Dr Ratter in Brazil.

Accessions. Total accessions of living material in the form of seeds, cuttings and plants numbered 3074 of which 2242 were of wild origin.

In February Mr R. Kerby, Assistant Curator of the department, visited Guyana. A number of Ericaceae were collected, including *Psamisia guianensis* which was identified after flowering in cultivation. Live plants of the pitcher plant *Heliamphora nutans*, various utricularias, Gesneriaceae and Bromeliaceae, including *Brocchinia reducta*, were also collected.

During March, Dr G. Argent and Mr I. W. J. Sinclair, Supervisor in the Tropical and Study Section, visited Sarawak and Sabah. A number of Gesneriaceae, Zingiberaceae and Ericaceae were collected. Of particular note was the collection of *Rhododendron salicifolium*, the first time this plant has been collected in the wild since 1912.

During May and June, Mr A. Grierson and Mr D. Long who made a return visit to Bhutan sent back five consignments of live Orchidaceae. *Tetracentron sinense* seedlings were also collected together with some Ericaceae (mainly *Agapetes*), Gesneriaceae, Araceae, Primulaceae, *Cupressus* and *Abies*.

In July, Mr G. Kirkpatrick, Supervisor in the Temperate Section, took part in the Edinburgh Sahara Botanical Expedition to Algeria, returning with a large collection of seed, including the endangered *Senecio hoggarensis*.

Further accessions included a large consignment of Orchidaceae from Mr T. Reeve, of the Highland Orchid Collection, New Guinea. Despite a lengthy period in transit the plants are now successfully established. A large collection of wild-origin New Zealand plants collected by Mr P. Seymour (University of Alberta, Edmonton, Canada) was received in May.

Dispatches. Live plant material within Britain and overseas:

326	— seeds
2348	— plants
2308	— cuttings
45	— bulbs
35	— scions
46	— specimens
<hr/> 5108	

PLANT HEALTH (Dr Watling)

Inspection of the material from several major expeditions, and other consignments has stretched the already limited resources of the laboratory staff. In total 115 interceptions were made: the majority of which were insects, particularly scales, some of which are rare and poorly known. The fungi intercepted were mainly leaf spots of no economic importance, except for a single unidentifiable *Uredo* on *Diplocaulobium* (Orchidaceae). However, the following species were found causing rots on material held for quarantine: *Nectria pallidula* on *Begonia*, *Fusarium oxysporum* on *Heurnia* (Asclepiadaceae), and *Oidium acrocladium* on *Caralluma* (Asclepiadaceae).

YOUNGER BOTANIC GARDEN
(Mr A. Hall)

Work commenced on phase 1 of the development of the Courtyard buildings, which will provide kitchen and dining room, washing, changing and toilet facilities for the garden staff as well as office accommodation for the Assistant Curator and Garden Supervisor. A cold greenhouse was built to provide shelter from the excesses of rain and wind for young container-grown plants.

Total rainfall for the year of 2618.4mm was well above average, but a comparatively dry spell from April to July enabled the garden staff to catch up on routine maintenance and make the garden presentable. Severe frosts in December '81 and January '82 caused the deaths of a number of long-established trees and shrubs, including *Berberidopsis corallina*, *Griselinia littoralis*, *Rhododendron sidereum*, *R. araiophyllum*, *Hoheria sexstylosa*, *Callistemon rigidus*, *Eucalyptus* spp., *Leptospermum* spp., and *Hebe* cvs. *Eucryphia cordifolia*, *Pittosporum tenuifolium* and a number of *Rhododendron* spp. were completely defoliated but are recovering slowly. Further additions were made to the conifer and rhododendron collections and a start was made on the construction of a concrete road to the woodyard, but otherwise the staff were engaged in routine maintenance.

One member of staff resigned during the year and has been replaced.

The total number of visitors from April to October was 30,037, nearly six thousand less than in the previous year.

LOGAN BOTANIC GARDEN
(Mr J. M. Colledge)

Effect of winter on collections. Almost all of the taxa of southern hemisphere origin planted in the spring of 1981 were killed but have now been replaced. The new avenue of *Cordyline australis* was destroyed; replacement plants will be available for planting in 1984. A number of young *Dicksonia antarctica*, some planted twenty years ago, were lost. Wind chill caused serious damage to all evergreen monocotyledons.

Plant Collection. *Xeronema callistemon* (Liliaceae), a rare endemic of the Poor Knights Islands, New Zealand, flowered in containers in the open but did not produce seed. *Yucca whipplei* subsp. *parishii* and *Beaucarnea recurvata* (Liliaceae), both of Mexico, flowered in the open ground for the first time. As in 1981 the most interesting new taxa came from Mr Burt's South African Collections: *Diascia elegans* (Scrophulariaceae), *Felicia aethiopica* subsp. *ecklonis* (Compositae), *Sutera breviflora* (Scrophulariaceae) and *Euryops tysonii* (Compositae) are introductions with horticultural potential.

Arboriculture. More old and dangerous trees have been removed, and a further block of *Fuchsia magellanica* was cut back in the south woodland to permit the planting of a mixture of *Nothofagus*, *Quercus* and *Fagus* for future shelter.

Glasshouse (Energy Conservation). A third of the house was partitioned off with 'Correx' to provide a more effective propagating area. The sides were insulated with 'Polesoll', a thermal screen, and supplementary lighting was installed. These installations have reduced our consumption of oil and markedly improved the condition of propagules during dark winter months.

Staff maintained a high standard of workmanship during the year and there were no staff changes.

Visitor numbers fell by 4,105 to 35,726, reflecting the drop in tourist traffic to the area.

THE ARBORETUM, DAWYCK

(Mr G. Broadley)

The first stage of the new Service Building, including offices, mess room, storerooms, toilet facilities for staff and toilet facilities for visitors, was completed in September. This is much appreciated by staff, who have suffered sub-standard facilities for over four years. The first cottage was completed in December, Mr Binns taking possession at Christmas. It is hoped that a start will be made on two further staff cottages next year.

A limited amount of road work was done during the year. Two difficult steep hills were hard-surfaced, allowing much easier access during the winter months. Heavy digger equipment was hired to clear many more large roots and areas of scrub on the west side.

The area for the new shelter belt on the west side is now ready for planting. Fencing and planting should be complete by the end of March 1983. Approximately 5000 young pines will be used. During the winter, 15 trees were blown down. Fortunately nearly all were old and diseased forest trees.

A tentative plan for conifer plantings has been worked out in co-operation with Dr Page. This involves planting large groups of individual species in specific areas.

Several groups of young conifers were planted in cleared areas, mainly on the east side. Designated areas for the arboretum have now been decided. Dawyck will be represented by the letter 'V' on the computer print-out and index cards.

HORTICULTURAL TRAINING SECTION (Mr G. Anderson)

The annual presentation of awards to students was made by Dr Charles Taylor, Director of the Scottish Crop Research Institute. On 7 July, 10 students were awarded Diplomas (seven with Credit) and one the Certificate. Overseas employment attracted one student, with the remainder gaining positions in the British amenity sector.

Mr Anderson's involvement with SCOTEC and the Royal Horticultural Society continued, as did the section's participation in degree and postgraduate landscape teaching with the University of Edinburgh and Heriot-Watt University. The section staff were involved in overseas travel during 1982: Mr Rae was joint leader of the Edinburgh-Sahara Botanical Expedition and Mr Anderson attended the 21st International Horticultural Congress in Hamburg.

The number of enquiries regarding horticultural careers information was lower than the previous year but the number of applications received for the 1982-85 Diploma Course increased.

ANNUAL RAINFALL

Edinburgh	726.4mm (28.60in)
Benmore	2618.4mm (103.08in)
Logan	1096mm (43.16in)

STAFF LIST (December 1982)

DA, Dawyck Arboretum; LBG, Logan Botanic Garden;
YBG, Younger Botanic Garden

<i>Regius Keeper</i>	Mr D. M. Henderson	
<i>Assistant Keeper</i>	Dr J. Cullen	
<i>Principal Scientific Officers</i>	Dr G. C. G. Argent	Dr C. N. Page
	Dr D. F. Chamberlain	Dr J. A. Ratter
	Mr A. J. C. Grierson	Dr R. Watling
	Mr I. C. Hedge	
<i>Senior Scientific Officers</i>	Mr G. Anderson (Hort. Train.)	Mr L. A. Lauener
	Dr R. B. Burbidge	Miss V. A. Matthews
	Mr B. J. Coppins	Miss R. M. Smith
	Mr D. G. Long	
<i>Higher Scientific Officers</i>	Mr A. P. Bennell	Miss D. E. Purves
	Mr R. Eudall	Mr D. A. H. Rae
	Mrs N. M. Gregory	Mrs J. M. Woods
	Mr D. R. McKean	Mr P. J. B. Woods
	Mr A. G. Miller	
<i>Scientific Officers</i>	Mrs F. M. Bennell	Mrs H. Hoy
	Mr K. N. Grant	Miss R. A. King
	Miss E. H. Hamlet	Miss M. A. H. Paul

<i>Assistant Scientific Officers</i>	Miss S. J. Mackay	Miss A. M. McRitchie
<i>Laboratory Attendants</i>	Miss M. Bryce	Mrs D. M. Radcliffe
	Mrs E. A. McAllan	Miss M. McLaren
<i>Curator</i>	Mr R. L. Shaw	Mrs G. Miller
<i>Assistant Curators</i>	Mr G. Broadley	Mr A. Evans
	Mr L. Buchan	Mr A. Hall (YBG)
	Mr J. M. Colledge (LBG)	Mr R. Kerby
<i>Garden Supervisors</i>	Mr D. Binns (DA)	Mr J. Sandham
	Mr N. Claughan	Mr I. W. J. Sinclair
	Mr R. U. Cranston	Mr W. Tait
	Mr G. Kirkpatrick	Mr B. Unwin (LBG)
	Mr G. Knott	Mr M. Welsh (YBG)
	Mr R. J. D. McBeath	
<i>Librarian</i>	Mr M. V. Mathew	
<i>Assistant Librarian</i>	Mrs D. A. Morrison	
<i>Higher Executive Officer</i>	Mr J. Sinclair	
<i>Executive Officer</i>	Miss J. R. S. Renwick	
<i>Clerical Officers</i>	Mr K. Brodie	Mrs R. Bell
<i>Clerical Assistants</i>	Mrs A. J. Black	Mrs D. M. R. Mackay
	Mr M. A. Delaney	Mrs M. O'Brien
<i>Senior Paperkeeper</i>	Mr W. Nicholson	
<i>Sergeant Park-Keeper</i>	Mr J. Y. Thomson	
<i>Corporal Park-Keeper</i>	Mr A. W. Brown	
<i>Park Constables</i>	Mr W. S. Connachar	Mr W. Murray
	Mr M. E. Fitz	Mr T. A. Nisbet
	Mr P. N. Fletcher	Mr W. B. Scott
	Mr D. C. Hogg	Mr R. Stevenson
<i>Gardeners Special</i>	Mr T. Y. A. Brown	Mr A. J. Paxton
	Mr G. W. Lawson	Mr J. Stewart
	Mr J. McCluskey (YBG)	Mr E. F. Young
	Mr S. Macpherson	
<i>Gardeners I</i>	Mr S. Boyd (LBG)	Mr G. Murdoch (LBG)
	Mr J. Fernie	Mr H. W. Paxton
	Mr G. Godbert (YBG)	Mr I. M. Potts
	Mrs P. R. Griffiths-Hardman	Mr R. M. Robertson
	Mr J. Henderson	Mr I. H. Rooksby
	Miss M. Jones	Mr R. Stainthorpe
	Mr W. Koczwar	Mr T. L. Sutherland
	Mr W. M. Milne (DA)	Mr C. Thomson (LBG)
	Mr C. Murray (YBG)	Mr N. A. Wright (YBG)
<i>Gardeners II</i>	Miss J. M. Corden	Miss E. A. Macintosh
	Mr I. Fisher	Mr N. McIntyre (YBG)
	Mr G. A. Hall	Mr J. Smith
	Mr J. B. Henderson	Mr D. M. Stewart
	Mr I. Herkes	Mr J. Urquhart
	Mr A. S. Jamieson	Mr R. Waddell
<i>Assistant Gardeners</i>	Mr D. C. Cameron	Mr C. Shaffrey
	Mr A. J. Dunn (DA)	Mr J. Sherriff (YBG)
	Mrs S. A. Murray (YBG)	Mr E. D. Traynor (YBG)
<i>Junior Gardeners</i>	Mr M. D. Cassidy	Mr M. Geddes (LBG)
	Mr E. Duff	
<i>Engraver</i>	Miss M. Laing	
<i>Storeman</i>	Mr G. Roddex	
<i>Driver</i>	Mrs M. Boyd	

<i>Female Lavatory Attendants</i>	Mrs W. Connachar Mrs C. Horner	Mrs A. S. Milne (DA)
<i>Male Lavatory Attendants</i>	Mr L. J. Kelly	Mr H. McDonald
<i>Male Cleaner/Handyman</i>	Mr P. McCormick	
<i>Nightwatchmen</i>	Mr J. Brady Mr J. Duffy	Mr J. McKenzie Mr W. Pringle