

A SURVEY OF THE WORK OF THE ROYAL BOTANIC GARDEN EDINBURGH IN 1981

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GENERAL REVIEW

The year 1981 has been difficult for the Garden and its interests. It has been a year of continued austerity in all fields — the gardens, science and horticultural training — with the unhappy anxiety that due to creeping staff cuts, especially at the lower levels, 'the boat is being spoilt for a ha'penny worth of tar'. Standards have been maintained only by continued devoted work. Because most of the resources are inevitably and rightly devoted to maintenance and long-term projects there has been virtually no room for innovation. At the same time the Garden has been faced with the possibility of being hived-off as a grant-aided institute coordinate with DAFS's other research institutes — this has involved senior management in many discussions with Research Branch (DAFS). Such possibilities are always disturbing to an institute and to individual members of staff. It becomes even more necessary for a decision to be made in 1982.

The general public certainly demonstrated their loyalty to the Gardens: admissions in Edinburgh were 641,275 and on Sunday 30 August, 16,484 visitors were recorded, the highest daily number since May 1939. Numbers at Benmore and Logan held firm in spite of falls in tourist traffic in Scotland and a drop of at least 5% at amenity sites in general. There is no doubt that the policy of steadily upgrading care and maintenance, sometimes over considerable areas and involving many man-hours of work, is necessary to retain our position — after Edinburgh Castle, the Garden has the highest annual visitor numbers in Scotland, and any observer in the Garden in the tourist season is soon aware of the many who come from overseas. As noted in previous reports building progress at Dawyck has been held back, but the staff have achieved a great deal of clearing with considerable help from a local Youth Opportunities Programme.

Scientific activities have suffered particularly through shortage of assistants so that several projects are running at sub-optimum levels. Nevertheless after a run-in period Edinburgh's share of the European Cultivated Flora project is well on target; the Bhutan Flora is suffering

from production difficulties but the first part is written; the Flora of Arabia project awaits a reply from research organisations in Arabia; the text of the second main part of the Revision of *Rhododendron* has gone to press; another part of the British Fungus Flora has been printed.

Our overseas links and activities have prospered. The Garden has had a particular interest in the temperate flora of SE Asia this century. After a gap of decades a return to close botanical links with China is exciting; Mr Hu from Kweichow is now in his second year with us and Dr Chamberlain came back from the Tali region with a fine collection including many living plants. In the Autumn R. McBeath supported by the Garden took part in a private expedition to Nepal and brought back much to be watched with interest in the next few years.

In addition to these specific projects the Garden has maintained its many links with science in Scotland: surveying for the Nature Conservancy Council, running Interlink projects with the Zoo and the Royal Scottish Museum, collaborating with all the universities through visits to the Garden, provision of library and herbarium facilities and by supply of research materials. These diverse activities take up much time but maintain the Garden as a core of botanical and horticultural activity in Scotland.

TAXONOMIC RESEARCH

SOUTH WEST ASIA: FLORISTIC STUDIES

During the last three decades there were very substantial accessions of Turkish, Iranian and Afghan collections. These were linked with active progress on the *Flora of Turkey* (Professor P. H. Davis, University of Edinburgh) and *Flora Iranica* (Professor K. Rechinger, Vienna) projects. Neither of these major Floras is completed but in at least the case of the former Edinburgh-based one, the beginning of the end is in sight. In 1981 research and curatorial activity in this floristic area continued, but with reduced momentum on the part of the government staff. Miss Matthews, however, completed her accounts of some Monocotyledonous genera for *Flora of Turkey* vol. 8.

Work on the flora of the Arabian peninsula — a relatively new interest for Edinburgh but a natural follow-on from our expertise further north — made very good progress. A. G. Miller and D. G. Long spent 4–6 weeks in N Yemen with Professor Müller-Hohenstein (Bayreuth); I. C. Hedge with two colleagues from Kew (P. S. Green and Dr G. E. Wickens) visited Kuwait and Damascus to try to raise funds for a Flora of the peninsula; a botanical bibliography of Arabia was sent to press; check-lists of a further 20 families were prepared; and much curation of our steadily increasing collections was done.

During the year we welcomed three Turkish botanists on longer-term visits: Dr Tuzlaçi (Ankara), Dr Engin (Erzurum) and Dr Vural (Konya). All were working on their general collections from different parts of Turkey. Mr Jahandar Shah (Peshawar) studying for a Ph.D. at Aberdeen University spent some weeks working on Pakistan Gentianaceae.

LEVEILLE CATALOGUE, ETC.

Part XIV of the Catalogue is in press and awaiting publication whilst Part XV, containing several families but mainly Lauraceae, has been submitted. Preparation of Part XVI including Euphorbiaceae (D. McKean) and Urticaceae (L. A. Lauener) is well in hand and almost completed. Work on Part XVII has also been started.

Mr Lauener and Miss H. Paul have prepared a draft of a paper on type specimens of species described by Robert Graham (Regius Keeper & Professor of Botany, Edinburgh, 1820-45).

ERICALES

With the publication (late 1980) of Dr Cullen's revision of the scaly species (subg. *Rhododendron*), and the completion during the year of Dr Chamberlain's revision of the non-scaly species (subg. *Hymenanthus*), work on the taxonomy of the hardy species of the genus *Rhododendron* is almost completed. Dr Argent has continued work on the non-hardy species of sect. *Vireya*, mainly those of Borneo, and has made extensive use of the living collections, many of which he has collected himself. He has also continued the identification and study of living Ericaceous material belonging to other genera, accumulated at Edinburgh from various sources (again, many of them collected by Dr Argent himself, and by Mr Kerby). Edinburgh now has in cultivation an unrivalled collection of material of the family, a collection which is in considerable demand as a research resource by specialists from all over the world.

Our interest in the Ericaceae, and particularly in *Rhododendron* will be symbolised in May 1982 by the holding at the Garden of the 2nd International Rhododendron Conference. This conference will be organised by Dr Wood, who has already done much preparatory work towards it.

THE EUROPEAN GARDEN FLORA

Work on Edinburgh's contribution to this major collaborative project has continued during the year, and the following accounts have been completed: most genera of the Orchidaceae (Miss Matthews, Mr Woods, Dr Cullen); genera of Liliaceae, Taccaceae (Miss Matthews); Zingiberaceae (Miss Smith); Cannaceae, Marantaceae (Dr Ratter); Strelitziaceae, Musaceae (Dr Argent); Ferns and some genera of the Conifers (Dr Page & Mrs Bennell). Miss Matthews and Dr Cullen have continued to serve on the Editorial Committee of the project.

ZINGIBERACEAE

Miss R. M. Smith has concentrated on three projects involving this family. An annotated checklist of the gingers of the Gunong Mulu National Park (Sarawak) has been completed and a paper containing descriptions of 14 new species found in the park has gone to press. Work on the Zingiberaceae of Australia continues, and an account of the family for the European Garden Flora has been finalised. Miss Smith also produced the second of

our departmental publications, *Synoptic Keys to the Genera of Zingiberaceae pro parte*, which was published in May.

BHUTAN FLORA PROJECT

During the past year final drafts of the plant families to be included in the first part of the Flora of Bhutan were completed and the introductory chapters written. Hopes that it could be published at the end of 1981 were dashed by the breakdown of machines at the typesetters. It is hoped that the first part will now appear in the second half of 1982.

Following the two visits to Bhutan by Mr Grierson and Mr Long in 1975 and 1979 it was a pleasure to welcome in exchange in January 1981 Mr Sonam Tshering of the Bhutanese Forestry Department. He was with us for three months to learn basic herbarium curation as he is to take charge of the new herbarium in Thimphu, the Bhutanese capital.

CONIFERS & PTERIDOPHYTES

The main activity of the conifer/pteridophyte programme has been in the preparation of accounts of these groups for the European Garden Flora. Total accounts prepared at Edinburgh by Dr Page (with collaboration mainly from Mrs Bennell) include *Pinus*, *Picea*, *Larix* and *Pseudolarix*, and 108 genera of ferns and fern-allies. Anticipated completion date for all these non-flowering plant groups is early 1982.

Dr. Page's various teaching commitments have continued, and close links have been maintained particularly with the honours-botany teaching in the University of Edinburgh. The ability to bring whole-plant field experience to bear has proved popular and successful with students.

Research papers have been presented at two major symposia. One, on bracken, served particularly to emphasise the great need felt amongst applied scientists for basic observations on the biology of plants in the wild.

A steady flow of requests for identification and advice on both groups continues, and there have been further requests for conifer and pteridophyte accounts for various Floras. These requests seem to underline a growing need for such information in an increasingly conservation-conscious world, against a background of decreasing numbers of staff trained to fulfil such a commitment.

BRAZILIAN FLORA STUDIES & CYTOLOGY

Dr Ratter's research time was spent in identification of the collections made during his 1980 visit to Brazil, preparation of the Cannaceae and Marantaceae accounts for the 'Flora of Cultivated Plants', and a four-week visit to Belize as botanist of a University of Edinburgh expedition.

Because of lack of assistant staff virtually no time has been available for cytological work during the year.

BRITISH HERBARIUM

Mr McKean and Miss Paul continued to deal with queries from the public and both were involved (with Dr Chamberlain, Miss Hamlet and Mr Grant)

with survey work for the Nature Conservancy Council. This year, in view of ski-ing development proposals, the survey included the Drumochter and lesser-known Ben Alder hills and Creag Meagaidh.

Towards the end of the year the Botanical Society of Edinburgh announced a new 'Flora of the Lothians' project. The Garden will inevitably play an active part in this because of its large herbarium collection and library resources.

The work of sorting through the large Robert Mackechnie Herbarium is almost complete; those specimens of significance to us have been kept in Edinburgh, the remaining and larger part has been sent to Kelvinside Museum.

BASIDIOMYCETES

Studies on agarics (Dr Watling), particularly those in the Bolbitiaceae and the genus *Armillaria*, have continued, the latter in collaboration with Dr Glen Kile, Victoria, Australia. Work is underway on two further parts of the *British Fungus Flora*.

Collaboration with members of the Forensic Science Unit, Department of Pharmaceutical Chemistry, University of Strathclyde, has expanded to include analysis of toxins from *Cortinarius* spp. and their possible role in taxonomy.

Experimental work is minimal because of staff shortages. Dr Watling organised courses on larger fungi at Sheffield University and Kindrogan Field Centre, Perthshire; he delivered a paper at the Society for Bibliography of Natural History.

Mr Bennell has continued his investigations on the biology of *Chrysomyxa rhododendri* (Uredinales) and his revision of this genus. An account of these studies was presented at the Nottingham symposium on 'Advances in Research on Rusts' in September. The species of *Puccinia* attacking *Caltha* were examined as part of the EM survey of rust spore development.

A pilot scheme for mapping British Rust fungi is being tested in collaboration with Dr R. W. G. Dennis (ex RBG, Kew).

ASCOMYCETES

Mr Coppins has continued his studies on British lichenised and non-lichenised ascomycetes, and his revision of the lichen genus *Micarea* in Europe is nearing completion. He has been involved in the setting-up of a natural history recording unit for museums in Scotland, and in a review of British woodlands of lichenological interest being prepared by the British Lichen Society for the Nature Conservancy Council. Mr Coppins led a successful British Society meeting in Berwickshire in October.

PALYNOLOGY

Mr Bennell has worked in collaboration with Mr E. M. Hu (Kweichow, China) to complete a palynological survey of the genus *Lysimachia* (Primulaceae) including SEM and TEM examination. He also worked with

Dr. E. Tuzlađi (Istanbul, Turkey) on the pollen of the genus *Asphodeline* and its relatives.

THE HERBARIUM

ACCESSIONS, LOANS & SPECIMENS MOUNTED

Exchange accessions in 1981 came from 25 sources and totalled 2,696 specimens with no outstandingly large acquisitions. Of about 10,000 duplicates distributed by us, over 7,000 George Forrest Chinese collections were sent to Peking and c. 1,000 Arabian (Oman & N Yemen) specimens to Kew.

Gifts and specimens collected by staff members amounted to c. 11,100 and included over 2,000 S African plants either from the herbarium at the University of Natal, Pietermaritzburg, or from the collections of O. M. Hilliard & B. L. Burt; 1,000 Chinese specimens from the 1981 Sino-British Expedition to Yunnan; c. 1,225 numbers from P. H. Davis from Mexico, California and the East Aegean Islands; 1,800 from the Arabian peninsula, including 560 collected by A. G. Miller & D. Long, c. 400 by Mrs Sheila Colenette and the remainder from recent contacts in the area. About 670 cultivated specimens and 800 British have been added, while the first 2,000 specimens from the R. Mackechnie British herbarium, gifted in 1978, now await mounting.

About 1,000 Iranian and Afghan specimens were purchased from Professor K. H. Rechinger, Vienna.

The cryptogamic herbarium has increased by about 800 including c. 350 from the Sino-British Expedition.

	1980	1981
Accessions	18,113	15,648
Distributions	14,107	12,114
Loans: in	6,299	4,065
Loans: out	5,979	6,922
Specimens mounted	14,701	14,351

CURATION

During the year under review an extra 243 new herbarium cabinets were installed: 201 on the lower floor, 42 on the upper. Those allocated for expansion of the British herbarium and the cryptogams have already been filled, but the really major task of moving around the world phanerogam collections will start in 1982.

PHOTOGRAPHIC SLIDE COLLECTION

About 400 slides, mainly taken by the photographic department, were added.

VISITORS

Dr Ali Al-Rawi (Kuwait); Miss S. Andrews (Kew); Mrs V. Armer (Kuwait); Miss S. Arnott (Edinburgh); Dr M. M. D. van Balgooy (Leiden); Miss Beaufort-Murphy (Raleigh, North Carolina); Dr H. D. Behnke (Heidelberg); Dr S. Blackmore (BM); Mr R. Brinklow (Dundee);

Prof. K. Browicz (Kornik); Dr P. J. Brownsey (Wellington); Miss E. Bullard (Kirkwall); Dr P. Cannon (CMI); Dr. S. Chaudhary (Riyadh); Mrs S. Collenette (Sway, Hants); Mr M. J. E. Coode (Kew); Mr U. Deil (Bayreuth); Prof. P. Dixon (California); Mr D. Dupuy (Reading/Kew); Dr R. E. C. Ferreira (NEC); Dr A. Ghafoor (Benghazi); Dr P. Gibbs (St Andrews); Dr H. Glen (Capetown/Kew); Mr E. Groves (BM); Prof. O. Hilliard (Pietermaritzburg); Mr P. Jaeger (Kew); Mr P. James (BM); Dr C. Jeffrey (Kew); Prof. C. Joly (Campinas/St Andrews); Dr W. Julich (Leiden); Dr G. Kile (Victoria, Australia); Dr F. Kollman (Jerusalem); Mr B. Lee (Kuching); Dr G. S. Leister (Long Beach, Ca); Dr R. Lester (Birmingham); Miss M. McCallum Webster (Forres, Morayshire); Miss D. Maserati (Goldsmiths College, London); Dr H. McCallister (Ness); Prof. R. Monteiro (Rio Claro/St Andrews); Prof. K. Müller-Hohenstein (Bayreuth); Dr N. Ozhatay (Istanbul); Dr K. Perino (Stuttgart); Mrs G. Perry (Perth, WA); Prof. H. Pfeiffer (Connecticut); Mr D. Philcox (Kew); Prof. D. Porter (Blacksburg, Va/Cambridge); Dr C. D. Preston (Monkswood); Dr C. D. Rao (Bangalore/BM); Prof. J. Semir (Campinas, Brazil); Mr A. J. Silverside (Paisley); Miss D. Snijman (Kirstenbosch); Mrs O. Stewart (Edinburgh); Dr A. McG. Stirling (Glasgow); Dr D. B. Sumithraarachah (Peradeniya); Dr G. J. Swales (Sunderland); Dr C. Z. Tang (Canton/Kew); Prof. N. Taroda (Campinas/St Andrews); Mrs M. Taylor (Auckland); Mr N. Taylor (Kew); Mr S. Tschering (Thimphu, Bhutan); Dr N. Uluoçak (Istanbul); Mrs D. Wheeler (NSW); Mr D. Whitcombe (Durham); Dr P. F. Yeo (Cambridge); Mr M. A. Zawawi (Al-Hassa, Saudi Arabia).

THE LIBRARY

Acquisitions (2,837), indexing (4,228), exchanges (1,039), interlibrary loans (1,039) and visitors (741) showed increases over the 1980 figures. Binding (91) again fell far short of what was necessary, adding to the already large backlog.

Installation of mobile shelving in the basement store provided adequate room for expansion of stock. The necessary shifting of some 85,000 lesser-used volumes inevitably caused some difficulties for all library users — these will continue until the job is completed and a new location list and shelf guides provided.

Shortage of staff continues to impede library operations, and causes more and more accumulation of arrears of work. Introduction of flexible working hours has not been easy to operate with the present library staff complement. Restriction of the use of the library by visitors, started in May, has not given the staff the expected time for uninterrupted work and the Librarian is still obliged to work extra hours.

PUBLIC EDUCATION

EXHIBITION HALL

1981 saw many changes in the Exhibition Hall. Exhibits, some of which had been on display since 1970, were steadily replaced by new displays. A new entrance exhibit, designed by Mrs Radcliffe, illustrates the process of photosynthesis and emphasises its importance as an energy source. An exhibit on hydroculture, prepared in conjunction with the Glass Department, won a gold medal at the Royal Caledonian Horticultural Society 1981 show and now occupies the window area of the Hall.

The major exhibit of 1981 on the subject of Plants and Medicine was opened on 9 September to coincide with the tercentenary celebrations of the Royal College of Physicians of Edinburgh.

An exhibit on the alpine plants collected by George Forrest was prepared for the 1981 International Alpine Plant Conference in Nottingham where it won a silver medal. It was later shown in the Exhibition Hall.

Preparation of material and the taking of photographs for a major exhibit on taxonomy and the genus *Rhododendron* continued through the year.

PUBLIC EDUCATION & SCIENTIFIC LIAISON

'Interlink' programmes on 'Jungles' and 'Food and Feeding' were well supported, the latter for the first time included collaboration with three other institutes — the Royal Scottish Museum, Edinburgh Zoo, and the Commonwealth Institute (Scotland).

The Garden and its staff featured in several TV productions including: 'A Dream of Poppies' about the collecting expeditions of Ludlow & Sheriff; 'Forests and Man', a schools' series programme; and 'Down to Earth', a gardening series featuring Mr Evans and other staff members.

During the year the Garden hosted official parties from New Zealand (Pukeiti Rhododendron Trust), Holland (Agriculturists), Bermuda (Horticultural students) and the United States (Smithsonian Institute, New York State Agricultural College, American Horticultural Society, Indiana State University) and from many parts of Britain (including the Universities of Aberdeen, Dundee, Edinburgh, Leeds, St Andrews and Stirling).

A large group from the tercentenary celebrations of the Royal College of Physicians were entertained by the Garden. The second Royal Horticultural Society Scottish Lecture on 'Wisley' by its director, C. D. Brickell, nearly filled the Lecture Theatre.

The Garden hosted many meetings including those of the Botanical Society of the British Isles, Botanical Society of Edinburgh, British Cactus Society, Scottish Rock Garden Club, Royal Caledonian Horticultural Society, National Trust for Scotland and the Edinburgh Floral Art Club. A highly successful conference on 'Plants in Industry' was organised jointly by the Botanical Society of Edinburgh and the Institute of Biology and held in the Lecture Theatre. The Tropical Ecology Unit of the British Ecological Society held an open meeting of invited papers on 25 September. This was organised by Dr G. Argent and by Dr Adrian Marshall (Aberdeen University); three papers were contributed by RBG staff.

PUBLICATIONS

No parts of *Notes RBG Edinb.* were published during the year; this was due to the termination of our long-term printing contract and the inevitable delays associated with the interim arrangements adopted. Two parts went to press during the year: volume 40(1) and 39(2) — the latter devoted to Dr Chamberlain's revision of *Rhododendron* subgenus *Hymenanthes*.

The second number of our departmental publication series, *Synoptic Keys to the Genera of Zingiberaceae pro parte* by Miss R. M. Smith, appeared in May. It follows the inexpensive comb-bound format of its predecessor.

PUBLICATIONS BY MEMBERS OF STAFF IN 1981

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- EVANS, A. Slow-growing conifers, The crucifers, Plants of Japan, The buttercup family, Mountain flowers, Late-flowering asters and 13 short plant notes — articles in *The Scotsman*.
- HEDGE, I. C. & LAMOND, J. L. Cruciferae (tribes Arabideae, Brassiceae, Euclidean, Lepididae and Sisymbrieae) in TOWNSEND, C. C. & GUEST, E. (eds) *Flora of Iraq* 4(2): 845–943, 997–1014 & 1067–1085.
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- & KILE, G. An expanded concept of *Armillaria luteobubalina*. *Trans. Br. Mycol. Soc.* 77: 75–83.
- & KNUDSEN, H. Fire interessante Arter i Gulhatfamilien (Bolbitiaceae) fra Danmark. *Svampe* 4: 74–79.
- & MARGOT, P. Studies in Australian agarics and boletes II. Further Studies in *Psilocybe*. *Trans. Br. Mycol. Soc.* 76: 485–489.
- & SEAWARD, M. A. D. James Bolton: Mycological Pioneer. *Archives Nat. Hist.* 10: 89–110.

THE GARDEN, EDINBURGH

Total admissions to the Edinburgh Garden were 641,275 — an increase of nearly 49,000 on the 1980 figure, with over 16,000 on one day: the highest number recorded since 1939.

ARBORETUM DEPARTMENT (Mr G. Broadley)

During February, March and April 1981, the scheme at the west gate (F1-F3) was completed with the planting of 45 *Pinus contorta* ranging from 3-12 ft in height. These plants will eventually provide wind shelter in the area. They were grown from seeds collected in different areas in North America, Canada and New Zealand and were obtained from the Forestry Commission trial plots at East Saltoun. It will be interesting to watch their progress in Edinburgh.

In March two new *Berberis* beds were constructed on the Berberis Lawn (B01) and some of the older beds were enlarged and reshaped. The existing collection was culled and many new species were introduced from the nursery.

The project to accommodate the lepidote rhododendrons at the Old Herbarium areas (M01-M08) was started in the autumn. Many unrequired trees and shrubs were removed. The area was then recontoured and prepared for planting in late winter and early spring of 1982. It is hoped to complete the first stage before the Rhododendron Conference in May 1982.

In October a large specimen of *Pyrus ussuriensis* var. *ovoidea* blew down at the west end of the Herbarium building (N3). After clearance the entrance path was re-sited and the area replanted with shrubs and ground cover.

During the year an area in the nursery (E16) was transferred to the Arboretum Department to be used as a holding ground and hardstanding area. Heavy equipment was hired and all subsoil and rubbish removed from the site. The top-soil was exchanged with the Herbaceous Department, for the soil from the new rose beds, at present under construction in the Demonstration Garden.

A squad of one supervisor and three students was sent to Logan Garden in September to remove several unwanted and dangerous trees.

GLASS DEPARTMENT (Mr L. Buchan)

This year the Glass Department had several staff changes. Mr John Sandham joined the staff in April as a supervisor, taking charge of Houses 1 to 5 and 22 & 23. On the industrial side two assistant gardeners, Mr Ian Fisher and Mr David Cameron, have been appointed.

The semi-automatic irrigation systems in the Temperate and Tropical Plant Houses and the Orchid House have been completed. In the Service Orchid House special racks have been built to accommodate the increasing number of orchids that can be grown on bark. Mist lines have been constructed above the racks to increase humidity.

To save the erection of scaffolding a hydraulic mobile hoist was hired to see if it could cope with the pruning in the display houses. It proved to be moderately successful but was limited in certain houses owing to difficult access.

Plants were supplied and arranged to decorate the DAFS Building at the Royal Highland Show Ground, the Royal Scottish Academy and the Scottish Office Training Unit.

The installation including display tanks for submerged aquatic plants is receiving a major overhaul. New settings for plants are being devised and it

is hoped that an explanation leaflet will be available to cover the new display.

Biological control was tried out in the Tropical Aquatic House on Red Spider and Mealy Bug. This experiment will be continued next year.

Visits were made to the Glass Department by members of the British Ecological Society, The Architecture Department of Dundee University, Gustav Redalin from the University of Norway, Ger van Vliet (the Director of the Leiden Botanic Garden) and a BBC film unit.

HERBACEOUS & ALPINE DEPARTMENT (Mr A. Evans)

Alpine Section. During the winter and early spring a special effort was made to complete a major renovation in the Rock Garden ahead of schedule, so that a contingent of more than 170 delegates attending the International Rock Garden Plant Conference could be received and entertained properly.

In autumn a further substantial rebuilding programme was started to make changes in six compartments in the south-west part of the Rock Garden. It is hoped that access to this part of the Garden will be easier for less agile visitors.

Following local trials it is intended to provide an area of tufa in a south-facing frame to accommodate a permanent collection of cushion-forming and lime-tolerant alpins.

Herbaceous Section. The task of laying-out the Demonstration Garden on agreed lines continued and new beds and borders, cut out from the lawns, were prepared and made ready for planting. Quite a large portion of this was completed, i.e. hedges were planted, ground-cover plants assembled, lawns levelled and other adjustments made.

The main winter work for 1981/82 again centred around the Demonstration Garden. This time it involved the laying-out and planting-up of a demonstration rose garden. A great deal of site levelling and turf relaying was necessary as the site was uneven and in the beds many tons of light sandy soil had to be replaced with heavier loam obtained from the Experimental Garden. There is still much to be done and as winter came early in 1981 and work was held up for many weeks it may be that the completion of the project will not be possible by the spring of 1982.

Plant Records. Fresh information is constantly being added to the plant records and a cumulative list of threatened plants throughout the world is in the process of completion. The records have been maintained for Edinburgh, Younger and Logan Botanic Gardens and, in a small way, a start has been made on those for Dawyck. Work continues on the indexing of plants listed in older accession books.

Plant Labels. As an International Conference on Rhododendrons is to be held in Edinburgh in May 1982, a concerted effort has been made to try to label clearly all rhododendrons in the collection. Overall, more than 4,000 labels have been engraved.

During the year Mr Evans was chairman of the 5th International Rock Garden Plant Conference in Nottingham (*Alpines '81*) and was botanist on the Swan Hellenic cruise in July. He became an Associate of Honour of the

Royal Horticultural Society and was awarded the Lyttel Cup of the Alpine Garden Society.

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

Considerable changes in staff have taken place during the year. The departure of Mr Lewis and Mr Gardiner created vacancies at Supervisor level. These were filled by Mr Kirkpatrick (Temperate Section) and Mr Sinclair (Tropical Section). There are still problems in Industrial staffing and the department remains understrength.

Temperate Section. The Section has concentrated on the propagation of difficult subjects like *Acer*, *Malus* and *Sorbus* including many Forrest, Wilson and Rock introductions. Large-leaved rhododendrons, propagated mostly from cuttings but to some extent by grafting, have formed the major part of the rhododendron propagation programme.

The number of plants raised from wild-origin seeds was slightly lower than in previous years due to more stringent selection by Assistant Curators.

Tropical Section and Study Collections. An extensive propagation programme, necessitating supplementary lighting to ensure a 16-hour day, was undertaken so that Dr Argent's ericaceous collection will in future be in one location (P10). A number of gesneriads received similar treatment and as with the ericaceous material the results have been encouraging.

Dr Page's fern research work was furthered by a propagation programme (spores), and an enclosure was constructed out-of-doors to protect hardy ferns from exposure to winds and direct sunlight.

Tropical Propagation. The propagation of *Nepenthes* from cuttings and also from seed collected in Sabah by Dr Argent has been particularly successful. The endangered composite *Cylindrocline commersonii* (Mauritius) was propagated successfully.

Accessions. Total accessions numbered 3,727, of which 2,747 were of known wild origin. Over 5,000 items of vegetative material and 409 batches of seed were despatched. 15 major consignments of plants were sent to Benmore, Logan, Dawyck and Kew.

Dr Chamberlain's visit to China enabled the collection of much seed and live plant material, e.g., *Pleione forrestii* (pseudobulbs), seed of *Jasminum mesneyi*, *Lonicera setifera*, *Buddleia*, *Rhododendron*, etc. The material is growing well in the Propagation Department.

Mr McBeath returned from Nepal with 250 seed accessions including *Gentiana*, *Primula*, *Saxifraga* and *Rhododendron* species. A number of *Meconopsis* species collected in Nepal by Dr Grey-Wilson (Kew) were also received.

Messrs Miller and Long returned from the Yemen during the summer with a large collection of succulents — mainly *Caralluma*, *Aloe* and *Euphorbia* species. Most of them established well and flowered within the year.

PLANT HEALTH

Our need to control pest and disease import more rigorously has led to a new facet of laboratory work. This has taken up time formerly allocated to taxonomic research. Out of nearly 1,000 plant introductions from abroad, almost one third of these resulting from two RBG expeditions, 29 interceptions of pathogens have been made. The majority of interceptions were insects, particularly scales, of which several are apparently undescribed. Among the fungi intercepted were *Chrysomyxa* and *Sphaerotheca*. *Oidium acrocladium* and *Fusarium oxysporum* were found causing rots of material from Arabia.

YOUNGER BOTANIC GARDEN, BENMORE, ARGYLL
(Mr A. Hall)

In a particularly wet year, when the weather relented only occasionally, modifications and extensions to the tearoom were completed and it opened to the public in May.

A memorial to Professor H. R. Fletcher, the previous Regius Keeper, was commissioned by the Younger (Benmore) Trust, designed and made by Mr Edwin Russell of Brookbrae Ltd and erected in the Formal Garden in September.

The centre path of the Formal Garden was re-aligned and levelled by the Garden staff as part of the overall project. Other projects undertaken or continued by the staff were the draining of lawns, landscaping of the area around the new tearoom and extension of the concrete apron in the compost yard. About 250 specimens were planted, some 200 of which were conifers, representing 47 species and subspecies of 18 genera. The remainder were of flowering trees and shrubs of 10 genera. The spraying programme was continued when possible; particularly against bracken in July and August using Asulox, and against grass and soft weeds using Glyphosate and Paraquat.

Two members of the industrial staff resigned during the year and have been replaced.

The total number of visitors was 35,934, an increase of 1,268 in a year when there was a considerable drop in the number of tourists in the area.

LOGAN BOTANIC GARDEN
(Mr J. M. Colledge)

Refurbishing of the Garden and revision of the plantings continued in 1981. In the Deer Hill Plantation, Bishop and Monterey Pine, and Japanese and Hybrid Larch were used to beat up the earlier plantings, most of which are making modest growth. Much alteration and maintenance was carried out in the Walled Garden and the new borders were planted with tender woody and herbaceous material. The second section of the Cabbage Palm Avenues was grubbed and replaced with young plants. In the Woodland another section of overgrown *Fuchsia magellanica* was cut over to make way for hardwood plantings to provide future shelter; further 'block

plantings' of Southern Hemisphere taxa were made in the West Woodland; and in the autumn Mr Claughan and a party of students from RBG Edinburgh took down three large, partly dead and dangerous trees.

The major undertaking of draining and bottoming the inadequate hard-standing in the yard south of the Walled Garden was carried out during the year by Younger Botanic Garden staff. The new materials used have been well consolidated and the whole area has been surfaced with granite quarry waste.

The watercourse was piped through an abandoned superfluous pond. Other modifications were made to the drainage system to direct extra water, which would otherwise have been lost through leakage, to the formal pond.

The plant most admired by visitors in 1981 was *Diascia rigescens* collected by Mr B. L. Burt in South Africa; it remained in flower from July to November. *Knowltonia bracteata*, *Glumicalyx goseloides* and *Rhodohypoxis* spp. flowered well in the Peat Garden, all are Burt collections. Further taxa collected by Mr Burt were planted on the Terrace and in the Tearoom area. *Cordyline indivisa* planted 15 years ago flowered and fruited this year for the first time.

In 48 hours on 1-2 October 108.3mm of rain fell, causing problems in the drainage system and flooding the Garden buildings. PSA have since altered the drains to avert such problems in the future.

One replacement member of staff was recruited during the year. Staff productivity was particularly high and a good standard of workmanship was maintained throughout the year.

Visitor numbers remained more or less constant at 39,830.

THE ARBORETUM, DAWYCK (Mr G. Broadley)

Clearance of scrub, large roots and unwanted trees continues. Large areas have now been cleared for replanting and many new vistas have been opened. Although there is still much to be done it is now possible to make a serious appraisal regarding the establishment of a new planting programme. During 1982 the Garden will be divided into designated areas for group planting, and to provide locations to be included in computer records.

The installation, by PSA, of the new water supply system for the new services building and cottages started in November and is now nearing completion. It involves piping water through almost the whole length of the Garden and the construction of a larger header tank and chlorination plant. Work on the first phase of the new Services Block was started in December. Both these projects have been badly delayed due to the severe weather during December. Restoration work was also carried out on the two bridges over the stream and on some of the existing paths.

The severe winter weather resulted in a larger than usual invasion of wildlife, particularly Roe Deer — confirming that much work is needed on the boundary fence.

HORTICULTURAL TRAINING SECTION (Mr G. Anderson)

The annual presentation of awards to students was made by Sir William Fraser, KCB, Permanent Under Secretary of State, Scottish Office. On 7 July 1981 13 students were awarded diplomas (one with Honours, nine with Credit). On leaving the Garden students took up a variety of posts in horticulture but as in previous years the majority found employment in the amenity sector.

Mr Anderson was nominated as an Examiner, Moderator and Reviser for the SCOTEC Certificate in Horticulture Examinations during 1981-82. Links with the Royal Horticultural Society and Royal Forestry Society were maintained during the year. The section's involvement in degree and post-graduate landscape teaching of both University of Edinburgh and Heriot Watt University classes continued.

The number of enquiries regarding horticultural careers information continued to increase as did the number of applications for the 1981-84 Diploma Course.

ANNUAL RAINFALL

Edinburgh 474 mm (22.57 in)

Benmore 2351 mm (96.2 in)

Logan 1157.8 mm (45.58 in)

STAFF LIST (December 1981)

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 D. F. Chamberlain	Dr C. N. Page
	Mr A. J. C. Grierson	Dr J. A. Ratter
	Mr I. C. Hedge	Dr R. Watling
<i>Senior Scientific Officers</i>	Mr G. Anderson (Hort. Train.)	Mr D. G. Long
	Dr G. C. G. Argent	Mr L. A. Lauener
	Dr R. B. Burbidge	Miss R. M. Smith
	Mr B. J. Coppins	Dr C. C. Wood
<i>Higher Scientific Officers</i>	Mr A. P. Bennell	Miss D. E. Purves
	Mr R. Eudall	Mr D. A. H. Rae
	Mr. D. R. McKean	Mrs J. M. Woods
	Miss V. A. Matthews	Mr P. J. B. Woods
	Mr A. G. Miller	
<i>Scientific Officers</i>	Mrs F. M. Bennell	Miss E. M. Hamlet
	Mr K. N. Grant	Miss R. A. King
	Mrs N. M. Gregory	Miss M. A. H. Paul
<i>Assistant Scientific Officers</i>	Mrs D. Brunton	Miss S. J. Mackay
	Mrs L. A. Gibb	Mrs D. M. Radcliffe
	Mrs H. Hoy	
<i>Laboratory Attendants</i>	Miss M. Bryce	Miss M. McLaren
	Mrs E. A. McAllan	Mrs G. Miller

*Staff List (Contd.)**Curator**Assistant Curators**Garden Supervisors**Librarian**Assistant Librarian**Higher Executive Officer**Executive Officer**Clerical Officers**Clerical Assistants**Senior Paperkeeper**Sergeant Park-Keeper**Corporal Park-Keeper**Park Constables**Gardeners Special**Gardeners I**Gardeners II**Assistant Gardeners**Junior Gardener**Engraver**Storeman**Driver**Female Lavatory Attendants**Male Lavatory Attendants**Male Cleaner**Nightwatchmen*

Mr R. L. Shaw

Mr G. Broadley

Mr L. Buchan

Mr J. M. Colledge (LBG)

Mr D. Binns (DA)

Mr N. Claughan

Mr R. U. Cranston

Mr G. Kirkpatrick

Mr G. Knott

Mr R. J. D. McBeath

Mr M. V. Mathew

Mrs D. A. Morrison

Mr J. Sinclair

Miss J. R. S. Renwick

Mr K. Brodie

Mrs A. J. Black

Mrs J. Macdonald

Mr J. Adams

Mr J. Y. Thomson

Mr A. W. Brown

Mr W. S. Connachar

Mr M. E. Fitz

Mr P. N. Fletcher

Mr D. C. Hogg

Mr T. Y. A. Brown

Mr G. W. Lawson

Mr J. McCluskey (YBG)

Mr S. Macpherson

Mr S. Boyd (LBG)

Mr G. Godbert (YBG)

Mrs P. R. Griffiths-Hardman

Mr J. Henderson

Mr A. D. Hood

Miss J. M. Knott

Mr W. Kocz

Mr W. M. Milne (DN)

Mr A. Bain (YBG)

Miss L. Baldwin

Mr J. Fernie

Mr C. H. Fisher

Mr I. Herkes

Mr N. McIntyre (YBG)

Mr D. C. Cameron

Mr A. J. Dunn (DA)

Mr I. Fisher

Mr G. A. Hall

Mr J. B. Henderson

Mr M. Geddes (LBG)

Miss M. Laing

Mr G. Roddex

Mrs M. Boyd

Mrs C. Horner

Mr A. Haig

Mr G. Thomson

Mr J. Brady

Mr J. Duffy

Mr A. Evans

Mr A. Hall (YBG)

Mr R. Kerby

Mr J. Sandham

Mr I. W. J. Sinclair

Mr W. Tait

Mr B. Unwin (LBG)

Mr M. Welsh (YBG)

Mrs R. Bell

Mrs D. M. R. Mackay

Mrs M. O'Brien

Mr W. Murray

Mr T. A. Nisbet

Mr W. B. Scott

Mr R. Stevenson

Mr A. J. Paxton

Mr J. Stewart

Mr E. F. Young

Mr C. Murray (YBG)

Mr G. Murdoch (LBG)

Mr H. W. Paxton

Mr I. M. Potts

Mr R. M. Robertson

Mr T. L. Sutherland

Mr N. Totty

Mr N. A. Wright (YBG)

Mr D. S. Paterson

Mr J. Smith

Mr D. M. Stewart

Mr C. Thomson

Mr T. Urquhart

Mr R. Waddell

Mr A. S. Jamieson

Miss E. A. Macintosh

Mrs S. A. Murray (YBG)

Mr E. D. Traynor (YBG)

Miss J. Kirkwood

Mr J. Martin

Mr J. McKenzie

Mr W. Pringle