

A SURVEY OF THE WORK OF THE ROYAL BOTANIC GARDEN EDINBURGH IN 1980

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GENERAL REVIEW

Great institutions — like the Royal Botanic Garden, Edinburgh — have a high place in the regard of the public and scientific community because of the consistent quality of our work, horticultural, scientific, and educational. It is relatively easy to acquire and plant 'x' acres of gardens, greenhouses, research building — but the long term maintenance of quality requires the efforts of a dedicated staff in a continuing process. A botanic garden is not in a position to react quickly and in a major degree to the whims of fashionable research — if it were the results would soon be unacceptable to the public and users of its taxonomic output. Botanic gardens must be progressively conservative. This does not make for dramatic revelations in annual reports which, as this one does, are more likely to chronicle steady *and sure* progress.

Perhaps 1980 was most notable for a very poor summer which produced rampant weed growth mastered only by a lot of hard painstaking work. The problems were not helped by growing imposed restrictions on staff numbers — the saddest of which reduced our intake of students from 14 to 12. Whatever steps we take to introduce modern labour-saving technique, there are an irreducible number of jobs still to be done by hand, and even machines need minders! Similar pressures have built up in research where the result has been much assistant work falling on scientists — due to non-replaced 'wastage' in assistants. The work carries on but with difficulty, and one feels perhaps wastefully in scientific talent. In these situations flexibility and ability to pull together is at a premium — the RBG staff is not lacking in these qualities.

The Garden's outstations at Dawyck, Logan and Benmore have all progressed. At Dawyck the roads and paths have been restored and large areas of the American raspberry cleared. Mr Broadley has taken over from Mr Bisset in overall charge at this challenging time for developments there. At Logan the new tearoom has proved a resounding success — our Minister of State, Lord Mansfield, would endorse this after a visit in September. The problem of replanting formal avenues has arisen with the Cordylines and a bold plan of cutting them down entirely and replanting has started. In the formal garden at Benmore a partial realignment and paving of the main vista has begun; the repaired old fountain site will have at its centre an armillary sphere.

In the Edinburgh Garden changes have been relatively minor. The usual autumn work programmes run on from one annual report into the next. Thus

whilst the remodelling of the Viburnum lawn was largely completed by early 1980, the considerable work started in autumn in the rest of the Rock Garden and Rhododendron Walk will be completed only by spring 1981.

While the research programmes have continued, there is no doubt that there are difficulties, as referred to previously. In spite of this the Cultivated Flora programme has built up impetus, the Bhutan Flora project is on course to produce its first publications in 1981, and some progress has been made in arranging the Flora of Arabia. Following the publication of the first part of the revision of Rhododendron in 1980, the other major part will go to press in 1981. In furtherance of this activity and to renew important relations with Chinese botany, Dr Chamberlain visited China in the autumn and L. A. Lauener made a private visit in the early summer. Among our many foreign visitors we have been delighted to welcome for a year Mr Hu from the South China Institute of Botany.

TAXONOMIC RESEARCH

SOUTH WEST ASIA: FLORISTIC STUDIES

In 1980 the accounts of *Salvia*, *Nepeta* and *Quercus* for the *Flora of Turkey* vol. VII were finalized and now await publication. For *Flora Iranica* the account of *Salvia* was completed and is now (Jan. 1981) in the proof stage. Keys to the genera of Labiatae for both these Floras were also completed.

Professor Davis and his co-workers (Drs Edmondson, Mill and, later in the year, Kit Tan) were almost as much members of the herbarium staff as the Government staff and this close integration continued to be of the greatest benefit to both parties. It also ensured the steady progress of floristic research in SW Asia at Edinburgh. Although the political situation in Turkey, Iran and Afghanistan in 1980 was often, at best, unstable, and few new collections came in from these countries, the existing collections at Edinburgh are such as to enable good floristic work to continue.

In the countries of the Arabian peninsula, in contrast, the main aim at present is to build up good herbarium collections for future work. Much new material came in during 1980, was named at least provisionally, and incorporated into the herbarium. Work towards a first Check-list of Arabian phanerogams made good progress — c. 30 families have been revised — and a draft was completed of a botanical bibliography of the area.

As in recent years those most involved in the work mentioned above were I. C. Hedge, R. A. King, J. M. Lamond and A. G. Miller.

LÉVEILLÉ CATALOGUE, ETC.

Part XIII of the Catalogue has been published. Part XIV containing the families Labiatae to Polygonaceae is ready for press. Part XV is completed except for two small families. Mr Lauener is currently working on Urticaceae and Mr McKean on Euphorbiaceae for Part XVI.

A joint paper on the type specimens of Robert Graham is being prepared by Mr Lauener and Miss H. Paul.

In May 1980 Mr Lauener made a private trip to China visiting the herbaria in Beijing, Chengdu, Kunming and Hong Kong, and making contact with several Chinese botanists.

ERICALES, CULTIVATED PLANTS, ETC.

The first part of the revision of the genus *Rhododendron* (the lepidote species) was published in December. Dr Chamberlain has continued his work on the elepidote species, and his account of them is now nearly complete, and will be submitted for publication early in 1981.

Dr Argent has continued work on the Ericaceae (including *Rhododendrons*) of the Mulu National Park in Sabah, (in connection with which he visited Sabah in February and March) and has continued study of the very extensive collections of living Ericaceae that have been accumulated over the last few years. Several new species and one possible new genus have been detected, and descriptions and illustrations of these have been prepared.

Mr P. J. B. Woods participated in 'Les Florales internationales de Montréal' at the invitation of the Quebec Ministry of Agriculture and gave papers on 'Old World Gesneriaceae and the genus *Aeschynanthus*' and 'Montane Dendrobiums of New Guinea' in the symposia on Gesneriaceae and Orchidaceae respectively.

Dr Cullen (Secretary) and Miss Matthews have continued to serve on the editorial committee of the European Garden Flora. Much work on this has already been done; in Edinburgh accounts of the following families are being prepared: Orchidaceae (Miss Matthews, Mr Woods, Dr Cullen), Zingiberaceae (Miss Smith), Marantaceae (Dr Ratter), Pteridophyta (Dr Page, Mrs Bennell).

ZINGIBERACEAE, ETC.

Miss R. M. Smith has continued work on the family and three further papers were published. A revision of the Zingiberaceae of Australia is now underway and a short account of the family for the forthcoming *Vascular Plant Families of Australia* has gone to press, as has an account by Mr Burt and Miss Smith for the revised *Flora of Ceylon*.

Collections from Sulawesi and Borneo were worked over and treatment of the family for the proposed European Garden Flora is nearing completion.

Miss Smith also spent some time reorganizing the Cyperaceae; the new arrangement is similar to that of the Kew herbarium.

BHUTAN FLORA PROJECT

The early months of the year were occupied by completion of work on the 1979 collections made by A. J. C. Grierson and D. G. Long and the drafting of a paper outlining the more important discoveries from that trip. Simultaneously, a checklist was produced of the trees and major shrubs of Bhutan and Sikkim, including relevant synonymy and Bhutanese and Nepali names. This publication was requested by the Bhutanese as an interim work on the Flora. Two further papers were published: one on *Cupressus corneyana* in Bhutan, marking its discovery for the first time in the wild; the other on *Pinus bhutanica*, a new species of pine collected in Bhutan in 1979.

Throughout the year considerable progress was made towards the publication of the Flora. The format has been reconsidered and it has been decided to publish the work in three volumes comprising ten parts which will be published separately. The various printing and publishing methods investigated led to the decision to publish the work directly from the RBG Edinburgh. At a meeting in London during December these proposals were approved by the Overseas

Development Administration and the necessary funds promised to facilitate publication. It is hoped that the first part of volume 1 will go to press in spring 1981.

Arrangements were completed with the Overseas Development Administration and the British Council for a Bhutanese botanist to visit Edinburgh for several months in 1981 to study taxonomic methods and herbarium curation.

PTERIDOPHYTES & CONIFERS

With the launching of the European Garden Flora project, Dr Page and Mrs Bennell have undertaken the preparation of the Pteridophyta, and in collaboration with various other authors elsewhere, the accounts of the conifers. The necessity of producing these major accounts as the first two groups in the first volume of the Flora has meant a time-consuming commitment. A checklist of all Pteridophyta cultivated in Europe has been prepared, and work is well in hand with the preparation of descriptions, keys and illustrations for every taxon.

Experimental research on conifers involving SEM work and the living collections, has continued in a very much reduced form.

The development of fern biology courses at both University and field studies levels has continued to draw considerable numbers of students, reflecting an increasing interest in the biology of these plants in relation to the environment, and a growing need for expertise of the type which only taxonomic specialists can provide.

BRITISH FLORA

Mr D. McKean and Miss H. Paul have continued curation and identification of British plants and have begun work on the large Mackenzie collection. The names of most of the *Salix* species in the Garden were checked and many corrections made. In view of a proposed mountain railway/ski development on Ben Wyvis a plant survey of the mountain was undertaken and submitted to the Nature Conservancy Council.

The Nature Conservancy Council now officially shares responsibility for the Scottish Rare Plant Records with Mr McKean.

CYTOLOGY & BRAZILIAN FLORA STUDIES

Because of lack of staff very little time has been available for cytological work during the year.

Dr Ratter's research time was mainly spent in preparing for publication the results of his 1976 and '78 visits to Brazil and in revisiting the country for three months. During the latter he carried out a vegetation survey of the Reserva do Araguaia, Ilha do Bananal, and gave a course of postgraduate lectures at the University of Brasília.

BASIDIOMYCETES

Studies on agarics (Dr Watling) particularly those in the Bolbitiaceae and genus *Armillaria* have continued; a check-list of World species of Bolbitiaceae has been prepared in collaboration with Mrs N. M. Gregory and is ready for

publication. The third part of the *British Fungus Flora: Agarics and Boleti* which covers the three genera of the Bolbitiaceae is also ready for publication. An account with Mr Seaward (Bradford University) on the eighteenth century naturalist James Bolton is in press.

Mrs Marie Taylor, University of Auckland, New Zealand, joined Dr Watling towards the end of the year for a three-month study period, concentrating on the New Zealand members of the Bolbitiaceae. Collaboration with P. Margot, Forensic Science Unit, Dept of Pharmaceutical Chemistry, University of Strathclyde, continues. Lists and a report on the larger fungi of the Loch Lomond Nature Reserve have been prepared for the Nature Conservancy Council.

The problems in laboratory staffing have been acute during the year and so projected work-programmes have had to be extended; culture-work has been reduced to little more than a watching brief.

Dr Watling organised extra-mural courses on larger fungi at Manchester and Sheffield Universities, and on diseases and disorders of ornamental plants for the Edinburgh Workers' Educational Association; a field course on fungi was also held at Kindrogan Field Centre, Perthshire.

Dr Watling was a guest at the Nordic Mycological Congress held at Vordingborg, Sjaeland, Denmark, and at the celebrations to commemorate the 75th anniversary of the Danish Mycological Society; he delivered papers both in Copenhagen and Vordingborg.

Mr Bennell has continued his taxonomic studies of the Uredinales and Ustilaginales. The revision of *Anthracoidea* in Britain is nearing completion. The ultrastructure of the spores of *Armillaria* has been investigated in collaboration with Dr Watling. An EM survey of rust spore development and a revision of *Chrysomyxa* and detailed experimental investigations of *C. rhododendri* have been started; a preliminary report of this work was given by Mr Bennell to the Federation of British Plant Pathologists in October.

ASCOMYCETES

Mr Coppins continued his taxonomic study of *Micarea* which is nearing completion. A revision of the *Lecidea uliginosa*-complex was prepared in collaboration with Mr James (BM Nat. Hist.).

In August Mr Coppins led a meeting of the Nordic Lichen Society in Argyll; other visits to sites in Inverness-shire, Perthshire and the Loch Lomond area have been made and lists and reports prepared.

Mr Coppins has taken office as Cryptogamic Secretary of the Botanical Society of Edinburgh.

Dr Watling, in collaboration with Dr Whalley (Liverpool Polytechnic), has continued his investigation into the distribution of selected British members of the Xylariaceae; a paper on *Daldinia concentrica* is ready for press.

THE HERBARIUM

ACCESSIONS, LOANS & SPECIMENS MOUNTED

Exchange accessions in 1980 came from 29 sources and totalled c. 8,450 specimens: these included substantial collections from Washington, Leningrad, Peking, Pietermaritzburg, Bucharest, Lae, Kew, and Beltsville (who sent a large

number of fungi including c. 3,500 collected by Elam Bartholemew). Notable in the year was the resumption of exchanges with China and c. 3,900 Rhododendron duplicates collected by George Forrest were sent to Beijing and Kunming. Also distributed were c. 4,000 mounted duplicates to Berlin and about the same number of British duplicates to the County Museum, Liverpool.

Gifts and specimens collected by staff members totalled c. 8,800: c. 3,050 from the British Museum collected in Sicily and Italy by P. H. Davis & D. Sutton; c. 2,675 from the Arabian peninsula (S. Chaudhary, S. Collenette, J. Edmondson, J. Lavranos, A. Nasher, R. Whitcombe). About 760 Spanish specimens were purchased from Prof. P. H. Davis, as were 100 Japanese bryophytes from the Hattori Laboratory, Japan.

	1979	1980
Accessions	12,550	18,113
Distributions	4,773	14,107
Loans: in	8,368	6,299
Loans: out	4,951	5,979
Specimens mounted	14,696	14,701

Most of the specimens mounted were of Arabian, Bhutanese, European, South African and SW Asiatic origin. One of the mounters, Mrs Georgie Young, retired in July after nearly 30 years' service.

In the cryptogamic herbarium a large collection of fungi, particularly micro-species, have been received, as previously mentioned, from USDA, Maryland, for incorporation into the Edinburgh collections; over 100 specimens of East African lichens have been donated by Dr T. D. V. Swinscow.

PHOTOGRAPHIC SLIDE COLLECTION

Eight- to nine-hundred transparencies were added in 1980. These included c. 150 of Saudi Arabian plants (Mrs S. Collenette) and about the same number of Turkish plants (U. Rückbrodt).

VISITORS

Dr A. Anton (Cordoba, Argentine), Dr J. Blakemore (Newcastle), Dr A. Çirpici (Istanbul), Dr P. Cribb (Kew), Dr F. Davies (Kew), Dr L. T. Dempster (Berkeley), Prof. E. Dominguez (Cordoba), Dr J. Dransfield (Kew), Dr D. Ferguson (Antwerp), Dr C. Ferreira (NCC, Edinburgh), Dr P. Geissler (Geneva), Dr P. Gibbs (St Andrews), Dr D. Given (Christchurch, NZ), Dr P. Goldbatt (Missouri), Rev. G. G. Graham (Newcastle), Dr C. Grey-Wilson (Kew), Dr L. Heckard (Berkeley), Dr O. Hilliard (Pietrmaritzburg), Mr C. M. Hu (S China Institute of Botany, Kwantung), Mr C. Jeffrey (Kew), Miss Aktar Jehan (Rawalpindi), Dr R. Keymer (NCC, Edinburgh), Dr Kwiton Jong (Aberdeen), Dr P. de Jong (Utrecht), Mr H. Kehl (Berlin), Dr M. Koyuncu (Ankara), Mr P. Lalande (Toulouse), Prof. Y. H. Lee (Seoul), Mr D. McClintock (Surrey), Miss A. McCusker (Canberra), Mrs D. Mothersill (Ontario), Prof. K. Müller-Hohenstein (Bayreuth), Mr I. Nsafoah (Kumasi, Ghana), Mr el Oglah (Reading/Jordan), Miss C. Pennell (Oxford), Prof. & Mrs W. Philipson (Christchurch, NZ), Dr P. Rains (City Museum, Edinburgh), Prof. & Mrs K. H. Rechinger (Vienna), Miss J. Reilly (Kew), Dr J. Renz (Basel), Mr G. Roger (Melrose), Mr G. Rose (Agricultural Scientific Services, Edinburgh), Mr & Mrs D. Rückbrodt (Lampertheim), Dr M. N. Sankary (Aleppo), Prof. J. Semir (Unicamp, Brazil), Dr P. Silva (Berkeley), Dr A. Silverside (Paisley College), Dr R. Smith (NCC, Edinburgh), Dr F. Sorger (Vienna), Dr M. de Sousa (Mexico City), Mrs O. M. Stewart (Edinburgh), Mr A. Stirling (Glasgow), Mrs M. Taylor (Auckland), Mr D. Tennant (Yorkshire), Dr H. Terao (Kyoto), Dr J. Trelawny (Victoria, BC), Dr C. Thorpe (Missouri), Dr T. Uslu (Ankara), Mrs A. Walker (Kelvinside Museum, Glasgow), Prof. P. Wendelbo (Göteborg), Dr G. Wickens (Kew), Dr Wigston (Plymouth), Dr J. Womersley (Adelaide).

In addition to the longer term visitors in 1980 such as Drs Gırpıcı, Hilliard, Hu Chi Ming, Koyuncu, Taylor and Miss Jehan, three Edinburgh University Ph.D. students, Anton Doroszenko, Musa Doğan and Katherine Novosel made regular use of the herbarium facilities.

THE LIBRARY

The arrival of Mrs D. A. Morrison, Assistant Librarian, in August helped clear most of the arrears in cataloguing and enabled the restrictions imposed on interlibrary loans in 1979 to be eased. Shortage of staff, however, continued to affect library activity: no binding was done during the year; organization of the periodical and serials collection, and particularly checking the receipt of exchange journals, is far behind; and, despite the improved situation after the arrival of the Assistant Librarian, interlibrary loans were only about half the number of 1979.

The greater number of accessions in 1980 were largely due to exchange, gift, and some purchase of back numbers of journals, and also the purchase of a considerable number of books on microfiche.

PUBLIC EDUCATION

Three interlink programmes, 'Plants and Man', 'Water and Life', and 'Aspects of Asia', were mounted in collaboration with the Royal Scottish Museum and Edinburgh Zoo. All were fully booked and very well received.

The film 'Capital Garden' continued to be popular and was shown nearly 40 times in our own Lecture Theatre as well as in the United States and Oman.

The Garden assisted with and was featured briefly in the documentary film 'A Dream of Poppies' made by the BBC about the collecting expeditions of Ludlow and Sherriff.

During the year the Garden hosted official parties from Australia, Austria, Holland, Ireland, Mexico, Norway, San Francisco and Indiana as well as numerous groups from many parts of Britain, including the Universities of Aberdeen, Edinburgh, St Andrews and Stirling, Inverclyde Parks Department, Cannington College, Somerset, the Yorkshire Philosophical Society, and St Mary's College, Newcastle.

The first ever Royal Horticultural Society lecture in Scotland was given in the Lecture Theatre by Anthony Huxley to an audience of over 200.

With the exception of a loan exhibit on the commercial use of Jojoba bean (*Simmondsia*) and an exhibit prepared for the Caledonian Horticultural Society on hydroculture, little change was made in the Exhibition Hall during 1980 due to a lack of money. A series of major exhibits is, however, in preparation.

PUBLICATIONS

Four parts of *Notes RBG Edinb.* were published during 1980: vol. 38(1): 1–188; 38(2): 189–372; 38(3): 373–541; and 39(1): 1–207. These contained a total of 52 papers, 3 short notes and 12 book reviews. Volume 39(1) was devoted to Dr Cullen's revision of lepidote rhododendrons and an extra two thousand copies of this part were printed to meet expected demand.

A new guide-book to the RBG Edinburgh, written by Dr Burbidge, was also published; it conforms to the colour format already established for the guides to Logan and Younger Botanic Gardens and has sold well.

To avoid the ever-increasing cost of publication it was decided to experiment with relatively inexpensive photo-litho production methods for departmental publications. The first publication of this type, a 111 page comb-bound book, *Notes on the vegetation of Fazenda Agua Limpa*, written by Dr Ratter, appeared in July.

PUBLICATIONS BY MEMBERS OF STAFF IN 1980

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—, KJAER, A. & MALVER, O. *Dipterygium* — *Cruciferae* or *Capparaceae*? *Ibid.* 38: 247–250.

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LAUENER, L. A. Catalogue of the names published by Hector Lévêillé: XIII. *Notes RBG Edinb.* 38: 453–485.

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- PAGE, C. N. The earliest known form of living *Taiwania* (Taxodiaceae). *Kew Bull.* 34: 527–528.
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- & NICOLL, HAZEL. *Sphaerocysts* in *Lactarius rufus*. *Trans. Brit. Mycol. Soc.* 74: 424–431.
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THE GARDEN, EDINBURGH

The total admissions were 592,570 an increase of nearly 75,000 on the 1979 figure.

ARBORETUM DEPARTMENT (Mr G. Broadley)

The redevelopment of the area east of the Copse was started in the winter of 1979-80 and is now nearing completion. Levels have been altered and new larger shrub borders constructed. A considerable number of trees and shrubs have been planted including *Magnolia*, *Euonymus*, *Maytenus*, *Pittosporum*, *Arbutus*, *Clethra*, and *Helwingia*, with shade and filler plants between. Work in this area should be complete by early summer 1981.

The reconstruction of areas F02 and F03 was started with the removal of many unwanted rhododendrons and other shrubs; eventually shelter plants (mainly pines) will be planted at selected points in this area.

In the early spring of 1980, 33 young birch were planted in areas A02 and S20. Most of these are replacements for older trees in the collection, but some species are new to the Garden. The area round the West Lodge (S01) was also replanted at the same time.

During late spring and early summer the area S18 on the south side of the Rock Garden was cleared of unwanted *Salix* and other trees and shrubs. The border was widened and realigned then replanted with 13 different species and varieties of *Pinus*, comprising some 60 plants in all. These will eventually provide additional shelter in this area and make for a better link with the Rock Garden.

GLASS DEPARTMENT (Mr L. Buchan)

Temperate Aquatic House. The repairs to make the raised floor of this house watertight disturbed the plantings to such an extent that it provided an opportunity to reconsider the theme for their replacement. Since we wanted to display a representation of Bromeliaceae it was decided to devote the entire house to plants from the warmer parts of the Americas. Work to this end is in progress and already a collection of bromeliads established on an artificial tree and in borders, together with other South American plants, are making an attractive display.

Labour Saving Equipment. An underground plastic pipe irrigation system has been installed by the Glass Department staff in the Tropical Palm House and is already saving staff time. To the same end several sand capillary benches were set up in the service house (No. 20). Conventionally grown pot-plants in the Library, Foyer and Exhibition Hall have been replaced with those grown in a hydroculture system. All three projects are proving successful.

General Maintenance. Both ornamental pools have been drained, cleaned and restocked.

It has been possible, through the use of a recently purchased high-pressure sprayer, to tackle the generally neglected task of cleaning the glass inside the houses where mosses, grime and slime are a problem.

Scaffolding was erected in the Cactus and Temperate Houses to allow the

repair and replacement of ratchets on the side ventilators. After this work was completed and the scaffolding removed the horticultural staff had to make good the appearance of the borders in the Cactus House.

Paths in houses No. 22 and No. 23 had to be lifted and re-laid to meet the standards required.

Periodically vegetation in the houses must be reduced and thinned. Such work was dealt with in the Orchid and Cycad House where for instance a specimen of *Podocarpus imbricatus* had to be removed because it was suppressing other valuable plants. Similar work was done in the Peat and Rock houses.

Decorations. Plant decorations were mounted during the year at the Department of Agriculture and Fisheries for Scotland pavilion at the Royal Highland Show, the Royal Scottish Academy, and the Royal Caledonian Horticultural Society.

Visitors. Dr C. Luer from the Marie Selby Botanic Garden in Florida visited the orchid section and was particularly interested in the *Masdevallia* collection.

Mrs G. Janemain from Gothenburg Botanic Garden in Sweden worked in the orchid section for four weeks. She also visited other horticultural establishments in a programme arranged by the Garden.

The National Trust Head Gardeners' Conference was held in the Garden and had conducted tours around the Glass Department.

HERBACEOUS AND ALPINE DEPARTMENT (Mr A. Evans)

Much of the work involved in developing the Tennis Court area was carried out in the autumn of 1979. The final turf laying and much of the planting were completed in spring. Some hedging which had not transplanted successfully was replaced at the same time.

Early in the year the twin annual borders set against the hemlock hedges were turfed over and a new centre border was opened up and prepared for sowing with annuals. Only hardy annuals were used this time. This brings the area into line with other divisions in the Demonstration Garden.

A new scheme aimed at demonstrating Scottish native plants in family beds was started in spring. Although many plants suitable for this demonstration were already in the collection it may take some time before the less common species can be procured and planted out.

In spring a general assessment of the plants in the Experimental Ground was carried out and some unnecessary, duplicated plants were discarded. This meant that the plants remaining had to be rearranged.

An area in the Demonstration Garden, west of the Annual Border, was cleared and a start was made at laying out borders showing types of hedging and ground-cover plants. This should be completed by the spring of 1981.

A new arrangement of borders planned for the West Gate area was tackled late in the season. It is hoped that, depending on weather and the availability of staff, this may be finished in spring. As this was additional to the agreed winter programme, however, some aspects of it may have to be postponed until the autumn of 1981.

Work already started on Rock Garden mounds R14, X14 and R13 was finished in spring. This involved much rock moving, returfing and replanting.

The Rhododendron verification project continued throughout the spring among the dwarf species in the Rock Garden and Woodland Garden. Many were

determined and assessed, and some, found to be wrongly named or of hybrid origin, were discarded.

A large section of the Rock Garden was dismantled during autumn in a scheme which will run into 1981. This involves mounds R25, R26, R27 (in part), R28, R29 and R30 (in part). The aim is to re-lay much of the rock work which, over the years, had settled into awkward piles. In addition it is proposed to introduce a large area of grass which should be an aid towards keeping the area cooler in summer. This should be more pleasant underfoot and should not add to maintenance time.

A small exhibit of alpine plants was staged at the Alpine Garden Society's Show in Lancaster in March, 1980. It included rare plants in flower, and plants which had flowered particularly well.

Apart from the normal routine work of the Plant Records Section, an index is being compiled on the wild and threatened species. Additionally this section was heavily committed to the Rhododendron identification programme early in the year. Apart from record changes, hundreds of plant labels had to be engraved.

Mr Evans took part in various horticultural and botanical activities outside the Garden. He was leader of the Scottish Rock Garden Club's tour of Devon and Cornwall, botanist of the 'Around Britain Cruise' run by Swan (Hellenic) Ltd which visited gardens and wild habitats from the Channel and Scilly Islands to Shetland, and presenter of the six-programme STV series 'Down to Earth'.

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

Temperate section. The general work of propagating plants from seed, cuttings, grafting, etc., continued as requested by the Garden departments. The majority of time was spent propagating woody material. The plants comprising *Sorbus*, *Malus*, *Prunus*, *Acer*, etc., mainly of Chinese origin are still difficult if not impossible to obtain as seed from the wild. Many are from original material collected by Forrest, Wilson and others. Hardwood cuttings were tried under glass in a temperature of 50°F night minimum. The success rate was variable, the main problem being that the cuttings tend to flush rather than produce roots. *Acer* has proved most difficult as it is difficult to obtain suitable compatible stocks. Softwood cuttings of these subjects were also tried in containers both under mist and in a closed case, with supplementary lighting as a follow up.

A batch of seedlings of *Mahonia mairei* was raised from seed received from Kunming Botanic Garden. This species was reputed not to be in cultivation until the recent expeditions to China.

The production of ornamental half-hardy annuals was discontinued. This has greatly relieved the work of the department at a critical and particularly busy time of the year.

Tropical propagation. Seed of *Cycas pectinata* collected by A. Grierson and D. Long in Bhutan in 1979 germinated successfully, producing a long tap-root and two cotyledons. However, it was a year later, just prior to Christmas 1980, before adult leaves were produced.

Study collections & research block. The work of cultivating the study groups, Zingiberaceae, Gesneriaceae and Ericaceae continued. There was a more concentrated effort on Ericaceae and Gesneriaceae following visits abroad by the scientific staff concerned.

The rock work was completed in the Cambridge House to provide habitats for study plants. Suitable shade plants and climbers were planted to create a canopy necessary for the Zingiberaceae.

Young Ericaceae were given extended day length of 16 hours to improve overwintering; the improved performance was particularly noticeable in young seedlings.

Propagation of endangered species. Seed was received, via Kew, of *Sophora toromiro* from a plant growing at the botanic garden in Christchurch, New Zealand, which is the last known established plant in cultivation. Three plants were successfully raised of this species from Easter Island which is extinct in the wild.

Primula scotica has been successfully cultivated from the original plants raised from seed collected near Durness, Sutherland, in 1972. The plants are short-lived (normally two to three years) but set plenty of viable seed.

Another endangered Scottish native, *Saxifraga cernua*, can easily be increased from small plantlets which are produced on the flowering stems. We again have managed to keep a succession of these in cultivation.

Elingamita johnsonii, an endangered member of the Myrsinaceae from the Chatham Islands, New Zealand, has been raised successfully from both cuttings and seed of the two original plants received from Kew in 1962. The plants appear to set seed regularly in cultivation.

The 'Silversword', *Argyroxiphium kauense*, flowered again and set seed. We now have a very fine stock of young plants of various sizes, and seed has been distributed to twelve botanic gardens in various parts of the world.

Notable plants. Some members of the Proteaceae flowered successfully during the winter months with the help of supplementary lighting, e.g. *Protea laurifolia* and *P. pulchra* from South Africa and *Isopogon buxifolius* and *I. anemonifolius* from Australia.

Turraea obtusifolia, a South African member of the Meliaceae, produced its small white tubular flowers throughout the year. This plant which we obtained recently is particularly good for demonstrating the family Meliaceae as it flowers when young.

Hibiscus rockii from Hawaii flowered successfully on a number of occasions producing bright yellow flowers with very attractive brown protruding stigmas. Unfortunately the flowers barely last a day.

Marcgravia umbellata, a member of the Marcgraviaceae from tropical America, produced its curious green pitcher-like nectaries — the whole inflorescence resembling a Gorgon's head.

We received seed of *Lobelia boninensis*, an endangered species from the Ogasawara Islands lying between Japan and Hawaii, from Waimea Arboretum in 1977. Three of the resulting plants finally reached flowering size this year. The white flowers were rather disappointing, the glossy green foliage being more spectacular. The plants have now set seed.

Buddleia bhutanica, seed of which was collected by A. Grierson and D. Long in Bhutan, produced its white terminal inflorescences towards the end of the year. It is doubtfully hardy in Edinburgh as it was collected at a low altitude.

Accessions. The total number of items in the form of seed, cuttings and plants was 4,563, consisting of 2,574 of wild origin and 1,989 of non-wild origin.

A large consignment of Ericaceae was received following Dr Argent's visit to Mt Kinabalu, Sabah. This material arrived in March, which is undoubtedly the best time to receive live plant material from the wild. Material of a similar nature received the previous November had a very low survival rate. March being the start of the active growing season gives the plants plenty of time to settle down before the following winter.

Following P. Wood's visit to Canada and USA we received cutting material of Gesneriaceae including *Cyrtandra splendens* from Sarawak. This has now been successfully established.

We received a collection of Bromeliaceae from Kew, a plant family not well represented in our collections. Some of these have been successfully established in the Temperate Aquatic House.

Mr Soren Odum of Horsholm Arboretum, USA, visited the Garden in December, donating a collection of seed he collected in Argentina and Chile. The seed included *Nothofagus*, *Maytenus boaria*, *Hydrangea integerrima*, *Chusquea culeou*, *Polylepis australis* and *Austrocedrus chilensis*, all of known wild origin.

A collection of Chinese seed, mainly of woody material collected on Mt Omei in Sichuan Province, was received from Mr Roy Lancaster of Winchester.

Seed of *Acer nipponicum* was received via Dr P. C. de Jong of Utrecht from a plant growing in the Zuiderpark in the Hague. The only other known plant of this species in Europe is at Dawyck.

The total number of items dispatched during the year was 9,086, consisting of 339 seed lots, 3,855 plants, 4,180 cuttings, 210 bulbs, 200 scions and 302 specimens.

Staff changes. Mr J. M. Gardiner, Garden Supervisor in the temperate propagation section, left the Garden to take up the post of Curator at the City of Liverpool Botanic Garden at the beginning of December.

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

There was a prolonged dry spell in April and May, and it was extremely wet from September to December with only 14 dry days. The remaining six months were about average for Benmore.

The Special Temporary Employment Programme on the slopes of Benmore Hill Wood above the Massan valley was completed in February.

Projects undertaken by the Garden staff during the year included felling trees and moving shrubs from the site of the tearoom extension; draining waterlogged lawns in the Formal Garden; clearing an area for an extension of the collection of *Rhododendron* species of the *Campanulata* subsection; extensive repairs to the concrete lining of the pond; extending the concrete apron in the compost and leaf-mould yard; and burying tree stumps.

Approximately 300 specimens were planted out into the collections during the year. About half of these were rhododendrons representing about 50 species. The remainder were mainly conifers representing 30 species of 15 genera.

A spraying programme followed during the months of May, June, July and August, as and when conditions were suitable. Glyphosate and Paraquat were used against grasses and soft weeds, Asulox against bracken and docks, and

Supertox against broadleaved weeds in lawns. Glyphosate and Paraquat were also tried on an experimental basis against *Rhododendron ponticum*, but were not effective, the rhododendrons growing away quickly after an initial check.

A further two members of the staff resigned during May and June thereby reducing the Industrial Staff to five. This was insufficient for purposes of routine maintenance over the whole Garden and some of the outlying areas were abandoned for a short period. When recruiting restrictions were lifted it was possible to add two to the staff in August, a third in September, and a fourth in December to bring the staff level back to fill an agreed lower complement.

Staff of the Department of the Environment renewed the bridge over the pond, repaired the Bailey Balfour Memorial Hut, and treated the greenhouse with teak dressing. The contractor started work in September on the modification and extension of the tearoom.

Visitors totalled 34,666, a fall of 3,124 on the previous year.

LOGAN BOTANIC GARDEN, STRANRAER, WIGTOWNSHIRE
(Mr J. M. Colledge)

In August Lord Mansfield, Minister of State, visited the Garden accompanied by the Regius Keeper.

The most noteworthy part of the year's work was the completion by PSA of the new tearoom. The nature of the tearoom and the calibre of its staff ensured a very successful catering season, reflected by an award by the 'Glasgow Herald'.

The precincts of the tearoom and a renovated formal pond had to be remodelled and the horticultural staff succeeded in doing this in time for the start of the 'open season'. The job involved breaking-up bedrock to gain required levels, constructing ramped stonework, introducing twelve authentic stone troughs planted with alpine, and replacing overgrown shrubs with plantings of *Dierama*, *Alstroemeria*, *Watsonia*, *Salvia* and *Hebe*.

It is greatly to the credit of the staff that they managed to maintain the Garden to the high standard set in previous years despite difficulties caused by shortage of manpower and exacerbated by a wet season.

Visitors totalled 38,552, representing an increase of nearly 4,000 on the 1979 figures.

Cordyline Avenue. The existing avenues of *Cordyline australis*, so deteriorated in recent years by drought, low temperatures, and age, are being replaced section by section. The first section has now been replanted using material from seed of the original trees with a ground-cover of *Hebe*, *Parahebe*, *Fuschia*, *Mitrraria* and *Blechnum* beneath.

Peat Garden. It was decided to remove all dwarf rhododendrons of doubtful value from the peat-walls. They have been replaced by wild source, low-growing Ericaceae and other shrubs of southern hemisphere origin. Later it is planned to add the *Rhodohypoxis* collection made by B. L. Burt in South Africa.

Walled Garden. Plantings to extend and improve the collection of *Maddenia* subsection rhododendrons and the conifer collection (particularly *Podocarpus*) were made during the season. Interesting plants flowering in the area were *Salvia apiana*, a species from SW North America, which produced a six-foot spike of white flowers, and the Chinese *Eurya aurea*.

Woodland. During the course of replacing shelter trees six senile hardwoods were removed. The spaces left will be gapped-up with material now being grown on in the Propagation Department, Edinburgh. Above average rainfall during the growing season in combination with the use of herbicides and crushed bark for mulching has brought about excellent growth on young block plantings of various woody species.

Deer Hill Plantations. The plantations got off to a bad start but since SWOA beat up the wind-breaks in the spring there is an improvement. The annual increment of the trees is not expected to be substantial until their canopy begins to suppress competitive grasses and other ground herbage.

THE ARBORETUM, DAWYCK (Mr G. Broadley)

The eradication of tracts of scrub has continued. Already large areas have been cleared and this work will go on until completion, hopefully in the winter of 1981-82.

Several large diseased and dangerous trees have been removed, mainly sycamore and beech. This has cleared further areas for replanting and eliminated some of the many hazards in the Garden.

In September 1980 the contractors started work on the first stage of the new road programme.

A new gravel footpath was constructed leading directly from the Car Park by way of a new bridge over the Scrape Burn into the centre of the Garden. The path will provide the main pedestrian access to the Arboretum and eventually may pass through a new service building, where a gate will be constructed.

In addition a hard-surfaced road was laid, leading directly up the steep part of the hill. This will allow easier vehicular access to the main road network of the Garden.

Drains were also laid across some of the existing roads, not altogether successfully, in an attempt to prevent surplus water reaching the Car Park area. The existing driveway from the main road to the Car Park was patched and a cattle grid installed at its entrance.

The SSEB laid a new underground, electric supply cable, which terminates near the existing accommodation. This will eventually supply the new service buildings.

The weather was not particularly helpful in 1980 and staffing remained a problem. Nevertheless much good work was done by the staff at Dawyck under difficult circumstances. Several parties of staff and students were sent from Edinburgh to assist with the heavier tree work, which provided an excellent opportunity for students to gain further experience in this type of work.

The new 'back actor' (digger) which was fitted to the old MF 135 tractor was transferred from Edinburgh to Dawyck. This will help considerably in preparations for new planting and also with heavier reconstruction work. The building of the new Service Block and one dwelling house is scheduled to start in April 1981.

HORTICULTURAL TRAINING SECTION (Mr G. Anderson)

Prizes and awards were presented in July by Dr J. H. Burnett, Principal and Vice Chancellor of the University of Edinburgh. Thirteen students gained the Diploma (10 with Credit, none with Honours). The amenity area within local authority parks and landscape sections continued to attract the highest number of students although, this year, four took up posts in the commercial sector of the amenity field.

The participation of RBG horticultural and scientific staff in student teaching continued and new links were established with local authorities and external lecturers. The number of enquiries received concerning horticultural education continued to increase and the number of completed application forms received for entry to the 1980/83 course was high. Over the year Mr Anderson continued to be involved with the setting up of horticultural courses for the Scottish Technical Education Council, and in July was invited to address an international conference on horticultural education in Scotland on the role of the RBG in this sphere.

ANNUAL RAINFALL

Edinburgh	653.5 mm (25.73 in)
Benmore	2362 mm (93.0 in)
Logan	1122.2 mm (44.1 in)

STAFF LIST (December 1980)

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. 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 R. Eudall	Miss D. E. Purves
	Mr D. R. McKean	Mrs J. M. Woods
	Miss V. A. Matthews	Mr P. J. B. Woods
	Mr A. G. Miller	
<i>Junior Research Fellow</i>	Mr A. P. Bennell	
<i>Scientific Officers</i>	Mrs F. M. Bennell	Miss R. A. King
	Mrs N. M. Gregory	Miss M. A. H. Paul
	Miss E. M. Hamlet	Mr D. A. H. Rae
<i>Assistant Scientific Officers</i>	Mrs D. Brunton	Mrs H. Hoy
	Mrs L. A. Gibb	Miss S. J. Mackay
	Mr K. N. Grant	Miss D. M. Taylor
<i>Laboratory Attendants</i>	Miss M. Bryce	Miss M. McLaren
	Mrs E. A. McAllan	Mrs G. Miller

<i>Curator</i>	Mr R. L. Shaw	
<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. D. McBeath
	Mr R. U. Cranston	Mr W. Tait
	Mr G. Knott	Mr B. Unwin (LBG)
	Mr G. J. Lewis	Mr M. Welsh (YBG)
<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 J. Macdonald
	Mrs M. O'Brien	Mrs D. Mackay
<i>Senior Paper-Keeper</i>	Mr J. Clelland	
<i>Sergeant Park-Keeper</i>	Mr J. Y. Thomson	
<i>Corporal Park-Keeper</i>	Mr A. W. Brown	
<i>Park Constables</i>	Mr N. Campbell	Mr W. Murray
	Mr W. S. Connachar	Mr T. A. Nisbet
	Mr M. E. Fitz	Mr W. Scott
	Mr P. N. Fletcher	Mr R. Stevenson
	Mr D. C. Hogg	
<i>Gardeners Special</i>	Mr T. Y. A. Brown	Mr I. W. J. Sinclair
	Mr G. Kirkpatrick	Mr J. Stewart
	Mr G. W. Lawson	Mr C. J. P. Taylor
	Mr J. McCluskey (YBG)	Mr E. F. Young
	Mr A. J. Paxton	
<i>Gardeners I</i>	Mr S. Boyd (LBG)	Miss B. C. Morrison
	Mrs J. E. Currie (LBG)	Mr G. Murdoch (LBG)
	Mr G. Godbent (YBG)	Mr C. Murray (YBG)
	Mr J. Henderson	Mr I. M. Potts
	Mr B. Holt (YBG)	Mr R. M. Robertson
	Mr W. Kocz	Mr T. L. Sutherland
	Mr S. MacPherson	Mr N. Totty
	Mr W. M. Milne (DA)	
<i>Gardeners II</i>	Mr G. A. Bain (YBG)	Miss J. G. Queen
	Mr J. Fernie	Mr J. Smith
	Mr I. Herkes	Mr R. Waddell
	Mr D. Parker (DA)	
<i>Assistant Gardeners</i>	Miss L. Baldwin	Mr C. W. S. Ross
	Mr G. A. Hall	Mr K. Stables
	Mr J. B. Henderson	Mr D. M. Stewart
	Mr H. Holman	Mr C. Thompson
	Mr A. S. Jamieson	Mr R. D. Traynor (YBG)
	Mr K. M. McFarlane	Mr P. Turner
	Miss E. A. McIntosh	Mr J. Urquhart
	Mr N. McIntyre	Mr G. D. Wilson (DA)
<i>Junior Gardeners</i>	Miss M. Geddes (LBG)	Miss L. E. Hunter (YBG)
<i>Engraver</i>	Miss M. Laing	
<i>Storeman</i>	Mr G. Roddex	
<i>Female Lavatory Attendants</i>	Mrs C. Horner	Miss J. Kirkwood
<i>Male Lavatory Attendants</i>	Mr J. Innes	Mr J. Martin
<i>Male Cleaner</i>	Mr G. Thomson	
<i>Nightwatchmen</i>	Mr J. Brady	Mr J. McKenzie
	Mr J. Duffy	Mr W. Pringle