

# A SURVEY OF THE WORK OF THE ROYAL BOTANIC GARDEN EDINBURGH IN 1977

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## GENERAL REVIEW

Evolution is a slow, gradual process. Changes in botanic gardens tend to proceed by evolution rather than dramatic revolutions. This is surely inevitable in an organisation in which the greatest part of the effort must go towards preserving the major collections—whether they be the living plants in the gardens, the hundreds of thousands of herbarium specimens, or the volumes in the library. So it has been, as every year, in the Garden and its two outstations in 1977. The emphasis is on steady progress within a basic pattern of high quality conservation. There have been modest advances in most sections: the new windbreak at Logan will eventually provide the shelter so desperately needed from SW gales, the new hill wood at Benmore will grow at least some of the wild origin conifers, and the new planthouses at Edinburgh give the gardening staff the modern facilities they deserve. The new houses to be open to the public in 1978, the tropical montane house to contain ericads and the house for gesneriads and gingers, promise to be as popular as the alpine house is now.

On the scientific side progress was steady: discoveries in plant taxonomy are seldom dramatic. The revision of *Rhododendron* has proceeded to plan and correlates well with activities in the living plant collections. The Bhutan Flora project was hampered by difficulties in revisiting the country but the herbarium study is on schedule. In order to widen work experience of the herbarium staff, loads were reallocated, most Principal Scientific Officers now have new responsibilities; Mr Hedge is now formally Curator of the whole herbarium.

The attendance figures at Logan Botanic Garden and Edinburgh showed a downward trend whereas at Benmore the figure rose by four thousand. The vagaries of the weather and changes in holiday habits and travelling patterns are important but unidentifiable factors influencing these figures.

## TAXONOMIC RESEARCH

### SOUTH-WEST ASIA: FLORISTIC STUDIES

The established pattern of recent years was followed again in 1976. An ever-increasing number of collections from throughout SW Asia was sent in for naming and dealt with. Most of them were either Turkish in origin, and often worked through in co-operation with Dr Davis' Edinburgh University

Flora of Turkey Unit, or Iranian. The recent interest in the flora of Yemen continued as the result of the acquisition of collections made either by local residents or by Dr J. J. Lavranos on his travels.

The close ties with the *Flora of Pakistan* and *Flora of Libya* projects continued and further manuscripts were received for surveillance and comments.

Mr Hedge and Miss Lamond completed a short paper dealing with the tribe Echinophoreae of Umbelliferae. It included some of the interesting finds made by Mr A. Miller and Dr J. Edmondson (Flora of Turkey Unit) during a short vacation trip in May/June to the Yazd and Kerman regions of S Iran. Mr Miller, in addition to working through this Iranian material, completed a revision of the small Crucifer genus *Pseudocamelina*, and dealt with most of the Arabian collections mentioned above. In November Mr Hedge spent a few days in Göteborg working with Professor P. Wendelbo on a joint paper dealing with plant distribution in Iran.

#### LÉVEILLÉ CATALOGUE (& RANUNCULACEAE)

Part XII of the *Catalogue*, dealing with Gentianales and Polemoniales, was completed by Mr Lauener during 1977. Work is continuing on part XIII.

Examination of the Ranunculaceae collected by Royle in the Himalayas in the 1820-30s, and housed at Liverpool and Dehra Dun, was completed and the results written up.

From June till the end of the year, Dr Michio Tamura (Osaka University) worked in the herbarium on *Anemone*, *Clematis* and *Ranunculus*. He also worked with Mr Lauener on *Aconitum* subgenus *Paraconitum*; this resulted in a complete review of the constituent species.

#### ERICALES, etc.

Progress on the taxonomic revision of the genus *Rhododendron* has continued, and the greater part of the work dealing with the non-Malesian species is now completed. In preparation for an international meeting on *Rhododendron* taxonomy, to be held at New York Botanical Garden in May 1978, a synopsis of the work already completed was prepared (*Notes R.B.G. Edinb.* 36:105-126). Some preliminary studies of *Rhododendron* scales and hairs were undertaken, using the Scanning Electron Microscope, and a re-survey of the leaf anatomy of the genus was begun. Both these studies will provide valuable taxonomic evidence as they proceed. Dr Cullen lectured in June to the *Rhododendron* Group of the Royal Horticultural Society on work in progress in Edinburgh, and in September to the Scottish Rock Garden Club on Eastern Asiatic Gentians; Dr Burbidge also lectured on Scottish Plant collectors at this latter meeting.

Dr Argent and Mr Kerby took part in a Royal Geographical Society expedition to Mt Mulu in Borneo (a proposed National Park), and large living collections of Ericaceae and other plants were obtained; many of these are now growing in the Garden, and are available for scientific study. Drs Argent and Burbidge continued with the identification and classification of material previously collected in Ecuador. Dr Argent lectured on 'New Guinea Bananas—a Problematic Genetic Resource' at the 5th Aberdeen-Hull

Symposium ('Research Problems in the Conservation of the South East Asian Genetic Resources') in May. His paper will be published in the proceedings of the symposium.

Among other activities, Dr Cullen attended several meetings of a committee set up to study the possibility of the production of a Flora of Cultivated Plants. In connection with work related to this, a temporary ASO (Miss M. M. McDonald) was employed for four months in the summer. Dr Chamberlain continued to work on the distribution of Bryophytes, in collaboration with the Nature Conservancy Council, and Dr Burbidge completed his work on the genus *Tulbaghia*.

#### ZINGIBERACEAE

Miss R. M. Smith has continued her work on this family; two papers were published during the year and a further two were prepared. In addition, an account of the family for *Flore de Mascareignes* was completed; and work on the account for *Flora of Ceylon*, together with Mr Burt, continues. Under the general guidance of Miss Smith and Mr Burt, Dr Kam Yee Kiew (Penang) spent two months on a preliminary survey of *Kaempferia*.

#### BHUTAN FLORA PROJECT

During the year Mr Grierson and Mr Long have continued herbarium studies and have now prepared accounts of 104 families encompassing 1300 species. The largest family so far studied is the Leguminosae in which accounts of 250 species were written. The first of a series of papers on "Notes relating to the Flora of Bhutan" (*Notes R.B.G. Edinb.* 36:139-150) was also prepared.

#### CONIFERS

Accumulation of phytogeographic information on Asiatic Conifers has continued, and a visit by Dr Page to Kashmir and Garhwal Himalayas in May provided information on the distribution and ecology of the species of these regions. The survey of wild-origin collections of Chinese conifers in British arboreta proceeded and the building up of new living research collections at our own three gardens is well in hand.

Scanning electron microscope studies of the genus *Agathis* in collaboration with the Commonwealth Forestry Institute, Oxford, have begun; as have hormone injection experiments to produce early coning, being carried out in conjunction with the Forestry Commission's Research station at the Bush.

#### PTERIDOPHYTES

The increase in general environmental awareness has produced a rising demand for taxonomic, ecological and conservational information on pteridophytes and much of Dr Page's time has been spent in satisfying this. Identification and survey work were carried out for the Nature Conservancy, courses were given (including an eight-lecture Honours course on fern biology in the Department of Botany, Edinburgh University), and various invited contributions to symposium volumes, etc., were written.

## CYTOLOGY (&amp; BRAZILIAN FLORA STUDIES)

The majority of Dr Ratter's research time has been spent working on the collection made in Central Brazil during 1976 and in the preparation of papers on Brazilian floristic studies, two of which are now in press.

Miss Milne has continued cytological work on Gentianaceae (in conjunction with Dr Cullen) and Mrs Brunton has carried out chromosome studies in Ericaceae (with Dr Argent) and in *Cheilanthes* (with Dr Page).

## BRITISH FLORA STUDIES

The major project carried out by Mr P. Harrold during the year was a survey of rare and endangered species in the West of Scotland. The study was made on behalf of the Nature Conservancy Council and involved some eight weeks of intensive fieldwork. Mr Harrold also continued his research on the experimental taxonomy of *Sagina*, the results of which are now in the course of publication.

## BASIDIOMYCETES

Dr Watling's studies on the Bolbitiaceae continued and further papers were prepared, including a world checklist and the third part of the *British Fungus Flora* covering the genera *Agrocybe*, *Bolbitius* and *Conocybe*. The study of the genus *Armillaria* proceeded and an account of some Australian members was written and is in press. The second part of the *British Fungus Flora* (Mr P. D. Orton and Dr Watling's account of *Coprinus*) was completed and is also in press.

Investigations have been completed on collections of Indian Basidiomycetes received at the Garden and studies on hallucinogenic agarics of the Coprinaceae and Strophariaceae have again taken some time.

Dr Watling was President of the Yorkshire Naturalists' Union during 1977 and delivered his Presidential address on "Distribution of Larger Fungi in Yorkshire" which will be published in *The Naturalist*.

Dr Watling spent six weeks in North America during the autumn, where he gave courses in agaricology in Aspen, Colorado, and Portland, Oregon, lectured at the Second International Congress, Tampa, Florida and took part in the Second Kananaskis Conference in Alberta, Canada. He carried out field studies in Oregon, Northern California, Alberta and Saskatchewan.

## ASCOMYCETES &amp; LICHENS

Mr Coppins has continued taxonomic and phytogeographical studies on British lichenised and non-lichenised Ascomycetes. Work has continued on revisions of *Bacidia*, *Micarea*, *Caliciales* and *Phaeographis*. Critical notes and descriptions of new or interesting lichens prepared with Mr P. James are to be published in 1978. Mr Coppins spent five weeks in Sweden, where he made a large collection of lichens and Ascomycetes, especially in Lapland.

## ELECTRON MICROSCOPE STUDIES

Mr Bennell has examined spore ontogeny in further genera of both British and foreign rust fungi (Uredinales), producing detailed accounts of the ultrastructure of spore ornamentation in *Tranzschelia*, *Hemileia* and various

*Puccinia* species, based on combined scanning and transmission EM observations. With the assistance of Mr K. Grant, preliminary SEM observations have been made on a range of materials, especially rust and smut fungal spores, *Rhododendron* leaf surfaces and a number of seed and pollen samples.

Studies on *Armillaria* have continued with Mr Christopher (HND sandwich student) carrying out a combined LM, SEM and TEM examination of gill and spore anatomy. In the course of this study, supervised by Mr Bennell and Dr Watling, a new technique for observing the detailed anatomy of agaric gill structure has been developed.

### THE HERBARIUM

#### ACCESSIONS, LOANS AND SPECIMENS MOUNTED

Exchange accessions in 1977 came from 22 different institutes; 4700 specimens were received. Some of the larger collections were from Aarhus, Adelaide, Baghdad, British Museum (Natural History), New York (Bronx), Kew, Lae, Leiden, Munich, Pietermaritzburg, Port Blair, Sofia, Tokyo and Utrecht.

Gifts totalled c. 7000 specimens; c. 3850 were Brazilian plants (from Dr P. H. Davis, the Botanical Institute of São Paulo and the University of Campinas); there were substantial collections from N America (cryptogams), Spain (Mr R. R. Mill), Tunisia (Dr Davis) and SW Asia. The only major purchase was of 750 Iranian specimens collected by Dr J. Edmondson (Flora of Turkey Unit) and Mr A. Miller.

There were 107 'loans-in' from c. 30 institutes and 121 'loans-out' to c. 60 institutes. About 300 specimens were distributed as exchange material to 7 institutes; 2000 Forrest Chinese duplicates were sent to Hamburg.

	1976	1977
Accessions	10,536	12,636
Distribution	5,541	3,828
Loans: in	4,254	2,900
Loans: out	6,595	6,485
Specimens mounted	20,047	19,555

#### HERBARIUM CURATION

In the general re-organisation of the Gramineae, Miss R. M. Smith, with the completion of the Panicoideae, has now reached the half-way mark.

#### PHOTOGRAPHIC SLIDE COLLECTION

About 900 slides were added to the collection; of these c. 100, mainly of Palestinian plants, were donated by the widow of the Rev. Dr Torrance, Dundee.

#### VISITORS

Miss D. Azizian (at Reading Univ.); Dr H. Beaufort-Murphy (N Carolina); Dr R. Brooks (Palmerston North, New Zealand); Dr F. G. Davies (Kew); Mr Musa Doğan (Ankara); Dr W. G. Dore (Ottawa); Prof. J. Ewan (New Orleans); Dr M. Fischer (Vienna); Dr E. Gabrielian (Erevan); Mrs Luiza

Gouvêa (University of Campinas, Brazil); Mr P. G. Green (Kew); Mr C. Grey-Wilson (Kew); Prof. H. Hara (Tokyo); Dr D. Hassall (Brisbane); Mr S. Z. Hussain (Reading); Dr Kam Yee Kiew (Penang); Dr T. Koyama (New York); Dr J. J. Lavranos (Johannesburg); Dr J. McNeil (Ottawa); Dr J. Maconochie (Alice Springs); Dr J. Paiva (Coimbra); Miss C. Pannell (Cambridge); Dr K. W. Perino (Stuttgart); Prof. D. Podlech (Munich); Dr & Mrs H. Riedl (Vienna); Dr W. Sauer (Munich); Dr R. R. Stewart (Michigan); Dr M. Tamura (Osaka, Japan); Dr N. Wace (Canberra); Mr J. Wenninger (Munich); Dr K. Wilson (Sydney).

### THE LIBRARY

This year has seen an increased pressure on the services that the Library is called upon to render. Interlibrary loans increased by 39% over 1976 to 1232 (416 borrowed and 816 lent). These figures do not include loans for Horticultural Students which in 1977 totalled 473 items (there is no comparative figure for 1976). Photocopying almost doubled to about 8,200 pages as compared with 4,200 in 1976. The number of visitors to the library also increased by almost 60% (473 as against 307 in 1976) and, although no comparative figures exist for the previous year, enquiries that necessitated more than two hours to answer approximated 188.

These results have been achieved with the same complement of staff that has prevailed over the last ten years which has meant that other aspects of library function have declined: accessions have dropped from 849 in 1976 to 614 in 1977, cataloguing from 2588 to 2172 items and binding from 466 to 410 volumes.

### PUBLIC EDUCATION

Three successful Interlink projects on 'Movement', the 'Sea' and 'Pre-historic Life' continued our link-up with the Royal Scottish Museum and the Edinburgh Zoo. Seventy local teachers attended an in-service training course on the Garden's facilities, demonstrating the demand for such a service; further sessions are being held in 1978. Twenty-six organised parties were shown features of the R.B.G. and twenty-six specialist individual visitors were helped with their projects.

The policy of producing exhibits for horticultural shows continued with exhibits at the Royal Caledonian Horticultural Society and the Scottish Rock Garden Club. The summer's controversy over Dutch Elm Disease prompted a joint exhibit with the Forestry Commission and once again we were pleased to host a large travelling exhibit produced by the Nature Conservancy Council entitled "The Last Wilderness".

### PUBLICATIONS

#### NOTES FROM THE ROYAL BOTANIC GARDEN, EDINBURGH

Two parts of *Notes R.B.G. Edinb.* were published during 1977: vol. 35, 2: 155-295 and vol. 35, 3: 297-435. These contained 25 papers: 8 of these dealt with aspects of SW Asiatic botany; 5 with Zingiberaceae; 3 each with mycology, and African plants; 2 each with Gesneriaceae, Cyperaceae, and the Lévêillé herbarium. There were 8 book reviews.

Two further parts were sent to press during the year, vol. 36 pts 1 and 2; the latter being a festschrift for Mr B. L. Burtt.

In Autumn, after 10 years at the job, Mr Hedge handed over the responsibility for Garden publications to Dr Ratter.

# PUBLICATIONS BY MEMBERS OF STAFF IN 1977

BURBIDGE, R. B. Other Scottish Collectors, *Scottish Rock Garden Club Journal* 15(4): 237-245.

CHAMBERLAIN, D. F. Anchusa in DAVIS, P. H., Materials for a Flora of Turkey XXXIV: Boraginaceae, Gentianaceae, Solanaceae. *Notes R.B.G. Edinb.* 35:298-299.

— Catalogue of the names published by Hector Léveillé: X. *l.c.* 35:247-264.

— The identity of *Ferula assa-foetida* L. *l.c.* 35:229-233.

COPPINS, B. J. Field meeting at Girvan, Ayrshire. *Lichenologist* 9:153-167.

— & VĚZDA, A. *Marcentina*, a lichen genus new to Europe. *l.c.* 9:47-49.

— & SEAWARD, M. D. The James Gilchrist Lichen Collection. *Trans. Dumfriesshire Galloway Natur. Hist. Antiq. Soc. Ser. 3*, 52:17-22.

CULLEN, J. Work in Progress at Edinburgh on the Classification of Rhododendron. *Rhododendrons with Magnolias and Camellias* 1977: 33-43.

HEDGE, I. C. & BOKHARI, M. H. Anatomical observations on a desert group of *Salvia* species. *Notes R.B.G. Edinb.* 35:377-389.

— & MILLER, A. G. New and interesting taxa from NE tropical Africa. *l.c.* 35:179-193.

HENDERSON, D. M. & PANTIDOU, M. Fungi of Greece VII: new records of rust fungi. *Notes R.B.G. Edinb.* 35:407-414.

— & PRENTICE, H. T. The morphology of fungal spores: *Milesina blechni*. *l.c.* 35:415-417.

LAMOND, J. M. Notes on Parsa's Flore de L'Iran vols 8 & 9. *Notes R.B.G. Edinb.* 35:349-364.

LAUENER, L. A. Catalogue of the names published by Hector Léveillé: XI. *Notes R.B.G. Edinb.* 35:265-279.

PAGE, C. N. An ecological survey of the ferns of the Canary Islands. *Fern Gaz.* 11:297-312.

RATTER, J. A., ASKEW, G. P., MONTGOMERY, R. F., AND GIFFORD, D. R. Observações adicionais sobre o cerradão de solos mesotróficos no Brasil Central. *IV Simpósio sobre o Cerrado*: 303-316. São Paulo.

SMITH, R. M. Additional notes on *Alpinia* sect. *Myriocrater*. *Notes R.B.G. Edinb.* 35:195-208.

— A new genus of Zingiberaceae from S India. *l.c.* 35:365-368.

WATLING, R. A *Panaeolus* poisoning in Scotland, *Mycopathologia* 61:182-190.

— An analysis of the taxonomic characters used in defining the species of the Bolbitiaceae, *Herbette symposium: Species Concept in Hymenomycetes* ed. H. Clemençon. J. Cramer, Vaduz.

— Observations on the Bolbitiaceae 13: A xeromorphic member of the family. *Kew Bull.* 31:587-591.

— Observations on the Bolbitiaceae 14: Miscellaneous notes and new combinations and names. *Kew Bull.* 31:591-594.

— Observations on the Bolbitiaceae 16: *Conocyb* sect. *Gigantae*. *Notes R.B.G. Edinb.* 35:281-295.



- & GREGORY, N. M. Larger fungi from Turkey, Iran and neighbouring countries. *Karstenia* 17:59–72.
- & LARGENT, D. Macro- and microscopic analysis of the cortical zones of basidiocarps of selected agaric families. *Nova Hedwigia*, 28:569–636.
- WOODS, P. J. B. Studies in the Gesneriaceae of the Old World XLII: *Aeschynanthus* in the Solomon Islands. *Notes R.B.G. Edinb.* 35:375–376.

### THE GARDENS, EDINBURGH

#### ARBORETUM DEPARTMENT (Mr S. J. Armstrong)

A number of areas were renovated or altered during the year including much of the *Rhododendron* Walk, where useless specimens were discarded and more space allowed for scientifically valuable material and the planting of herbaceous species. All the *rhododendrons* growing beneath the limes in front of Inverleith House were removed, the valuable species planted in other sections, and the area turfed and incorporated as part of the adjoining lawn. The shrubbery to the south of the *Praecox* Hedge was also refurbished, and an unsightly bed of unnamed *Rhododendron* hybrids on the east side of the hill was extensively altered and replanted with *Rhododendron campanulatum* raised from seed collected by Spring-Smythe in eastern Nepal. Improvements were also made to the Yew hedge on the south side of Inverleith House.

The fine, venerable specimen of *Pinus nigra* toppled into the pond on a calm day in February. Much of the timber lay underwater, and it took over a week to clear up the debris. During the year the following measures were applied to other trees in our collections to avoid possible damage: (a) all *Ulmus* specimens were injected with Lignasan in the hope that this will give effective protection from Dutch Elm Disease; and (b) the tops were removed from the 'Leyland Cypress' screen situated behind the steps at the east end of the Exhibition glass, because their height and mass when subjected to strong winds were making them unstable.

One Garden Supervisor and five horticultural students spent a week at Logan carrying out tree extraction and branch limbing and staff also helped with the arboricultural examination practical.

#### GLASS DEPARTMENT (Mr J. A. R. Kerby)

*Planthouses.* The policy of the replacement of overgrown specimens with new material of wild origin continues as the latter becomes available. This can be a slow process particularly in areas like the cactus house where genera such as *Agave* take a long time to reach a suitable size for planting. Some tropical genera however mature more quickly.

Modifications with rock work to create better habitats with free drainage for more difficult plants have continued: the *Sansevieria* collection in the Temperate Aquatic House was treated in this manner, as were parts of the Fern and Orchid Houses.

A mossed, artificial, metal tree was constructed in the Temperate Aquatic House beside the entrance to the Cactus House to provide a habitat for Rhipsaloid Cactaceae. This has provided a visual link between epiphytic rainforest cacti and the terrestrial species from arid regions grown in the Cactus House.



The *Maddenii* Series rhododendrons have established and flowered well in the Temperate Palmhouse despite poor light conditions, and in the same house *Elingamita johnsonii* (Myrsinaceae), an endangered species from the Chatham Islands, flowered for the first time at Edinburgh.

A number of species not previously displayed have been established in the ponds for winter interest when the *Victoria* waterlilies are out of season; amongst these are *Eichornia paniculata* and *Canna glauca*, collected by Dr P. H. Davis in Brazil in 1976.

*Planthouse Borders.* From January 1977 the Patio and all the borders surrounding the planthouses came under the management of the Glass Department. There has always been an obvious link between the Temperate Glass and areas like the Patio where plants previously thought to be tender in Edinburgh have been grown successfully for a number of years. Many more tender genera were tried outside during 1977 but an analysis of their performance is better left for a future report.

*New developments.* The bulk of the work of the department during 1977 centred on the two new display planthouses, comprising a tropical house with a night minimum temperature of 65°F and a warm temperate house with a night minimum of 55°F.

In the tropical house slab laying commenced in December 1976 and the basic planting contours were established. The path layout was designed to give visitors easy access to as many plants as possible. A start was made in February on the construction of a limestone wall for Gesneriaceae with stone from Middleton Quarry. By the end of 1977 good progress had been made, but work will continue into 1978.

Both planthouses were wired longitudinally in readiness for climbing plants, which were planted in June to establish a quick shade canopy and by the end of the season had made excellent progress. The selection includes *Quisqualis mussaendiflora*, an attractive species of Combretaceae from the Congo, and members of the families Passifloraceae, Aristolochiaceae, Bignoniaceae and Convolvulaceae.

The warm temperate house will display our large collection of tender Ericaceae which come mainly from South East Asia. Peat walls have been constructed (in some cases as high as 9 ft) and a trial area planted with a selection of *Dimorphothera*, *Diplycosia* and *Vaccinium*, which have rapidly become established.

*Staff.* Reorganisation was necessary as a result of the addition of the borders, exhibition hall and new planthouses to the department's responsibilities. Mr Buchan therefore took charge of the temperate section and outside borders and Mr Cranston became responsible for the tropical planthouses, the fernery and exhibition hall.

In November Mr Kerby (with Dr Argent) visited the Mulu National Park, Sarawak, as a member of an expedition sponsored by the Royal Geographical Society. The purpose of the visit was to collect living material of groups currently under scientific study at Edinburgh, viz: Ericaceae, Zingiberaceae and Gesneriaceae. Observation of these plants in their native habitat provided information useful for their successful cultivation at Edinburgh.

## HERBACEOUS AND ALPINE DEPARTMENT (Mr A. Evans)

Work has been interesting and varied and much was accomplished despite difficulties with structural work in the Tennis Court area outwith the Garden's control and particularly foul weather during the latter part of the year which interrupted outside work.

*Rhododendron Walk.* Four areas were almost wholly replanted. After the rhododendrons themselves had been rearranged by Arboretum staff, herbaceous and bulbous species were planted in the many gaps left vacant for that purpose.

*Herbaceous Border.* In areas where perennial plants are grown there is always a continuous battle against pernicious weeds and herbaceous borders suffer a great deal from these invaders. Decorative plants were removed from areas where couch grass, *Convolvulus*, *Stachys palustris*, etc., had penetrated and become established and then, as far as possible, these areas were cleared of weeds.

*Tennis Court Area.* A great deal of basic preparation was carried out in readiness for slabbing, the building of walls and planting. A causeway was constructed to separate the end tennis court from the part of the area scheduled to be open to the public and fences were removed and a great deal of tidying up carried out.

Temporary frames were laid out to accommodate pots of alpine plants destined for display in the Alpine House and to hold collections of hardy bulbs, sempervivums, sedums, etc., for which this department is now responsible.

*Alpine House.* Construction work in this area was virtually completed when the slab laying finished in spring. In autumn, however, a collection of old troughs, procured from Lancashire, was added to the layout. These troughs have improved the balance of the area and should add greatly to the interest. Building up the collection in this area has gone ahead but will still take some time as certain attractive, interesting species are not readily available. It was enriched, however, when the plant collection belonging to Mrs E. Cairns, Whaup's Whirr, Berwickshire, was presented to the R.B.G. during the summer.

*Rock Garden.* The planting of the east side of the East Valley with plants native to the Himalayan Region was completed in spring. Work on the other side of the valley, designated for Japanese species, was started in Spring 1977 but the major part was carried out in the autumn. Inclement weather held up completion but it is hoped that before the late spring of 1978 the whole area will be planted.

*Rhododendron Heath.* An extension of this area was carried out in spring. In addition to the rhododendrons, a ground cover of autumn-flowering gentians was planted in certain prominent areas to provide colour and interest at a time when the rhododendrons are not in flower.

*Plant Records.* The work continues to expand and apart from the routine production of lists for labels and updating of record cards and computer records, additional information is now being provided in the form of colour cards for threatened species and those of wild origin.

*General.* The Herbaceous and Alpine Department staff carried out a number of outside activities: they acted as judges at shows, were invited to give lectures to various societies in different parts of the country and Mr Evans undertook a three weeks' lecture tour in eastern North America in October.

#### PROPAGATION DEPARTMENT (Mr L. E. Bisset)

The planthouses, occupied in November 1976, have in the main proved satisfactory but the heating and ventilating controls have from the outset, caused considerable difficulty. The rain- and wind-sensing devices have been particularly troublesome and are about to be replaced and resited. The sub-irrigation system also did not perform as well as was expected but some of the problems may be due to the texture of the growing medium and simple trials are indicated. The diffusing glass reduces the "winter" light to a point lower than we expected but, on the whole, has caused minor difficulties only. Indeed, on balance, all but a few plants have shown improvement in their new quarters and generally staff are well pleased with working conditions within the structures.

The programme for building up Ericaceous material began to put pressure on covered space and additional protected space had to be provided in the Experimental Ground. The collection from Ecuador, gathered by Dr Argent in 1976, did particularly well. Within a year or so many of these acquisitions should be part of the displayed living collections within the Garden.

The acquisition of conifers continued and many of Dr Page's collections are established. Two species of *Amentotaxus* have been established and will be distributed after more material becomes available.

In the Propagation Section material for Logan, Benmore and Edinburgh was produced throughout the year with the *Rhododendron* propagation programme taking up the most time and space. A fine collection of *Rhododendron* cuttings was gathered at Borde Hill, Sussex, by Mr Gardiner and Miss Cunningham.

*Staff.* The complement of permanent industrial staff was filled fairly adequately and two new supervisors joined the department. Mr Maudsley left in July to assume the curatorship of the Botanic Garden, University of Durham, and was replaced by Mr Kirkpatrick. Mr John Lewis took over day-to-day responsibility of the Research Block 6.

*Accessions.* The total number of items was 3,659 and of these 2,443 were of wild origin. The main contributors were the following: Mr B. L. Burt and Dr O. M. Hilliard (over 200 items from S Africa); Mrs Cairns of Gordon, Berwickshire (her complete collection of alpine totalling over 300 plants); Herr E. Pasche, Germany (100 bulbs and corms from his own collection); the Scandinavian Expedition to S Korea of 1976 (216 pkts of seeds); Mr

Tsuguki (75 plants from Japan gifted to Mr Evans, many of which were rare species); the Sarawak Expedition of 1977 of which Mr Kerby was a member (184 plants, 54 cuttings and 89 pkts of seeds). The breakdown of accessions is as follows:—

Wild origin: 836 plants; 1,353 pkts of seeds; 254 cuttings.

Non-wild origin: 732 plants; 425 pkts of seeds; 59 cuttings.

The total number of items despatched during the year was 1,571, consisting of 245 seed lots, 625 plants, 528 cuttings, 49 bulbs and 122 scions.

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

Work on the development of Benmore Hill Wood took a big step forward due to the operation from October of a Job Creation Scheme sponsored by the Younger (Benmore) Trust, whereby a supervisor and six labourers were employed to clear thickets of *Rhododendron ponticum* and windblown trees and brush left behind after timber extraction, and to open up drains and paths. The scheme is scheduled to last six months initially. A contract to build a new road through the area was given to the Forestry Commission and good progress was made, but owing to restrictions in public spending it could not be completed in 1977. Work continued on clearing and draining a new site for the rhododendrons of the *Thomsonii* Series, and a start was made in clearing a new site for the *Taliense* Series.

In the established areas of the garden over 300 specimens representing 30 genera were planted out, mainly from nursery stock, and these included 112 specimens of wild source rhododendrons of about 60 species and their varieties. High pruning of selected trees and felling of diseased trees were undertaken whenever weather conditions were suitable and staff could be spared from essential maintenance. Unwanted natural regeneration was removed from a large part of the hillside from the area occupied by the *Falconeri* Series through to the *Trichocladum* Series.

The two new staff houses were completed and were occupied in March. Tarmac surfaces were laid on paths in the lower parts of the garden to improve conditions, particularly for the elderly and visitors with prams or wheelchairs. Contractors started work on the new entrance at the 'Golden Gates' in December.

The weather was exceedingly wet for most of the year but there were some good dry spells during the period May to August. Attendance figures reached a new record of 37,421 for the period April to October, an increase of 4,000 on 1976.

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

The brick steps at the south end of the terrace were removed and replaced with a bank of *Fascicularia bicolor*. The adjacent borders were cleared out, dug, fertilised, the wall re-wired and replanted with suitable plants from

Edinburgh. An ancient and unsafe specimen of *Eucalyptus urnigera* was removed from the walled garden and an old specimen of *Rhododendron x russellianum* cut back to promote young flowering growth at a lower level. Along the West Border a flagged path was laid to provide better access for staff and public.

A twelve-year-old specimen of *Puya alpestris* flowered for the first time, producing an inflorescence 10' high. *Banksia serrata* again flowered well and the yellow-flowered form of *Eccremocarpus scaber* was much admired. Further dense plantings of *Fuchsia*, *Olearia*, *Arbutus*, *Leptospermum* and *Pittosporum* were made in the woodland. A densely planted batch of *Eucalyptus* species has, at the time of writing, survived wind and frost with little injury.

Finally 10.5 acres of the Deer Hill were acquired, fenced by Property Services Agency, and then in the late autumn ploughed, drained, and prepared for planting by contract as a shelter belt. Garden staff spent three weeks restoring the neglected ditch and drainage system in the shelter belt.

Visitors to the garden totalled 39,913, very slightly less than in 1976; the tearoom is still popular but overcrowded at times. At 884 mm (34.8 ins) the rainfall was again almost 150 mm below the fifty year average.

#### HORTICULTURAL TRAINING SECTION

(Mr J. M. Marshall)

In July 1977 thirteen students gained the Garden's Diploma (one with Honours) and one student gained the Certificate in Horticulture. The awards and prizes were presented by Dr Jean Balfour, Chairman of the Countryside Commission for Scotland.

A high proportion of the students obtained lecturing posts in agricultural/horticultural colleges and one went to a teachers' training college. As expected with the severe monetary cutbacks within local authorities, recruitment in the leisure and recreation departments was restricted. Three enterprising students (one who left in 1975) hope to obtain permission to collect plants of horticultural value in Nepal during 1978. Another student joined an expedition to Sabah immediately after he completed the Diploma course.

#### ANNUAL RAINFALL

Edinburgh	636 mm (29 ins)
Benmore	2314 mm (91 ins)
Logan	884 mm (34.8 ins)

#### STAFF LIST

(December 1977)

<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>	Dr G. C. G. Argent Dr R. B. Burbidge Mr L. A. Lauener	Mr J. M. Marshall (Hort. Educ.) Miss R. M. Smith
<i>Higher Scientific Officers</i>	Mr G. Anderson (Hort. Educ.) Mr B. J. Coppins Mr R. Eudall Miss J. M. Lamond [Woods]*	Miss V. A. Matthews [Burbidge] Miss D. Purves Dr C. C. Wood Mr P. J. B. Woods
<i>Scientific Officers</i>	Mr P. Harrold Mr D. R. McKean Miss G. A. Meadows [Waller]	Mr A. G. Miller Miss C. Milne [Roosa]
<i>Junior Research Fellow</i>	Mr A. P. Bennell	
<i>Assistant Scientific Officers</i>	Mrs F. M. Bennell Mrs D. Brunton Mrs L. A. Gibb Mrs N. M. Gregory Mr K. N. Grant Miss E. H. Hamlet	Mrs H. Hoy Miss R. A. King Miss L. McLuckie [Mowatt] Miss L. F. Mitchell Miss D. M. Taylor
<i>Laboratory Attendants</i>	Miss M. Bryce Mrs E. A. McAllan Miss M. McLaren	Mrs G. Millar Mrs G. Young
<i>Curator</i>	Mr R. L. Shaw	
<i>Assistant Curators</i>	Mr S. J. Armstrong Mr L. Bisset Mr J. M. Colledge (Logan)	Mr A. Evans Mr A. Hall (Benmore) Mr J. A. R. Kerby
<i>Garden Supervisors</i>	Mr G. G. Broadley Mr L. Buchan Mr R. U. Cranston Mr J. M. Gardiner Mr G. Kirkpatrick Mr G. Knott	Mr G. J. Lewis Mr R. J. D. McBeath Mr W. Tait Mr B. Unwin (Logan) Mr M. Welsh (Benmore)
<i>Librarian</i>	Mr M. V. Mathew	
<i>Assistant Librarian</i>	Mrs L. Clark	
<i>Higher Executive Officer</i>	Mr T. C. Dobbie	
<i>Executive Officer</i>	Miss J. R. S. Renwick	
<i>Clerical Officers</i>	Mr K. Brodie	Mr J. B. Meff
<i>Clerical Assistants</i>	Mr J. S. Burnett Mr A. A. Gosden	Mrs J. B. S. Thomson Miss J. Thomson

\* Square brackets are used for married names of staff married during the year or normally using maiden names.

<i>Senior Paperkeeper</i>	Mr D. Ward	
<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. B. Connacher Mr M. E. Fitz Mr P. N. Fletcher Mr D. C. Hogg	Mr T. Maxwell Mr T. A. Nisbet Mr G. Sinclair Mr R. Stevenson
<i>Gardeners Special</i>	Mr T. Y. A. Brown Mr W. R. Caldwell Miss L. R. Cunningham Mr C. G. Drawbridge	Mr T. G. Grieve Mr G. W. Lawson Mr J. McCluskey (Benmore) Mr A. J. Paxton
<i>Gardeners I</i>	Mr D. L. Binns (Benmore) Mr S. Boyd (Logan) Mr T. R. Burnett Mr A. M. Cameron (Benmore) Mr A. H. Clark (Benmore) Mr W. Crowe (Benmore) Mr A. Currie (Logan) Mr G. Godbert (Benmore) Mr J. Henderson	Mr W. Kocz Mr G. Murdoch (Logan) Mr I. M. Potts (Benmore) Mr R. M. Robertson Mr E. Smith Mr J. Stewart Mr C. J. P. Taylor (Benmore) Miss J. E. Unsworth (Logan) Mr E. F. Young
<i>Gardeners II</i>	Mr M. Fletcher (Benmore) Miss S. E. Gregory Mr I. Herkes Mr J. McElroy Miss B. C. Morrison	Mr I. W. J. Sinclair Mr J. Smith Mr T. L. Sutherland Mr P. Thompson Mr R. Waddell
<i>Assistant Gardeners</i>	Mr S. J. Ansdell Mr I. E. Burdge Mr W. M. M. Eddie Mr I. A. Hutton (Logan) Miss J. M. Knott	Mrs E. McCluskey (Benmore) Mr S. MacPherson Mr R. S. Sibbald Mr D. M. Stewart Mr J. Urquhart
<i>Junior Gardener</i>	Mr G. A. Bain (Benmore)	
<i>Labourers</i>	Mr J. B. Henderson	Mr R. S. Waddell
<i>Driver</i>	Mr W. D. Lewis	
<i>Engraver</i>	Mr J. R. Wright	
<i>Storeman</i>	Mr G. Roddex	
<i>Male Cleaner</i>	Mr G. Thomson	
<i>Female Lavatory Attendants</i>	Mrs C. Horner	Mrs F. R. Horner
<i>Male Lavatory Attendants</i>	Mr B. Ford	Mr T. H. Potter
<i>Nightwatchmen</i>	Mr J. Brady Mr J. Duffy	Mr W. Pringle