A SURVEY OF THE WORK OF THE ROYAL BOTANIC GARDEN EDINBURGH IN 1976

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General Review

Nineteen hundred and seventy-six was a year of some achievement—completion of the Edinburgh Garden's large building programme started in the 1960s—but perhaps more importantly a year of reassessment propelled by the sexennial review of Garden policy by an independent Review Group in July. The group, chaired by Professor P. W. Brian of the University of Cambridge, included Professor W. W. Fletcher, Mr. A. Oldham, Dr S. M. Walters, Professor P. W. Richards and Dr Lake. The report of the review group endorsed progress since 1970 and suggested modest aims for the next six years. The restrictions in forecast expenditure which have appeared since the Group's visit suggest that more grandiose schemes would have merely led to frustration.

The necessary facilities for both the horticultural and scientific work were most satisfactorily provided in 1976. The Garden now has adequate service glasshouses for many years, the research range of glass provides space for scientific and horticultural experiment, and the range of glasshouses to be opened to the public by 1978 will allow display of specialist collections not usually shown in botanic gardens.

The new Alpine House reached completion towards the end of the year and when the surrounding landscaping has been completed it will allow the opening of the houses in early 1977. This will provide a public stage for our considerable bulb and alpine collections hitherto confined behind the scenes.

In August we collaborated with the Edinburgh Festival Society and the Gallery of Modern Art in mounting a major exhibition of recent sculpture by the late Barbara Hepworth. Professional critics had nothing but praise for the Garden as a setting for exhibits of this stature. The exhibition undoubtedly helped to swell the yearly attendance figure in Edinburgh to more than seven hundred thousand. It is noteworthy that the corresponding totals for Benmore and Logan rose to 33,276 and 40,365 respectively.

At Benmore the felling of unimportant mature trees in the Golden Gates and upper Massan Wood areas is now completed in preparation for the long-term replanting of a worthy collection of conifers and associated shrubs. All the major planting at Benmore is now closely related to the Garden's conifer and rhododendron research projects.

The effects of wind exposure and decrepit windbreaks to the south west of

the Logan Garden still inhibit optimum development, but in 1976 preliminary agreement was reached with Logan Estate to acquire a portion of Deer Hill, in exchange for surplus old cottages at Henknowe, for planting an effective windbreak.

The Garden has continued its extremely important activities overseas, maintaining our links with foreign botanists and collecting and studying living plants. Dr Argent and Dr Burbidge were fortunate to be invited to join the British Army sponsored expedition to a remote area of Ecuador; Dr Watling attended meetings in Switzerland and Denmark concerned with macrofungi; and Mr Evans lectured and travelled in western Canada on the occasion of the World Rock Garden conference. Unfortunately, diplomatic problems prevented Messrs Grierson and Long from carrying out a major expedition in Bhutan. Towards the end of the year Dr Page travelled on the first leg of his Nuffield/Leverhulme scholarship project with visits to Japan, Taiwan and Australasia in pursuit of conifers.

The exceedingly dry summer seemed to be causing damage at the time but after the autumn rains there seemed little sign of permanent or serious loss.

Taxonomic Research

SOUTH-WEST ASIA: FLORISTIC STUDIES

The general pattern of previous years was repeated in 1976 both with regard to routine and original work.

A large number of collections from different parts of SW Asia were sent to Edinburgh for critical or general naming. Particular mention can be made of the excellent material sent by the Ariamehr Botanic Garden, Tehran, in exchange for names; a good proportion of the material consisted of Chenopodiaceae which will be of the greatest value when further detailed studies are undertaken in this family.

Some preliminary literature work for the account of Chenopodiaceae in *Flora Iranica* was completed by Mr Miller prior to the future preparation of the accounts of certain genera by Mr Hedge. Dr Chamberlain submitted to Professor K. H. Rechinger, Vienna, the accounts of the large and important genera of Umbelliferae *Ferula* and *Ferulago* for *Flora Iranica*. Miss Lamond worked on the accounts of *Primula* and *Androsace* for the sixth volume of the *Flora of Turkey*, under preparation by Dr Davis' Science Research Council project in the University of Edinburgh.

The close co-operation with the Flora of W Pakistan project has continued. Over 100 parts of this Flora have now been published; almost all the manuscripts have been sent to Edinburgh for general vetting and comments since the project started in the late 1960s. Close ties with the more recent *Flora of Bangladesh* were strengthened by the nine-month visit of its editor Professor M. S. Khan, Dacca. Likewise, the editor of the proposed *Flora of Libya*, Professor S. I. Ali, and his successor Dr S. M. Jafri, visited the herbarium, consulted with the staff and sent manuscripts for surveillance.

The recent collecting activities of Mr J. J. Lavranos in the Yemen and Somalia and our acquisition of his specimens has resulted in an extension southwards of our SW Asiatic interests. A paper dealing with some of the more interesting plants of Somalia and adjacent Afars & Issas was prepared by Mr Hedge and Mr Miller.

CATALOGUE OF THE NAMES PUBLISHED BY HECTOR LÉVEILLÉ

During the year, pt. X of the *Catalogue* dealing with the Campanulales and Ericales was produced by Dr Chamberlain and pt. XI, the Primulales and Ebenales, by Mr Lauener. These eleven completed parts have disposed of about 1934 Léveilléan taxa in 1390 numbers of the *Catalogue*.

Mr Lauener has also continued miscellaneous work on the Sino-Himalayan Ranunculaceae and is currently examining the material of this family from the Royle herbarium in Liverpool.

ERICALES

Taxonomic work in this group has continued steadily. More than half of the large genus *Rhododendron* has now been revised, and analysis of the results of the chemical studies made by Dr Knights of Glasgow University has progressed. During the year cytological and anatomical studies have been started with the assistance of Miss Milne and Mrs Brunton.

Dr Argent and Dr Burbidge joined an expedition to Ecuador, to make both living and herbarium collections. This expedition, which turned out to be very successful, was organised jointly by the British and Ecuadorean armies, whose support made possible the exploration of an area normally very difficult of access. Large collections were made, and work is already in progress on the identification of the herbarium material and the cultivation of the living plants.

Dr Cullen's work with garden plants and their records has continued, as has Dr Chamberlain's study of the mosses of the Lothians. Dr Argent has completed his work on the bananas of New Guinea, and a first paper was sent to press.

ZINGIBERACEAE

Miss R. M. Smith has continued her studies on *Alpinia*, in particular sect. *Myriocrater*, and a further paper dealing with this section was sent to press. She has also worked over much of the Zingiberaceae material collected by Mr Burtt from Sarawak in 1975. Field keys to certain genera, plus notes and sketches, have been drawn up and sent to the Sarawak Forestry Department; preliminary work on a proposed revision of *Boesenbergia* has been completed. Additional material from the Smithsonian Institute, Washington, has been incorporated into the *Flora of Ceylon* (Zingiberaceae) manuscript which is being prepared jointly with Mr Burtt.

FLORA OF BHUTAN

This was the first full year, so far as herbarium and library work were concerned, of the co-operative venture involving Mr Grierson and Mr Long in preparing an annotated check-list of the flora of Bhutan (sponsored by the Ministry of Overseas Development). In this time they have completed preliminary accounts of seventy-two plant families each of which consists of a family description, an analytical key to genera and a short description of each species represented (c. 730 reported on to date—though the number of names considered but reduced to synonymy is greater).

Messrs Grierson and Long had hoped to make a second and much longer visit to Bhutan early in 1976 but permission for this was not forthcoming from the Bhutanese Government. They are still in contact with the Bhutan Forestry Department (under whose wing they operated in 1975) who are still considering a second visit.

CYTOLOGY (and Brazilian flora studies)

In February Dr Ratter commenced a year's leave of absence based at the University of Brazil (Brasilia) where he continued his studies on 'cerrado' and associated vegetation and assisted in the setting up of an ecological department at the University. Before leaving he completed former projects and continued chromosome studies (with Miss Milne) on Ericaceae and primitive angiosperms in conjunction with other members of staff. These studies continued in his absence.

BASIDIOMYCETES

Studies on the Bolbitiaceae continue (Dr Watling) with further papers in preparation or in press, particularly a compilation of a world check-list of species. The pilot scheme commenced in 1976 on the economically important plant parasite genus *Armillaria* has been expanded to include New Zealand collections. Dr Alan Mills, from Hobart University, Tasmania, is studying with Dr Watling for 12 months and it is proposed to prepare an account of some Australian boletes.

Interesting investigations have been completed on various hallucinogenic agarics (Coprinaceae and Strophariaceae), Greenland fungi and a range of larger fungi collected in SW Asia.

Dr Watling lectured at various centres and took part in Symposia of the Biodeterioration Society at Kew and of the British Mycological Society at Warwick University on ecology of higher fungi and at Kew on the recording of larger fungi. He also took part in the Herbette symposium on 'Species concept in the Higher Fungi' held in Lausanne, Switzerland and was guest at the Institut for Sporeplanter and the Danish Botanical Society in September. With Dr R. Kemp, Dr Watling conducted a British Mycological Society workshop on the culture and classification of members of the genus *Coprinus*.

ASCOMYCETES AND LICHENS

Mr Coppins has continued taxonomic and phytogeographical studies in lichenised and non-lichenised Ascomycetes with special emphasis on those of the native Scottish pine-woods. He is continuing his work on *Bacidia* and *Micarea* as well as preparing accounts of the Caliciales and the lichen genus *Phaeographis*. Reports and descriptions have been prepared on several species of lichen newly reported from Britain.

SCANNING/TRANSMISSION ELECTRON MICROSCOPE-WORK

Mr Bennell has carried out studies on the spores of a wide range of Rust Fungi (Uredinales), especially the majority of the common Scottish members. This screening has allowed further techniques to be developed to study spore-ornamentation and to select species which show particular characters worthy of deeper study. Electron microscope work has also been carried out on *Armillaria* (with Dr Watling).

The Herbarium

ACCESSIONS, LOANS AND SPECIMENS MOUNTED

Our exchange accessions in 1976 came from 25 different institutes; 6000 specimens were received. These included about 2,000 southern Indian from the Smithsonian Institution, over 1,000 Iranian from the Ariamehr Botanic Garden, Tehran, 758 New Guinea specimens from Lae, 216 Armenian from Erevan, 227 Japanese and Himalayan from Tokyo University, 250 Romanian fungi from Bucharest, and 200 Indian from Port Blair, India. Through collections by members of the staff and honorary associates we received 1145 Natal and 215 Sarawak specimens from Mr Burtt, 600 Ecuadorean from Dr Argent and Dr Burbidge, 150 Corfu from Dr P. H. Davis, and about 200 bryophytes from Dr Chamberlain and Mr Long. Dr Watling and Mr Coppins added steadily to our mycological and lichen collections.

Our purchases during 1976 included 550 Iranian specimens from Barbara Croxall and a small Jugoslavian collection from Dr G. Halliday.

The publication of volume V of the *Flora of Turkey* enabled us to send out about 1600 Turkish duplicates. Other large distributions included 975 of Dr Davis' Tunisian specimens to the British Museum (Natural History), 283 miscellaneous to Rancho Santa Ana, California and 220 Scottish Pteridophytes to the National Science Museum, Tokyo. Some Reginald Farrer Chinese duplicates were also distributed.

Although 200 fewer specimens were sent on loan this year compared with last year, the total number of loans, 139, is the highest so far recorded.

	1975	1976
Accessions	21,479	10,536
Distribution	2,143	5,541
Loans: in	2,212	4,254
Loans: out	6,839	6,595
Specimens mounted	18,800	20,047

HERBARIUM CURATION

In August Miss R. M. Smith started on the long overdue and much needed curation of the Gramineae and the initial re-organisation of about a quarter of the family has now been completed. This involves major alteration to the existing Bentham & Hooker arrangement. Dr Edmondson (Flora of Turkey Unit, Edinburgh University Botany Dept) is collaborating with this long-term job.

Cultivated herbarium. In the cultivated herbarium a systematic effort was begun to collect species grown in the Garden but poorly represented in the herbarium.

Miss Matthews has contributed to the preparation of the accounts of *Tulipa* and *Lilium* for *Flora Europaea*. Thankfully the number of *Cannabis* enquiries from the police has decreased in 1976 following the appointment of their own Forensic Officer.

A complete re-organisation of material preserved in spirit was undertaken and finished by Miss Meadows and Miss Mitchell. This involved using a running number sequence for the arrangement of the material and the preparation of a finding card-index arranged systematically.

Photographic slide collection. About 1200 slides were added to the collection. Of these some 500 were a gift from Dr P. H. Davis and consisted in the main of plants from Turkey and N Africa. This is a most valuable acquisition as, in almost all cases, the transparencies may be linked to herbarium material. The economic botany category was usefully enlarged by the purchase of two sets of slides. Also incorporated was a small collection of excellent quality taken by a student mountaineering/botanical expedition to E Greenland.

VISITORS

Prof. S. Ali (Tripoli/Karachi); Mr M. Assadi (Ariamehr Garden, Tehran); Dr A. Dafni (Jerusalem); Dr Dawith al Asweiri (at Reading Univ.); Dr D. B. Deb (Calcutta); Dr T. Delendick (Brooklyn, New York); Dr W. Dore (Ottawa); Dr W. H. Earle (Phoenix, Arizona); Dr D. Farr (Beltsville, USA); Dr H. Glen (Cape Town, SA); Mr C. Grey-Wilson (Kew); Mr E. Groves (British Museum); Dr O. M. Hilliard (Pietermaritzburg); Mr B. Hofsten (Uppsala); Dr S. M. Jafri (Tripoli); Mr P. James (British Museum); Dr A. Kanis (Australian Liaison Officer, Kew/Canberra); Dr S. M. Kazmi (Peshawar); Prof. M. S. Khan (Dacca); Mr J. J. Lavranos (from Athens); Mr B. McAlpine (New York); Dr J. McNeil (Ottawa); Mr A. Önder (at Aberdeen Univ.); Mr B. Peart (Ontario); Prof. & Mrs W. Philipson (Christchurch, NZ); Miss Ouda Salmeen (at Reading University); Dr M. Seaward (Bradford); Prof. A. R. Taylor (New Brunswick); Dr L. Tibell (Uppsala); Dr D. D. Tirvengadum (Paris); Dr P. G. Wilson (Perth, WA); Dr P. F. Yeo (Cambridge).

Numerous British botanists consulted the British collections during the years; several were regular visitors.

The Library

The continued growth of botanical and horticultural publication presents problems. The policy of maintaining the Library as the national botanical library in Scotland (and indeed the most comprehensive outside London) has continued but the result is severe pressure on staff and approaching problems of accommodation. 849 books and 347 pamphlets were added to stock; 2588 items were indexed; our current titles intake is now 1163. Our valuable exchanges—639 copies of *Notes R.B.G. Edinb.* and *Trans. Bot. Soc. Edinb.*—continued to our advantage in the publications received from other institutes. In addition to many photocopies sent in response to enquiries, 593 books were sent out on loan—a measure of the service to science in Scotland. Individual visitors totalled 307 and in addition 11 librarian groups visited and 17 overseas visitors worked specifically in the Library. The Library is also used regularly by researchers who require considerable assistance over several days—7 such occasions arose during the year.

The checking of library stock is a tedious process and total annual checks are impossible with present staff resources. A detailed check of a frequently used section—Floras and monographs—was carried out, but the final outcome is not complete.

The staff complement of the Library has remained static for over ten years while the volume of work in the Library has increased considerably. Because the present staff is unable to cope with the current work-load, the quality of work has suffered badly. Without more professional and clerical staff the functioning of the Library may well deteriorate further.

PUBLICATIONS

NOTES FROM THE ROYAL BOTANIC GARDEN, EDINBURGH

Two parts of *Notes R.B.G. Edinb.* were published during 1976: vol. 34, 3:253–448; vol. 35, 1:1–154.

As usual the published papers reflected the work and interests of the staff and the close links with colleagues outside the Garden. There was another substantial contribution to studies on southern African plants by Dr Olive Hilliard (Pietermaritzburg) and Mr Burtt, who although retired is continuing with unabated energy on his varied projects. Mr. Lauener's long-term project on clarifying the works of Léveillé on Chinese plants took a big step forward with the publication of a paper dealing with the family Compositae. Dr Ratter concluded a series of papers on *Spergularia* cytotaxonomy with a summation article. There were papers by Dr Cullen and Dr Argent on respectively the *Anthyllis vulneraria* complex and the wild bananas of New Guinea, both resulting from projects largely completed before joining the Garden staff. An important revision of the infrageneric structure of *Vicia* by Dr F. Kupicha (British Museum, Natural History) stemmed largely from her Ph.D. thesis completed at Edinburgh. The strong south-west Asiatic interests of the department were emphasised by the publication of six papers, several by colleagues abroad, dealing with varied aspects of Turkish, Iranian, Afghan and Israeli plant life.

As the lists below indicate, staff members also published papers, in addition to those in our own scientific journal, in various other journals at home and abroad.

PUBLICATIONS BY MEMBERS OF STAFF IN 1976

ARGENT, G. C. G. The wild bananas of Papua New Guinea. *Notes R.B.G. Edinb.* 35:77–114.

COPPINS, B. J. & SEAWARD, M. R. A. A lichen collection from the Yorkshire Museum, Yorks. *Naturalist (Hull)* 1976:13–15.

CULLEN, J. The Anthyllis vulneria complex: a résumé. *Notes R.B.G. Edinb.* 35:1–38.

——The use of record systems in the planning of Botanic garden collections. In Simmonds et al., eds, *Conservation of Threatened Plants* 95–111.

HEDGE, I. C. A systematic and geographical survey of the Old World Cruciferae. In Vaughan, J. et al., eds, *The biology and chemistry of the Cruciferae* 1–45. Academic Press.

HEDGE, I. C. & BOKHARI, M. H. Zhumeria (Labiatae): anatomy, taxonomy and affinities. *Iran. Journ. Bot.* 1:1–10.

HEDGE, I. C. & LAMOND, J. M. Aizoaceae in Rechinger, f., ed., *Flora Iranica* no. 113, 1–8. Molluginaceae. *op. cit.* no. 114, 1–8.

HENDERSON, D. M. Presidential Address: the living rust fungi. *Trans. Brit. Mycol. Soc.* 67:189–192.

LAUENER, L. A. Catalogue of the names published by Hector Léveillé: IX (Compositae). *Notes R.B.G. Edinb.* 34:327–402.

PAGE, C. N. The taxonomy and phytogeography of bracken, a review. *Bot. Journ. Linn. Soc.* 73:1–34.

RATTER, J. A. Cytogenetic studies in Spergularia: IX, summary and conclusions. *Notes R.B.G. Edinb.* 34:411–428.

RATTER, J. A. & MILNE, C. Chromosome counts in primitive Angiosperms: 2. *Notes R.B.G. Edinb.* 35:143–145.

WATLING, R. Some observations on puffballs from British archaeological sites. *Journ. Archaeol. Science* 1976, 3:165–172.

——Observations on the Bolbitiaceae 15: the taxonomic position of those species of Conocybe possessing ornamented basidiospores. *Rev. Mycol.* 40:31–37.

——The importance of field studies in an attempt to cultivate wild mushrooms. *Proc. First Sympos. on Survey & Cult. of Edible Fungi in India* 126–134.

——Forward and keys in: Purkayastha, R. P. & Chandra, A. *Indian Edible Mushrooms.* Calcutta.

GARDEN GUIDES AND OTHER PUBLICATIONS

Other than postcards and pre-packed sets of transparencies, only *The Garden Companion*, the main guide to the Garden, and *The History of the Royal Botanic Garden, 1670–1970* were offered for sale in 1976. The semi-popular leaflet, *The Garden*, was discontinued and the *Guide to the Demonstration Garden* is currently out-of-date.

THE LIVING COLLECTIONS AT EDINBURGH

ARBORETUM DEPARTMENT (Mr S. J. Armstrong)

As in the past, general maintenance was responsible for absorbing most of the department's time and labour. But this year because of the exceptionally dry season, more man-hours were used in watering—with our irrigation equipment fully stretched—than in weed eradication.

Renovation work in the Rhododendron Walk continued with the completion of four further sections (4–7). All the scientifically important specimens were lifted, given fresh compost and replanted with more growing space; a few suppressed or duplicated plants were discarded. The Rhododendrons in an area near Inverleith House (F 11) were removed, a few discarded and others transferred to a new extension nearby (F 18). Most of the specimens in this section were affected by the over-hanging canopy of the limes and their roots. The area left will be grassed down while some of the offending branches will be removed from the limes.

Plants from the scrapped beds of Glenn Dale hybrids on the Azalea Lawn were used to brighten the edges of the evergreen shelter planted in this area the previous year. These plants not only provide a fine splash of colour in the early summer, but also varying foliage tints in autumn and winter. The various plantings of *Rhododendron ciliatum* were brought together in a new

border, backed by a group of hollies in the vista area, north of Inverleith House. Similar treatment was given to *Rhododendron mucronulatum*.

A part of the large Yew hedge to the south of Inverleith House was removed in order to allow the light to reach the fastigiate forms behind. Since the base of this old hedge has started to 'break', it will be safe to treat the remainder in similar fashion. During the very dry summer this hedge was mulched, watered and fed regularly.

The border of the north and west sides of the East Gate Cottage was reduced in size and some of the old hybrid rhododendrons discarded. The soil was cultivated, composted and replanted with a selection of more important rhododendrons.

The first phase of the conifer survey was implemented by the removal of duplicate trees and others causing overcrowding; phase two is being prepared. The practical survey of all the specimens on the *Pyrus* lawn was carried out during the summer.

Flowering specimens of all the deutzias and spiraeas in the Garden were collected during the summer for herbarium and verification purposes. Later in the year fruiting specimens of all the wild origin *Berberis* were gathered and photographed.

In the interests of safety and after complaints from the park-keeping staff, the steep bank on the north side of the pond was enclosed with chestnut fencing. This was erected so that it is hardly noticeable amongst vegetation from the south side.

The disposal of waste material from the Garden is becoming a greater problem, particularly since the closing of Corstorphine quarry. Burning of rubbish in the Experimental Ground is the quickest, cheapest, and easiest method, but frequently it is necessary to wait for a suitable wind direction. The segregation of materials at source is essential, and in order to control this, three bays for different grades of rubbish will be constructed.

The only purchase of major machinery was a hedge cutter that should save time and allow the students experience with up-to-date equipment. A Garden Supervisor and four students spent a week at Logan Garden removing dangerous trees and limbing others.

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

Mr A. Snoddy retired at the end of November after 20 years as Assistant Curator in the Garden, during the last ten of which he was in charge of the Glass Department. He was succeeded by Mr Kerby. At the same time, Mr P. Maudsley transferred to the Propagation Department and Mr Buchan returned to Glass after acting as liaison officer with the contractors on the new glasshouse site.

The general policy of replacing overgrown specimens with wild-origin material has continued. The Temperate Centre House has become overgrown in many places and will be replanted as and when propagated material is available. An attempt has been made to establish cool ferns and shade-tolerant ground-cover plants in the area under the bridge. This area could prove useful for growing cooler ferns, as the temperature in the Fern House has been raised to 60°F. In the Fern House, a new porch was added to the west end to give protection to the plants in the vicinity of the door; a number of Malesian rhododendrons and orchids have been successfully established

on trunks of tree ferns. The artificial trees in the Orchid House continue to provide homes for a wide range of Orchidaceae, Gesneriaceae etc.; these need to be replaced periodically when the plants become over-mature and the spagnum moss disintegrates.

In the Tropical Palm House, the new heating system was installed early in the year and is now in working order despite some teething troubles. This house which has been closed for about 10 years, other than a short spell during the Tercentenary celebrations in 1970, was re-opened on Friday 16 April. The original path lay-out was replaced with new paving slabs informally arranged; this released a larger area for planting in a house where space is limited. Shade-tolerant plants such as *Hernandia cordigera* and *Heritiera macrophylla* are best used in the Palm House in order to leave as much room as possible elsewhere for light-demanding species. A number of young palms were planted as eventual replacements; shade-tolerant genera such as *Lowia*, *Spathiphyllum* and *Curculigo* form the basis of the ground flora.

New glasshouses. The new 'growing-on' house (block 5), with a tropical and temperate section, was handed over by the contractors in November. The transference of plants from their temporary home in block 6 (where the orchid collection had been housed since July 1975) was completed very successfully in three days. "Bondina" matting, tried experimentally in the propagation department, has been used as a base for the capillary benches and the long-term results are awaited with interest.

Notable plants. Thunbergia mysorensis, a climber from the Nilgiri hills, flowered extremely well in the Orchid House. Here too, the cycads have continued to make good growth and a number have produced cones, the most recent being *Cycas circinalis*. *Dendrobium macrophyllum*, *D. fantasticum* and *D. aberrans*, all collected by Mr P. Woods in New Guinea, were sent to the Royal Horticultural Society's Spring Show where they received cultural awards. *Cymbidium giganteum* 'Wilsonii' flowered at Edinburgh for the first time and was sent to Kew for illustration in the *Botanical Magazine*. A number of unusual plants flowered well in the Temperate House: *Ocotea foetens* (Lauraceae) from the Canary Islands; *Maesa henryi* (Myrsinaceae) from Yunnan; and *Elaeocarpus dentatus* from New Zealand.

A plant of *Victoria amazonica* raised from seed collected in the wild over-wintered in the propagation department and was planted out in April—normally this species does not over-winter well because of poor winter light. The plant was still flowering in December and has been successfully self-fertilised.

Despatches. The glass department continued to handle despatches and during the year sent out 323 seed lots, 982 plants, 2,260 cuttings, 290 scions and 120 seedlings.

HERBACEOUS AND ALPINE DEPARTMENT (Mr A. Evans)

In the Experimental Ground, spring saw the completion of the lay-out of the plant family borders. Surplus cultivars are segregated from the species and are held together in borders on the west side of the centre road; many other plants are temporarily held in these borders.

Following the rearrangement of the rhododendrons in the two most westerly borders in the Rhododendron Walk, the soil was deeply cultivated and replanted with a varied collection of herbaceous plants and bulbs. While the main aim is to use these sites to hold botanically valuable material, an opportunity has been taken to introduce a number of late flowering perennials to brighten these borders at Festival time. In autumn, another large part of that area (beds FO 4–FO 11) was cleared of suppressed herbaceous plants which are now in the process of rejuvenation. It is almost 20 years since these beds were overhauled.

A new hedge of *Paeonia lutea* var. *ludlowii* has been planted at the west end of the Demonstration Garden while in a new border a collection of *Paeonia* species has been laid out according to their affinities. Although not complete, the collection is quite comprehensive. After a number of years in the same border the lilies were transplanted into a fresh site.

At last a start has been made to the Alpine House complex. The old west range of glasshouses was dismantled and removed cleanly and effectively by garden staff. The Alpine House and attending frames were erected by contractors. The task of levelling, laying slabs and introducing plants will begin as soon as the house is handed over.

In the Rock Garden three mounds (15, 48, 70) were virtually cleared of plants to make way for part of a new development, namely the Rhododendron Heath which extends westwards into the Woodland Garden (W 20 and W 22). The aim is to provide a suitable setting for the small-leaved species and varieties which form large tracts of shrubby cover in exposed areas in the wild. Although a fairly extensive task it was completed within a matter of weeks. Other areas close at hand (M 06, X 15, and R 12), are scheduled for the same treatment; the beds have already been cleared and prepared and a new grass path laid. This concentration of related taxa acquired from a variety of sources provides a good opportunity for a critical botanical survey; a number of nomenclatural anomalies have already become evident. The reconstruction and planting of mounds 41 and 42 was completed in spring. A fairly extensive part of the east side of the rock garden has now been remodelled and many plants are responding to the extra light and fresh soil available.

The long east valley of the Rock Garden had received no great attention for 40 years and the large rocks, lain-in about 70–80 years ago, had slipped and interlocked in the most odd arrangements. The reconstruction means a long, hard operation, but in October work started and, weather permitting, it is hoped that most will be completed by spring. The ultimate aim is to show a collection of Himalayan flora on one side of the valley and restrict the other side to Japanese natives.

Plant Records Department.

Routine work continued throughout the year, and approximately 1200 new accession and amendment forms were sent each month to the Scottish Office Computer Service, keeping the print-out up-to-date. About 2,700 labels were engraved, and 650 specimens for identification passed through the Records Office before being dealt with by the appropriate botanist.

For the first time a colour code system has been introduced in the record cards. Three new types of card have been devised: a white one for cultivars

and garden hybrids; a green one for species or infra-specific taxa received from a cultivated source (private or botanic gardens, or nurseries); and a pink one for plants of known wild origin or those listed as threatened in the wild. Each record card will record the history of one accession, carrying one accession number only, and the entire back of the card is blank so that the fullest botanical and horticultural details can be entered. The new card is keyed for threatened species and those of known wild origin and it is planned to put this information on to the computer in the near future.

It is hoped to produce another *Catalogue of Plants* in 1977 which will again be based on the family print-out. In this instance, however, all plants of known wild origin will be indicated.

PROPAGATION DEPARTMENT (Mr L. E. Bisset)

Exceptionally high summer temperatures and the on-going glasshouse building programme affected almost every section of the department during the year, but little of the annual work programme was not completed. Inclement weather during the last three months of the year also affected work in the Experimental Ground. It was ironic that during a difficult year more plant introductions than normal were recorded and it is also worth noting that over 75% were of wild origin.

Some plants seemed to benefit from improved glasshouse conditions and probably from closer attention. Amongst these *Allamanda doniana*, a deciduous species from Brazil, *Boea treubii*, flowering for the first time, and the startling and sweetly scented *Aristolochia gigantea* were outstanding. The successful germination of *Nepenthes villosa*, from Mt Kinabalu, Borneo. engendered interest amongst the staff.

Propagation. Demands from departments for vegetative propagation were fairly light and in view of the delay in replacing the present mist unit it is doubtful if the department could deal with an increased demand. The material from two expeditions, Argent & Burbidge (Ecuador) and Page (Far East and Australasia) yielded a considerable quantity (835 items) of material, much of it of horticultural importance.

Seed propagation was fairly successful despite several site alterations during the year, and the appointment of a young man particularly interested in seeds augurs well for the future. The introduction of many conifer seeds has given an opportunity for some small experiments with seed stratification.

Accessions. The total number of items was 4,305, an increase over the previous year, and of these 3,305 were from natural sources. The two expeditions already mentioned made the biggest contribution. *Amentotaxus argotaenia*, from Hong Kong, and *A. formosana*, from Taiwan, introduced respectively as seeds and cuttings were probably the most interesting of Page's introductions and from Ecuador several species and genera new to cultivation in the R.B.G. were noteworthy. The breakdown of accessions is as follows:—
Wild origin: 1,080 plants; 1,674 pkts of seeds; 551 cuttings.
Non-wild origin: 420 plants; 527 pkts of seeds; 53 cuttings.

Major contributors (in addition to those mentioned) were Mr B. L. Burtt & Dr O. M. Hilliard and Dr P. H. Davis.

Staff. Due to the staff changes necessitated by the promotion of Mr Kerby in December, Mr Gardiner took over in Propagation and Mr Maudsley, from the Glass Department, filled the vacancy in the Plant Study and Research Section.

Horticultural Training Section
(Mr J. M. Marshall)

In July 1976 nine students gained the Garden's Diploma of Horticulture (one with Honours) and two students gained certificates in Horticulture. The awards and prizes were presented by Hugh Brown M.P., Parliamentary Under-Secretary of State, Scottish Office.

As in previous years the majority of students obtained posts in local authority work. With the present restriction of appointments in leisure and recreation departments, it is pleasing to report that the majority of students continue to obtain middle and lower management positions.

Regarding the content of the course every effort has been made to adapt to the ever-changing requirements of an amenity horticulturist. This has entailed making the students aware of the activities of such organisations as the Nature Conservancy Council, the Countryside Commission and the Leisure and Recreation Departments of the new Regional Councils.

Younger Botanic Garden, Benmore, Argyllshire
(Mr A. Hall)

Heavy rain and high winds made working conditions difficult in the first three months of the year, but good weather prevailed during the spring and summer and it was an excellent year for flower and fruit.

In the established area of the Garden, the programme of tree surgery and removal of dangerous trees continued whenever the weather was suitable and time could be spared from other essential maintenance work. Plants of about 30 genera were moved from the nursery to permanent sites during the year. A physical inventory check was made on the plants in approximately two-thirds of the garden and the records brought up-to-date. Unwanted natural regeneration was removed from the area of the *Rhododendron falconeri* series. Construction work around Edinburgh Education Department's Outdoor Centre in Benmore House involved Garden staff in some follow-up tasks. Construction of a new fire escape for Benmore House started in the summer and some damage to lawns and shrubberies was inevitable in the restricted space available to the builders. The lawns around the House were repaired after the new sewage system was installed.

Extraction of timber from the development area towards the Golden Gates and above the Massan Wood towards the viewpoint was completed in the first half of the year. 'Lop and top' has been cleared from the Golden Gates area, from the proposed area of Rhododendrons of the Thomsonii series and from the line of the proposed new access road through Benmore Hill wood. An open ditch is being constructed through low-lying parts of the Golden Gates area to improve drainage.

The construction of two new staff houses was started in January 1976 and is nearing completion: entry is expected in January 1977. The concrete lining on the inner edge of the pond was renewed and the water level is holding for the first time for many years.

Attendance figures rose by 2,600 to 33,276.

Logan Botanic Garden, Stranraer, Wigtownshire

(Mr M. Colledge)

The greater part of the staff's time was taken up with routine maintenance. In early January a severe gale destroyed five large trees in the woodland area. Long-term renovation of old plantings and encouragement of growth of new plantings especially in the informal woodland/shrubbery have been a focus of attention. A short steep bank at the north end of the terrace was improved by removing old plantings of *Potentilla* cultivars, and building into the soil surface large flat stones acquired from a local quarry. A selection of plants suited to a hot dry site was planted in the crevices. An old worn-out specimen of *Magnolia wilsonii* was removed, and a new island bed was formed on the site and replanted. An overgrown border was renovated and planted with a collection of *Fuchsia* containing uncommon and botanically interesting species; all flowered well during 1976.

Further plantings were made in the woodland of *Olearia*, *Leptospermum*, *Drimys*, *Callistemon* and *Eucryphia*; these in one area were thickly interplanted with *Fuchsia magellanica* in an endeavour to provide shelter quickly and to nurse them up rapidly to worthwhile specimens. The same area has been sprayed with a total weed-killer in an attempt to reduce the competition from grass for available plant food. Previous plantings fed with a slow-release fertilizer have shown some improvement in growth. A further area of woodland has been cleared and mass-planted with *Dicksonia antarctica* grown on from naturally regenerated sporelings. About 100 *Alnus rubra* from Edinburgh have been added to the shelter belts.

In consultation with the Curator and local Property Service Agency staff a circulatory system for the Garden pools has been devised; it will be installed early in 1977. Several meetings to discuss structural and landscape aspects of the proposed extension to the tea-room were held with the architects. The PSA continued repairs to the boundary walls and demolished the old glasshouses.

Fascicularia littoralis flowered for the first time in twelve years; *Sinofranchetia chinensis* flowered and produced purple fruits. A species of *Ugni* (*Herklots* 115), having withstood 11°F of frost, flowered during the summer.

In common with other areas Logan experienced severe drought conditions in August, when only 7 mm of rainfall was recorded. During this period the walled garden required continuous irrigation.

The number of visitors for the year increased by 6,257 to 40,365. The automaticket machine again proved a worthwhile investment. There was a marked increase of nearly 25% in tea-room customers—a rise which emphasises the urgent need for an extension.

Annual Rainfall

Edinburgh	584·20 mm	(23·00 ins)
Benmore	2138·60 mm	(84·21 ins)
Logan	831·72 mm	(32·68 ins)

Staff List

(December 1976)

Regius Keeper	Mr D. M. Henderson	
Assistant Keeper	Dr J. Cullen	
Principal Scientific Officers	Dr D. F. Chamberlain Mr A. J. C. Grierson Mr I. C. Hedge	Dr J. A. Ratter Dr R. Watling
Senior Scientific Officers	Dr G. C. G. Argent Dr R. B. Burbidge Mr L. A. Lauener	Mr J. M. Marshall (Hort. Educ.) Dr C. N. Page Miss R. M. Smith
Higher Scientific Officers	Mr G. Anderson (Hort. Educ.) Mr B. J. Coppins Mr R. Eudall Miss J. M. Lamond	Miss V. A. Matthews Miss D. Purves Dr C. C. Wood Mr P. J. B. Woods
Scientific Officers	Mr P. Harrold Mr D. R. McKean Miss G. A. Meadows	Mr A. G. Miller Miss C. Milne
Junior Research Fellow	Mr. A. P. Bennell	
Assistant Scientific Officers	Mrs F. M. Bennell Mrs D. Brunton Miss G. F. Chamberlain Mrs L. A. Gibb Mrs. N. M. Gregory Mr K. N. Grant	Miss E. H. Hamlet Mrs H. Hoy Miss L. McLuckie Miss L. F. Mitchell Miss M. A. H. Paul Miss D. M. Taylor
Laboratory Attendants	Miss M. Bryce Mrs E. A. McAllan Miss M. McLaren	Mrs G. Millar Mrs G. Young
Curator	Mr R. L. Shaw	
Assistant Curators	Mr S. J. Armstong Mr L. Bisset Mr J. M. Colledge (Logan)	Mr A. Evans Mr A. Hall (Benmore) Mr J. A. R. Kerby
Garden Supervisors	Mr G. G. Broadley Mr L. Buchan Mr R. U. Cranston Mr J. M. Gardiner Mr G. Kirkpatrick Mr G. Knott	Mr P. J. Maudsley Mr R. J. D. McBeath Mr W. Tait Mr B. Unwin (Logan) Mr M. Welsh (Benmore)

Librarian	Mr M. V. Mathew	
Assistant Librarian	Mrs L. Clark	
Higher Executive Officer	Mr T. C. Dobbie	
Executive Officer	Miss J. R. S. Renwick	
Clerical Officers	Mrs H. S. Boyes Mr G. L. Leetion	
Clerical Assistants	Mr A. A. Gosden Mrs E. C. Stivens	Mrs J. S. B. Thomson Miss J. Thomson
Senior Paperkeeper	Mr D. Ward	
Sergeant Park-keeper	Mr J. Y. Thomson	
Corporal Park-keeper	Mr A. W. Brown	
Park Constables	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
Gardeners Special	Mr T. Y. A. Brown Mr W. R. Caldwell Mr C. G. Drawbridge Mr T. G. Grieve	Mr G. W. Lawson Mr J. McCluskey (Benmore) Mr A. J. Paxton
Gardeners I	Mr T. R. Burnett Mr S. Boyd (Logan) Mr A. M. Cameron (Benmore) Miss L. R. Cunningham Mr G. Godbert (Benmore) Mr J. M. Hirst Mr W. Kocz	Mr G. Murdoch (Logan) Mr I. M. Potts (Benmore) Mr R. M. Robertson Mr E. Smith Mr J. Stewart Mr E. F. Young
Gardeners II	Mr W. A. Crowe (Benmore) Mr A. Currie (Logan) Mr J. Henderson Mr D. Lumsden (Benmore)	Mr J. McElroy Mr J. Smith Mr T. L. Sutherland Miss J. E. Unsworth (Logan)
Assistant Gardeners	Mr S. J. Ansdell Miss H. Elliott Mr J. Herkes Mr A. S. Jackson (Benmore) Mr K. M. MacLeod Mr S. MacPherson Mr C. P. McClelland (Benmore) Mr R. S. Sibbald	Mr I. W. J. Sinclair Mr J. H. Smith Mr D. M. Stewart Mr J. M. Tagney Mr N. H. A. Totty Mr J. Urquhart Mr R. Waddell
Junior Gardener	Mr I. A. Hutton (Logan)	
Labourers	Mr M. Fletcher (Benmore) Mr R. S. Waddell	
Driver	Mr W. D. Lewis	
Engraver	Mr J. R. Wright	

Storeman	Mr G. Roddex	
Male Cleaner	Mr G. Thomson	
Female Lavatory Attendants	Mrs. C. Horner Mrs F. R. Horner	
Male Lavatory Attendants	Mr T. H. Potter Mr A. G. Currie	
Nightwatchmen	Mr P. F. Banks Mr J. Brady	Mr D. K. Lawrie Mr W. Pringle