

BRITISH BOTANICAL GARDENS IN THE 1980s:
CHANGES REFLECTED BY BIBLIOGRAPHICAL
AND SOCIAL SURVEY

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SUMMARY

- (1) British botanical gardens in the 1980s represent the latest stage in their long history dating from the Middle Ages. Origins lie in different types of institution: religious; academic; economic; amateur; scientific; and municipal. This diversity explains the variety of modern institutions involved with gardens, which may be recognized in four categories: state; university; local authority; and private societies.
- (2) The relationship of the gardens to the community is central to this study. Emphasis is placed on public views of them. (A small sample survey was conducted to obtain the ideas of the public about their functions.)
- (3) A questionnaire was sent to relevant gardens, enquiring about possible international relationships based on European 'twinning' schemes.
- (4) Many influences are seen to contribute to the substantial changes evident in the activities of British botanical gardens today. New

developments are considered, e.g. increased leisure and consequent need for recreation activities; transport facilities; influence of the mass media, especially television; conservation schemes; and current financial stringency. Some scientific advances (e.g. micropropagation) and technical progress (e.g. labour-saving machinery) are mentioned.

- (5) Six main functions of the gardens are identified and considered in detail: teaching and research; economic botany; horticulture; amenity; public information and education services, public recreation facilities; and conservation. The functions are reviewed in relation to overlap with those of other modern institutions (e.g. research stations), and other types of garden.
- (6) Sheffield Botanical Gardens - seen in their historical context - provide a good example of change affecting a nineteenth-century institution adapted to the 1980s. The Gardens' importance to the local community is assessed from informal enquiries.
- (7) A bibliography of non-specialized material is included. Most chapters contain a literature section with notes on important published material.

- (8) Findings include: the contribution, uniquely made by academic botanical gardens, to teaching and research; the importance in all the gardens of public information and education services and recreation facilities; the significance of conservation activities within a national and international framework.

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Chapter 1

Chapter 1

INTRODUCTION: AIMS AND SCOPE

British botanical gardens are now at an exciting stage in their long development. During past centuries they have carried out different functions at various times. The purpose of the present study is to examine the functions which they now serve, to consider the different aspects of their work in the light of modern social conditions and to assess the continuing importance of their place in the life of the country, as seen from the point of view of the community.

All the main activities within gardens are discussed, but special emphasis is given to those functions which are connected with amenity, public information, and recreation, and to the very important part which botanical gardens may play in conserving wild and garden plants.

Aims of the investigation

These may be summarized as follows:

- a) To identify and describe the various functions (and priorities) of different categories of contemporary botanical gardens of Great Britain, following an initial study of the views expressed by directors and curators, as well as by writers on gardening topics and experts speaking on television.

- b) To consider each of these functions separately.
To study the changes which have taken place in the world of British botanical gardens in recent years (i.e. since about 1970). To demonstrate those aspects of the gardens' activities which relate directly to the life of the community.
To investigate by survey and informal enquiries the opinions held by the public about the functions and importance of these gardens at the present day. Reference will be made, where relevant, to the functions of other bodies, e.g. research stations, private and National Trust gardens and commercial nurseries, and to foreign botanical gardens.
To consider possible future developments in the work of these gardens.
- c) To refer to reports or features in the non-specialized literature, especially those which show the changes taking place, or envisaged, in the functions of British botanical gardens.

Definition of terms

- a) 'British' in this context is used in the strict sense of 'Great Britain', i.e. England, Scotland and Wales, and those islands which are administered from the mainland.

At a time when international co-operation between botanical gardens is increasing, however, it is important to include references to foreign gardens,

since they influence and are influenced by current British practice.

- b) 'Botanical Gardens'. To give a brief yet comprehensive definition of the modern meaning of the term 'botanical garden' is not easy. The answer may lie in the combination of the two words themselves. 'Botanical' implies 'scientific', with the plants systematically arranged and grown for reasons other than their own intrinsic attractiveness. 'Garden' usually refers to a place which is made pleasant to visit, though growing plants in themselves are usually attractive.

The definition is made more difficult by the existence of several types of botanical garden. Those attached to teaching institutions, e.g. university departments of Botany, departments in colleges of Agriculture and Horticulture, naturally differ from public botanical gardens administered by local authorities or from those botanical gardens still in the care of private societies or individuals. The following definition is suggested here, based on different versions in the literature:

A garden made primarily for scientific study, research, education or interest, where the plants are often arranged systematically. Other considerations such as conservation may play an

important part, and at least some area is usually included where amenity is the main objective, both in the design and in the planting.

Explanation of the arrangement of material and mode of presentation

As public leisure activities, and, by association, amenity horticulture, have a special importance in this survey, as well as conservation (considered from a layman's point of view), much more detail is given in these sections than in others.

For each function, however, the following information is given:

- a) Historical basis of the function, if it can be identified.
- b) Description of the function.
- c) Period of greatest importance, if applicable and can be established.
- d) Importance at present, including consideration of whether any other type of establishment is also carrying out the same function.

The concluding chapter reviews the present situation and looks to possible future developments. The object is (as stated above) to assess the importance which these gardens currently have, and may be expected to have in the future, in the life of the community.

Historical aspects

The history of British botanical gardens is not described separately here, as historical material relating to each function may be best included in considerations on that function, so that the past and the present situations can be treated together.

A concise, informative historical account of English botanical gardens is given by Ray Desmond in his chapter 'Physic and botanical gardens', in the Victoria and Albert Museum publication, The Garden: a celebration of one thousand years of British gardening (1979). The volume (edited by John Harris) was first published as an official account for sale at the Exhibition of 1979 and afterwards reissued.

Specialized scientific aspects

As earlier indicated, the aims of the present study are an appraisal of the functions of gardens and their relationship to the public generally rather than specialized scientific study. Accordingly scientific subjects such as, for example, plant physiology, cytology or metabolism, and the detailed aspects of economic botany and of horticulture are not discussed here.

Documentation

There is no lack of written material on subjects related to the present survey. For centuries books have been written, as well as articles in periodicals, about

plants, gardening, and garden design. To some extent, works on all these subjects are relevant to the study of botanical gardens. At present, however, and in recent years, there has been a substantial upsurge of material on gardens and plants, reflecting the considerable current interest in these subjects by both specialists and amateurs. Every week it is usual to find several new works published on these subjects, or, significantly, older books reprinted, showing a deep interest in the history of the subject.

Particular topics investigated

In appraising botanical gardens in the 1980s, with particular reference to their present-day functions and status, it has been aimed to make an original contribution to a number of important considerations. These main aspects of study, which have been investigated here in some detail, may be conveniently summarized as follows:

1. The assemblage of a bibliography of (non-specialized) literature on botanical gardens and related subjects.
2. Presentation of a particular viewpoint - that of the gardens as seen by the community.
3. A survey by questionnaire of potential links between botanical gardens in Great Britain and their European 'twin' towns.
4. A sample survey of public views on the functions of the gardens.

5. An indication of the influence of television garden programmes as a source of information about the gardens.
6. Consideration of the problem of overlap of functions between botanical gardens and other institutions.

Reference Material

One of the main parts of this study is the bibliographical element; the method by which reference material has been arranged is as follows:

Each chapter normally consists of two parts. The first contains the subject material, for example a discussion of the function in question. In the second part, notes are given on relevant literature. Inevitably, there are some references in the first part of a chapter to books and other source material but usually only a brief reference is given there, with more detailed information in the second part.

Full details of the literature are given in the alphabetical bibliography at the end of this thesis.

Additionally, Chapter 2 is devoted to an appraisal of key documents which are basic to an understanding of the present-day work of British botanical gardens. These documents consist of material such as conference proceedings, international resolutions relevant to the

work of the gardens, and international legislation, where it affects their development.

Existing literature

Four main categories of subject literature are of importance and relevance in connection with the theme of this study.

These are:

- a) scientific,
- b) historical,
- c) background literature of a popular type, in certain subject areas, including information on gardens and gardening in general,
- d) specific material on (mainly British) botanical gardens and the community, from a social point of view.

Each category is discussed in more detail in the following paragraphs.

a) Scientific literature

This material is, naturally, of a specialist nature. (Articles with a strong scientific base but directed to the general public are dealt with under popular literature.)

The truly specialized scientific literature, whether books, journal articles, conference papers, or reports to various bodies, is, of course, written by, and for, experts in the field concerned; its importance can be adequately

assessed only by a subject expert. Such literature is not included here, as its particular focus is not in the mainstream of the issues considered in the present study.

The theme of this survey, as earlier noted, is the social, or community, importance of modern botanical gardens in Great Britain. For this purpose, advanced studies on, for example, plant breeding, or many aspects of experimental botany, are not of immediate relevance.

However, much advanced research material in journals was noted in the course of two online searches made during the investigation. The data bases available are, predictably, weighted on the side of scientific rather than social studies, though the scope of the material varies very widely and some unexpected types of find were made during the search.

Any material found of a standard and content suitable for this study was considered. The remainder, by far the greater part, was noted as expert literature useful here as background information.

b) Historical information

The historical background is essential to the understanding of any present-day institution. For British botanical gardens, which have their origin in several distinct predecessors, it is especially important.

In a historical sense, as in the modern context, it is virtually impossible to keep entirely separate the different aspects of the functions of these gardens.

Originating as they did in different individual types of establishment, the various activities became inter-mixed. However, one particular function, economic botany as applied to the development of new food crops, may, at certain times and in certain overseas gardens only, have been the most significant in the general picture.

Reference to informative literature on historical aspects is given in the later, bibliographical, part of the chapter.

In a study devoted, like the present one, to contemporary aspects, the historical background has to remain as background.

The rate of change in the circumstances affecting gardens has made it necessary to restrict detailed coverage of the literature to the years from 1970 to approximately 1982. These are the key years covered by the subject study. Although recent developments sometimes have their origins in earlier events, the modern functions of the gardens have been most significantly shaped during the years in question.

c) Background literature

Some topics are comparatively self-contained and sharply circumscribed; it is then easier to set bounds to the areas of subject literature which are strictly relevant.

The theme of British botanical gardens, in their social context within the community, is by its nature very difficult to treat in a precise way.

It impinges on many other areas, through its connection with botany, horticulture, amenity, public information, education, recreation and conservation, to mention only the most important considerations. The subject therefore has both scientific aspects (botany, horticulture, and the practical basis of conservation) and social ones, as far as the other connections are concerned.

The range of subject literature which may be relevant is therefore very wide. This is especially true as regards the popular press; books and journals, even if not devoted to botanical gardens as such, may contain information useful as background or for comparison. As an example, the working practice of commercial nurseries, in horticulture, or of government-controlled stations, in experimental botany, may be an important parallel study to the work of botanical gardens. (The whole question of overlap between modern British botanical gardens and other statutory or voluntary organizations is considered in Chapter 10.)

Although the amount of modern literature to be monitored is considerable, frequently the articles dealing with gardens and gardening treat them in a fairly general way, with often only a brief reference to a botanical garden included.

Specific material: British botanical gardens and the community

The fourth category of literature consists of that most directly connected with the present study. There are some popular articles devoted to the description of British botanical gardens, though they are not frequent. (Books and journals tend to cover the historical aspects more than the present scene.)

On the relationship between present-day British botanical gardens and the community of which they form a part, there is not much reference material. As institutions in the social rather than the scientific sense, they have attracted less attention in print than might be expected.

Studies, as already mentioned, have been made of historical aspects. As the contemporary scene has altered so considerably, for reasons discussed here, later, it is to be expected that more literature in this category will be forthcoming. There are indications that the bibliographical situation is improving, especially in the light of the international conference of autumn 1985, in Las Palmas.

Grenville Sheringham wrote an interesting series of descriptive articles in GC & HTJ magazine, to which more detailed attention is given in the bibliographical section. In one of these articles (19 November 1982) he made reference to the present project, of which he had heard, as being: "in my view, a very important and neglected field of study".

On account of the gap in easily available literature, the bibliographic content of this study, as already stated, has been given emphasis as one of its main elements.

It has not proved in practice that a meaningful distinction can be made between the functions of modern British gardens and the practice operative in the institutions of their European neighbours. Although no attempt has been made to monitor foreign literature exhaustively, some items may be mentioned. In Blumenparadiese und Botanische Gärten (Reisigl, H., ed.¹⁹⁸⁰), an essay deals with an aspect of the subject, the division of garden visitors into categories, which appears not to have been previously discussed elsewhere, although it is clearly important. The article from Blumenparadiese is discussed in detail under reference material, later in this chapter.

European Conservation Year in 1970 stands out as a landmark, the beginning of the recent rapid developments in British botanical gardens, as in some foreign gardens also. The previous year was in some ways the forerunner to these developments. The Botanical Society of the British Isles held a conference in 1969, in preparation for the coming Conservation Year.

It is especially interesting, therefore, to look at the comments made in 1969 by Sir George Taylor, then Director of Kew Royal Botanic Gardens, and by Edward Hyams, both writing in the fine volume Great Botanical Gardens of the World (Hyams and MacQuitty, 1969). Sir George Taylor,

as a world authority, wrote the preface, in which he says:

Botanical gardens should, in most civilized countries, aim to be sources of aesthetic and intellectual delight, and they have become a proud part of the national heritage, making the science of botany the handmaiden of horticulture....

But setting is not everything and in one sense there is more merit in creating a lovely, scientifically and socially valuable garden in the ugly and difficult conditions of a city, than with all the advantages of the open country.

In his introductory essay to the above book, Edward Hyams says of botanical gardens that their aims have been in the past, and remain, several in number. He describes these aims in the following words:

Botanical gardens have served, and continue to serve, three major and many minor purposes. In the first place, by the comparative study of the plants collected in them and the herbarium material collected by them, the modern sciences of taxonomic and experimental botany have been developed. Taxonomy is concerned with the system of classification and nomenclature, which gives clear expression to the kinship groups into which plants fall. In the case of green, flowering plants, for example, it has erected a grand and noble scheme establishing the natural relationships between over a quarter of a million species. Experimental botany is concerned with establishing the anatomy, cytology and metabolism of plants.

Secondly, the applied science of economic botany has been so practised in botanic gardens that they have served

as acclimatization stations through which economically valuable plants such as rubber, coffee, tea, chocolate, cotton, hemp, vanilla and scores of others native to only one part of the world have been introduced to and established in others.

In the third place, there has been the specifically horticultural service of botanical gardens. Since the emphasis in such gardens has necessarily been on botany - a science - rather than on gardening - an art - this service has chiefly consisted in the trial, selection, hybridization and distribution into horticultural commerce of thousands of new or improved kinds of both useful and ornamental garden plants. In one or two great botanical gardens, however, the lessons of garden designing have been taught, too. Because two great garden designers have been concerned in laying it out, Kew is an object lesson in landscape gardening; so is Edinburgh, to which the best school of landscape gardening in the world is attached; and there are others in other lands.

An event of considerable importance in the horticultural world was the exhibition put on by the Victoria and Albert Museum in 1979. Described as the biggest exhibition ever mounted on British gardening history, it was entitled The Garden: a celebration of 1,000 years of British Gardening. An official publication was produced to accompany the exhibition, in the form of a collection of contributions by garden authorities. This volume was afterwards published as a book which is of great value in the study of gardens past and contemporary.

In the present context it deserves reference for the essay by Ray Desmond, already mentioned in this chapter, on the history of British botanical gardens. Ray Desmond

was for some years Librarian at Kew. His chapter is a model of concise writing, giving much interesting information in a very readable style.

Another interesting account, though much older, of the history of botanical gardens is provided by an address delivered by Lord Britton at a meeting in the USA in 1896. This, also, is primarily a bibliographical item, mentioned and quoted later in this chapter. It is another example showing that the history of the subject has been fairly fully described elsewhere in the literature. This was an important factor in the decision not to elaborate extensively in this account on the historical aspect of the gardens, which is, in any case, not the main theme here.

Owing to the rapid changes, already referred to, which have taken place in recent years, resulting from new pressures in the world generally, the period covered in thorough detail, both from a subject and a bibliographical point of view, is limited in the present survey, as already stated, to the time from 1970 to about 1982. The origins of these developments were foreshadowed before 1970 and early developments are mentioned; changes are continuing and will no doubt extend to the coming decades. The years from 1970 to 1982, however, seem especially significant, as the time when many new ideas came to have a decisive influence on the functions served by the botanical gardens of Great Britain.

General literature

The material included here is that relevant to British botanical gardens generally. Specific material on individual functions of the gardens is cited in the bibliographical section of the appropriate chapter.

1. Printed guide to individual gardens

If a particular garden is regularly open to the public, it is usual for a guide to be available for visitors. Such guides obviously afford an easy and authoritative source of information about the particular gardens. The guides are often well illustrated, and usually sold at a reasonable price, as part of the publicity for the garden.

The contents vary. For the Sheffield Botanical Gardens there are two leaflets; the first, now unfortunately out of print, is a history of the Gardens, the other is a straightforward guide to the grounds as they are today. At other places, the historical material forms part of the guide itself. Chapter 9 discusses the subject of garden guides, and contains a selection of extracts as examples of differing styles.

2. Online search material

To discuss online material separately from literature discovered through a manual search may suggest a false distinction, since the end product is the same.

As some very interesting background material resulted

from the two online searches made during this work, this source is worth mentioning.

Very little was found of a specific nature on the botanical gardens of Great Britain. On botanical gardens worldwide, with their activities and problems, there was a wealth of material, though much of it very specialized and intended for the scientist.

The best data bases for the so-called 'social' aspects studied here were found to be BIOSIS PREVIEWS (Biological Abstracts Inc.), ENVIROLINE, CRIS/USDA, and to some extent CAB (Commonwealth Agricultural Bureau) and Social Abstracts Inc.

The facility used was Lockheed Dialog.

A sample of 10 entries from an online search is included at the end of the alphabetical bibliography. Its purpose is to give an indication of the type of material which can be traced by this means.

3. Hyams, Edward and MacQuitty, W. Great botanical gardens of the world (1969)

This authoritative work, although some years old, remains a landmark in the history of garden literature. Edward Hyams was widely known and respected as an expert on gardens. The photographs by William MacQuitty match the standard of the text. The Preface was written by Sir George Taylor, then Director of RBG Kew.

This Preface and the introductory essay by Edward Hyams contain observations which are as interesting and valuable today as when they were first written. (Extracts are quoted earlier in the chapter.)

It seems certain that the book will long remain amongst the really significant works on botanical gardens. As far as book production is concerned this is a volume which does justice to its subject.

The gardens in Great Britain which are included are those of Kew, Oxford University and Edinburgh.

4. Sheringham, Grenville

[A series of six articles on the functions of contemporary British botanical gardens published in GC & HTJ magazine in 1982.]

This series of articles was preceded by a lively correspondence in the magazine on modern British botanical gardens. The letters showed an interesting variation of opinions amongst the professionals. Grenville Sheringham's survey was undertaken as a result of this interest. As a landscape gardener, the author has brought to his series of articles a professional interest in funding, staffing, maintenance and the practical problems facing the gardens at a time of rapidly rising labour costs.

He has also considered the functions of education, research, recreation and conservation, highlighting one garden in connection with each of these functions. The

gardens selected he considered to be outstanding examples, illustrating the particular functions. For 'innovative management' he commends especially the Botanic Garden of the University of Bristol. Within the limits of space in a periodical, the author has provided a good factual survey of how the various functions of gardens are served. He is personally a keen advocate for the opening of more gardens to the public.

5. Reisigl, Herbert, ed. Blumenparadiese und Botanische Gärten der Erde (1980)

The longer part of this very well produced and illustrated book is devoted to various localities in the world where the flora is particularly rich, and to some of the finest great gardens, for example that on the island of Mainau in Lake Constance.

There are in addition essays with material of interest about modern botanical gardens.

The introduction, by Herbert Reisigl, speaks of the gardens' considerable importance, now and in the future.

He says:

We have also included in this book the botanical gardens, which in our world, becoming ever more rapidly impoverished, not only serve as aesthetically attractive, but are also becoming more and more a living museum, a 'Noah's Ark of the 21st century' for the plants.

Another essay, entitled 'Freude und Leid mit einem Botanischen Garten', by Gustav Schoser, Director of the

Palmengarten at Frankfurt am Main, discusses the practical work of caring for a botanical garden. It is interesting that he mentions the different members of the team involved in such an enterprise, and, as a 'philosophical' study of the life, it could apply to any botanical garden. He stresses the importance of the contribution made by each worker, from the administrator to the practical gardener (p 11).

Another notable feature of this essay is a list of the categories of visitors to a botanical garden. These categories he discusses and lists as follows:

... The plants in a botanical garden are not there for their own benefit. They do not need to be a living museum or even simply a guide to the world of botany. The plants are there for the people. They ought to attract a person, teach him to marvel, set him questions. In this service to man lies all the true justification for the expenditure of a botanical garden, the garden finds in this connection its clear *raison d'être*. Without the interested people, the enquiring, the enthusiasts, this collection of plants would certainly be something living, but without pulsating life, without 'feedback'. What kind of people come into the botanical garden?

- (1) Those hungry for learning. They wish, for professional reasons, to widen and deepen their knowledge, to acquire and digest information. They wish (or are obliged) to learn to understand the life of plants. They are people of all age groups.
- (2) The professionals. They expect stimulating ideas and the answers to questions.
- (3) The amateurs. They have special preferences and interests. They are very keen to learn and at the same time they are knowledgeable.

- (4) The aesthetes. They seek through knowledge what is living, beautiful, sublime. They are open-minded and enthusiastic.
- (5) The egocentrics. They are seeking self-confirmation, they already know everything, they know all the plants, they collect what they can reach, in order to possess it.
- (6) The casual visitors. Chance (perhaps one of the mass media or some other publicity?) has attracted them into the garden. They are almost the most important visitors. They come in hope and curiosity, they are open-minded and receptive. They want to experience life and learn to understand things better.

We must therefore present and prepare the botanical garden at one and the same time as a 'science garden' and a 'pleasure garden'.

6. International Directory of Botanical Gardens

3rd ed. (1977)

This directory, issued and periodically updated by the International Association of Botanical Gardens, may fairly be described as a 'general' work on botanical gardens. As it lists gardens by country, however, and is intended to include only those open to the public, it is referred to in Chapter 9, which contains a list of gardens open to the public, rather than in the present section.

7. Conferences: reports of proceedings

The published Proceedings of international conferences on botanical gardens, especially those which have been held at Kew and at Cambridge University, are also 'general' material. They are extremely important, indeed basic, to an understanding of the activities of modern botanical gardens, including those

in Great Britain. They, together with other material, are included in Chapter 2 on Key Documents, and are not discussed in this chapter.

8. Britton, Nathaniel Lord. Botanical gardens: origin and development (1896) *

Although the detailed history of botanical gardens is outside the main subject of this thesis, it is useful to consider an occasional older source, for comparison. This important lecture, delivered nearly a century ago in the USA, is still of much interest. (A.A.A.S.) N.L. Britton says:

The cultivation of plants within small areas for their healing qualities by the monks of the Middle Ages appears to have been the beginning of the modern botanical garden, although these mediaeval gardens doubtless took their origin from others of greater antiquity. Botanical gardens were thus primarily formed for purely utilitarian purposes, although the aesthetic study of planting and of flowers must doubtless have appealed to their owners and visitors. Their function as aids in scientific teaching and research, the one which at present furnishes the dominating reason for their existence, did not develop much, if at all, before the sixteenth century, and prior to the middle of the seventeenth century a considerable number existed in Europe in which this function was recognized to a greater or less degree, of which those at Bologna, Montpellier, Leyden, Paris and Upsala were perhaps the most noteworthy. The ornamental and decorative taste for planting had meanwhile been slowly gaining ground, as well as the desire to cultivate rare or unusual species, and during the eighteenth century attained a high degree of development. Many persons of wealth and influence fostered this taste and became, through the employment of men skilled in botany and horticulture, generous patrons of science. The world was searched for new and rare plants, which were brought home to Europe for cultivation, and many

* Address ... at Buffalo, N.Y., August 1896

sumptuous volumes, describing and delineating them, were published, mainly through the same patronage. The older gardens were essentially private institutions, but as the rights of the people became more and more recognized, many existing establishments and an increasing number of newly founded ones became, to a greater or less extent, open to the public, either through an admittance fee or without charge. The four main elements of the modern botanical garden have thus been brought into it successively.

1. The utilitarian or economic.
2. The aesthetic.
3. The scientific or biologic.
4. The philanthropic.

These four elements have been given different degrees of prominence, depending mainly upon local conditions, some gardens being essentially aesthetic, some mainly scientific, while in our public parks we find the philanthropic function as the underlying feature, usually accompanied by more or less of the aesthetic and scientific.

9. Hepper, F.N. Royal Botanic Gardens Kew: Gardens for Science and Pleasure (1982)

Books on individual botanic gardens are not routinely included here in the bibliographical section of Chapter 1. For Kew, however, an exception has been made. Kew is unique, yet at the same time it epitomises for people all over the world the picture of a 'botanical garden'. Its activities historically are of the greatest importance and its work at present is as significant as it ever was.

This illustrated volume, produced in the pleasant format which is nowadays the hallmark of H. M. Stationery

Office publications, is intended for the general reader rather than the specialist. At the same time it is not meant to be only a guide (there is a paperback guide of the usual type in addition), but rather as a souvenir volume or a work of general interest. Some idea of the scope of this volume can be obtained from the publisher's note, as follows:

The Royal Botanic Gardens at Kew and at Wakehurst Place, Kew's annexe in the Sussex countryside, have an international reputation for their beauty, their remarkable collection of plants and their scientific research. The range of plants grown outdoors perhaps because of the notorious British climate and despite the far from ideal soil conditions at Kew itself is truly astonishing. However, in addition to those plants sufficiently hardy to be grown without protection there are many more, including tropical orchids, tree ferns, desert cacti, miniature alpines and giant waterlilies, for which special conditions are required, such as those provided by the elegant nineteenth-century Palm House.

Though the ornamental value and historical associations of Kew and Wakehurst Place will always remain important attractions to their many visitors, the primary function of these gardens is to serve as scientific collections for what many consider to be the world's leading institution devoted to the study of plants.

This handsomely illustrated book, to which many members of Kew staff have contributed by writing about their own fields of work in terms the layman can understand, tells the story of Kew's origins and development and discusses the most striking ornamental features of the gardens and their living collections. To keep these aspects of the gardens in proper balance with Kew's scientific purpose, it sets them beside such topics as Kew's involvement

in botanical expeditions worldwide, the role of Kew in the classification and identification of plants, the studies being carried out by Kew staff on the structure and reproduction of plants, and the active participation of Kew in the urgent task of conserving endangered species.

As well as being a record worthy of these beautiful gardens, this book provides a fascinating insight into current directions in plant studies.

10. Kew Magazine, The, incorporating Curtis's Botanical Magazine, Vol. 1-, 1984-

The following note from the Contents page sets out the objects of this publication:

The Kew Magazine, which incorporates Curtis's Botanical Magazine founded in 1787, has, in addition, features of special interest to botanists and horticulturists, plant ecologists and those with a special interest in botanical illustration, so providing an international forum for all these interests.

This magazine is published four times a year, in February, May, August and November.

Chapter 2

Chapter 2

KEY DOCUMENTS

Recent Literature

The aim of this chapter is to draw attention to written sources of particular importance in the study of modern botanical gardens. Key documents are perhaps easier to recognize than to define. It may, however, be said that these are publications certain to have considerable influence on the development of British botanical gardens at present and in the future. The material falls into several categories.

1. National and international legislation

This does not normally affect the functions of the gardens directly. Legislation in the field of conservation may do so indirectly by affecting the direction in which their work develops.

2. National and international organizations:
resolutions and recommendations

There are a number of organizations whose activities impinge on the work carried out in gardens, especially in the area of conservation. A detailed text (listed in the Bibliography) on these conservation bodies is by Robert Boardman (1981).

The Council of Europe does important work, not least by encouraging international consideration of common problems.

In publishing the observations of eminent scientists in its journal Naturopa it also draws the attention of the concerned but non-specialized reader to urgent problems. Again, much of the literature is mainly concerned with conservation, but some is more specifically involved with gardens, such as the recommendations for mountain garden reserves in Europe, which are very close in their purpose to that of botanical gardens.

Some of the most important and relevant material to gardens issued by the Council of Europe in Naturopa is reproduced here.

3. Conferences and their proceedings

This category contains material which is most relevant to the functions of botanical gardens. Several volumes of conference proceedings are essential to the understanding of the world of modern British, and foreign, botanical gardens. These publications have already had a very important influence on the thinking of those engaged in the direction and the care of the gardens. The papers contained in them will long continue to exert an influence. These documents are so basic to the study of gardens that they are considered in detail later in the chapter. In brief they consist of:

Resolutions of the International Association of Botanical Gardens (IABG), meeting in plenary session, at their conferences, International Conservation Conferences

held at Kew in 1975 (1) and 1978 (2) and the Cambridge Conservation Conference of 1980 (3) (see below). In the case of the Kew and Cambridge meetings, the Proceedings were published during the following year.

Material included in this chapter also appears elsewhere in the account. As these publications are so important, they are highlighted by this separate chapter devoted to such material.

^{bli}
Biographical notes
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1) Conferences

Since this chapter is bibliographical, there are no additional references to add in this section. There are, however, a few general comments which are appropriate here.

The first is to note the admirable speed of publication in respect of the three conferences mentioned earlier in this chapter.

The first Kew Conservation Conference was held in 1975; the Proceedings were published in 1976. The Second Kew Conference took place in 1978; the Proceedings followed in 1979. The Cambridge Conference of 1980 was published

(1) Simmons, J.B., Beyer, R.I. and Brandham, P.E.,
(eds) (1976).

(2) Synge, H. and Townsend, H., (eds) (1979).

(3) Synge, H. (ed) (1981).

in 1981. The importance of rapid publication of such important material is clear. Making the discussions and papers available to a much wider public greatly increases the value of the original conference.

The second point concerns the conference titles. The full titles of the conferences themselves and of the succeeding printed volumes are given elsewhere in this text, in the chapter on Conservation. The original, rather lengthy, titles of the conferences were wisely converted into more manageable versions as books. Especially striking is the Second Kew Conference published as Survival or Extinction, a dramatic title which has a strong impact and remains in the memory.

The third comment is that the titles, especially the original ones, underline the conservation aspect, perhaps to the exclusion of other topics of the conferences. Plant conservation needs had been the original reason for the conferences and they provided a strong stimulus for the new international co-operation which was to follow them.

The conferences were, however, seen as a welcome opportunity for general discussion, on an international basis, of the contemporary functions and future aims of botanical gardens. The subjects of the papers cover a much wider field than might be imagined from the titles. The discussions, also, are evidence of a wish to compare notes about problems and ideas. As the world becomes increasingly international in outlook it is natural that those responsible for the care of botanical gardens in

different countries should find one another's experiences relevant and useful.

The IABG is the official international body for botanical gardens, and as such its activities and pronouncements are of great importance to professionals involved with the work of these gardens. The IABG's connection with its parent body, the International Association for Plant Taxonomy (IAPT), adds to its authority.

The proceedings (Resolutions) of the IABG are reproduced in the Proceedings of the Second Kew Conservation Conference.

2) Council of Europe publications

The value of the publications issued by the Council of Europe has already been stressed. The Council offers the opportunity for scientific experts to express their views, so providing a forum for the exchange of ideas.

Two publications particularly relevant to this chapter, the Resolution on rare and threatened plants, (77) 6, (1977, reprinted 1982) and the List of rare, threatened and endemic plants (published for IUCN), are examples of its valuable work. Kew has a close connection with the latter, first issued in 1977 and revised in 1983. An Editorial by Dr. S. M. Walters, devoted to the List of rare ... plants is quoted in Chapter 14. (The monthly magazine Naturopa has been mentioned earlier in this chapter.) The role of the Council as an informational, advisory body is a valuable one.

NO BIOTOPE NO PROTECTION

Victor Westhoff

Diversity and limits of the flora protection system

The alarming increase in the impoverishment of European flora and vegetation can, in principle, lead to four different approaches which attempt to counteract it:

1. the preservation of species;
2. the use of botanical gardens as refuges for species;
3. education;
4. the conservation of habitats.

The rapid and accelerating changes in European land use during the last century, due to technical innovations as well as to population pressure and increasing outdoor activities, have brought about a situation in which only approach number 4 can be considered a proper, though not an adequate answer to the problem.

Measures for the protection of species have been enacted by legislation in many European countries. Such laws and by-laws, however, have a limited value; they aim to prohibit, partially or totally, the picking, destruction, etc. of rare plant species, but they do not have the power to prevent habitat destruction. This can lead to the absurd situation where a child may be prosecuted for picking gentians or orchids, while the entire population of the same gentians or orchids, on the same site, is legally destroyed by bulldozers for land reclamation. In practice, such species-preserving laws or by-laws are only effective in the case of plant species which are destroyed wholesale by commercial exploitation, e.g. for gardening or pharmaceutical purposes.

Botanical gardens undoubtedly have a specific responsibility to preserve species which otherwise would be exterminated. However, the survival of a plant species for the garden only is a poor substitute for the preservation of wildlife. Moreover, only a restricted number of species can

be preserved in gardens, many rare and sensitive, "stenoecous" species will not survive there. A third restriction is the vulnerability of this way of creating sanctuaries: it is entirely dependent on intensive care in a well-to-do society. Last but not least, it is hardly possible to maintain plant communities in botanical gardens. Some simple pioneer ecosystems, characteristic of dynamic or disturbed habitats, can be created artificially, e.g. eutrophic pools and reed-swamps, or road verges, but it is impossible to create all kinds of secondary and climax ecosystems in which the web of life is much more complicated and in which historical factors form a major part. Man cannot, however, deliberately reconstruct such biotic communities (e.g. bogs, grasslands on chalk, alluvial forests and other complicated stable environments) in a botanical garden.

The third answer, education, is likewise insufficient. As stated by Norman Moore in Naturopa No. 27 (1977), "despite a very real and desirable shift in opinion ... there is little evidence that education can produce the changes quickly enough to conserve wildlife; the economic and fiscal forces which operate in the opposite direction are too strong. Something more than education is required". This "something more" then has to be found in habitat preservation.

A major problem in habitat preservation is an adequate understanding of man's role in changing the face of the earth. As early as 1946 Edward Graham (Natural Principles of Land Use) proclaimed that such understanding should be the paramount preoccupation of nature conservationists....

Nature conservation must be a national aim

Finally we must stress that it will not be possible to preserve all plant species and communities in nature reserves, even in the ideal situation of enough representative reserves being established, with enough money and man-power to manage them properly. Even then reserves would not suffice. The long-established, historical, agrarian

landscapes with their small-scale diversity are indispensable for the maintenance of much of the European flora and vegetation. The main reason is that many species require larger or more "sophisticated" environmental dynamics than they will find in nature reserves. On the other hand, they cannot stand the disturbances of modern farming techniques. Such species find their habitats in extensively, more or less irregularly cultivated farmland, uncropped (ruderal) habitats on the farm or on the verges of irregularly trodden pathways ("off the beaten track"), or again in the fringes of woodland.

Total polarisation of agriculture and conservation would, therefore, be disastrous for the preservation of plant species and communities. A solution can only be found by a mixture of measures, as was clearly stated by Norman Moore (op cit). Most important will be the development of a national landuse strategy, which would state explicitly that the conservation of nature and landscape, as well as food and timber production are national aims.

V.W.

Naturoopa, No. 31, 1978.

NATURE AND ENVIRONMENT

Jean-Piere Ribaut

The Convention

The most important result of all the scientific work undertaken by the European Committee is undeniably the Convention on the Conservation of European Wildlife and Natural Habitats. Without the numerous studies on biotopes, management of the natural environment and the various European "red lists", this legal instrument would probably have never seen the light. It was ratified by nine EEC countries in autumn 1982 and the Standing Committee of the Contracting Parties has already held its first meeting. The European Committee is bound to find itself further involved with the Convention, since there is general agreement that its past experience has made it a scientific body unusually well-qualified to play a vital role in facilitating the operation and implementation of the text. Thus the European Committee's studies will make it possible to extend the appendices to cover freshwater fish and invertebrates; they will also help to ensure better protection for the most endangered biotopes, etc. Indeed, having regard to the vast aims of the Convention, all the Committee's activities are bound to help it to function effectively.

European network of biogenetic reserves

A wide range of studies will pave the way for establishment of the European network of biogenetic reserves, which is intended to conserve ecosystems and the biotopes of plant or animal species which are typical, unique, rare or endangered. But is there any real need for a new and systematic network of protected areas, at a time when UNESCO is developing its biosphere reserves (as part of the MAB 6 project) and, above all, when nearly every country has its national parks, nature parks (regional and otherwise), nature reserves and hunting reserves - the range of names

is vast! We should note, first of all, that the biosphere reserves include vast areas in which human activity is permitted. As for the national parks and other existing nature reserves, studies carried out by the Council of Europe and by individual countries have shown that these do not always include the most interesting or most endangered natural habitats. Why, for example, are national parks in Europe invariably located in mountain regions? Surely certain lowland areas also deserve to be national parks? They undoubtedly do - and one of the major merits of the European Committee's studies lies in pinpointing the glaring omissions which still exist in our European network of protected zones.

The potential uses of living species

It is essential that this network of biogenetic reserves should include specimens of all the species and varieties of European plant and animal life. Throughout the world, ecological diversity is on the decline: this trend is highlighted by the fact that 80% of all the world's foodstuffs is derived from 20 plant and animal species. At the same time, every species has its own potential uses, many of them unknown, but which may come to light by accident or as the result of prolonged research. In the Californian desert, for example, a bush - the ho-ho-ba - has been found whose berries yield an oil having practically the same properties as sperm oil. When one realises the economic importance of sperm oil (and thus of whaling!), the importance of this discovery becomes apparent.

The Japanese have found that the best detector of radioactivity is the simple spiderwort (Tradescantia virginiana), a garden flower whose cells may change colour when exposed to radiation.

As a final example of potential usefulness, we can take the water hyacinth (Eichhornia crassipes), whose reproductive powers, essentially vegetative, have made it a genuine scourge, since it can produce

further growth of up to 4₂kg (green weight) per day and per m² of water surface. It has recently been found that this very plant is capable of extracting up to 90% of the phosphates contained in waste-water. It can also be used to feed pigs, poultry and livestock. Finally, it can be processed into fertiliser or used to produce biogas. Scourge or not, it can thus prove very useful.

There are still enormous discoveries to be made in this field. This is why it is truly vital that we do everything in our power to protect the precious genetic resources which we possess in the animal and plant kingdom....

A scientific foundation

The studies carried out by the European Committee are also intended to provide a scientific foundation for the definition of development and management policies for our natural resources. The principles derived from these studies have been incorporated in the numerous recommendations adopted by the Committee of Ministers at the European Committee's suggestion. They have also, of course, been incorporated in the "wildlife" Convention. In spite of these efforts, however, the ecological situation of the countryside, for instance, is steadily deteriorating. In the old days, hunting was the principal threat to most of the vertebrate species. Mainly since the agricultural revolution, mechanisation, the spread of cultivation and the growth of one-crop farming, with the clearing of hedges and levelling of banks, have wrought profound changes in the European landscape. Woodland areas, too, have changed markedly. The results are clear for all to see: the landscape has grown poorer and duller and a frequently catastrophic swathe has been cut through plant and animal species. Where are the butterflies? Where are the shrikes, warblers and buntings which used to throng the hedges and wild banks along the country roads? Several of the Council of Europe's basic studies give a vivid picture, each in its own area, of this dramatic loss of ecological diversity in our surroundings....

Faced with an intractable economic crisis, our world is also facing a second, concealed, more insidious crisis, which is just becoming apparent and whose true extent we have yet to measure: the deterioration and impoverishment of our natural resources. It is not too late to put things right, but we must not wait too long. Scientists, in their work, are sounding the alarm. The time has now come for politicians, naturalists and men of goodwill to launch a crusade, to inform and to educate; for success and, in the long term, the survival of humanity depend on an evolutionary - indeed a revolutionary - change in the outlook and conduct, not just of politicians and other community leaders, but of every living individual.

J.-P.R.

Naturopa, No. 42, 1982.

Resolution (77) 6
ON THE CONSERVATION OF RARE
AND THREATENED PLANTS IN EUROPE
(adopted by the Committee of Ministers on
21 February 1977)

The Committee of Ministers,

... Recalling that man and all animals are dependent for their survival on the plant kingdom;

Recognizing that plants (species, sub-species, varieties, etc.) form a genetic resource of immeasurable value to mankind and that the economic potential of the plant kingdom is as yet only partly realised;

Recognising the scientific, educational, recreational, aesthetic, cultural and ethical value of plants to mankind;

Noting that the list includes some 1,400 species as rare and/or threatened in Europe, of which more than 100 are in imminent danger of extinction and that the figure of 1,400 represents approximately one tenth of the total European flora;

Realising that once a species becomes extinct, it cannot be recreated by man, and hence that it is of the utmost importance to ensure the conservation of as many species as possible for the economic, scientific and cultural benefit of mankind;

Recommends that the governments of member States of the Council of Europe be guided in their policy in this matter by the principles set out below:

1. ensure adequate legal protection for all plants identified as endangered in the above-mentioned list with provision for licences to be issued for approved collection purposes;
2. provide minimum legal protection for all plants against depredations not yet covered by law;
3. institute or complete national surveys of plants that are rare or threatened within their boundaries for appropriate dissemination and publication. Such surveys should:

- a. include plants that are rare or threatened only in particular countries and therefore not included in the list;
 - b. identify the principal threats to the plants so listed;
 - c. specify the action needed to ensure their survival;
4. establish nature reserves and designate areas in which vegetation and flora are protected by law and stimulate the setting up of nature reserves by private bodies, with the long-term aim of ensuring that all species on the list can be found in such areas and in so doing contribute to the establishment of the European network of biogenetic reserves which was the subject of Resolution (76) 17;
5. incorporate safeguards in future planning strategies to protect all species on the list, as the major threat to many plants is created by changing patterns of land use;
6. stimulate, undertake and co-ordinate through competent organisations multi-disciplinary research at national or international level, with particular emphasis on bringing together information on plants found in more than one country with a view to:
 - a. extending and improving knowledge about the flora of those areas in Europe that are still insufficiently known botanically, so as to be able to make constructive proposals for conservation and planning purposes;
 - b. promoting studies on the habitat, autoecology and population biology of each plant on the list to provide the information needed from which integrated conservation management plans can be formulated;
 - c. promoting studies on the dynamics and ecology of the vegetation types in which the plants on the list occur.

7. Give appropriate support to scientifically based botanical gardens so that they have the facilities they need to propagate and grow the plants on the list and to distribute the propagating material to other institutions and where appropriate re-introduce plants to the wild, with the aim of reducing the pressure on wild plant populations and at the same time drawing attention to the aesthetic, cultural and scientific importance of these plants;
8. Ratify for their states, if they have not already done so, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, opened for signature in Washington on 3 March 1973;
9. Acknowledge that the plant kingdom is a dynamic system and needs to be monitored at stated intervals so that the list can be revised regularly;
10. Prepare and disseminate codes of conduct on rare and threatened plants;
11. Disseminate general information on the need to protect plants and on the protective measures set out in the European Committee's list.

Naturopa, No. 31, 1978.

Chapter 3

Chapter 3

PLANTS FOR TEACHING AND FOR RESEARCH: teaching of botany, supplies of plant material, research into taxonomy, experimental botany

Modern botanical gardens have their origin in several different types of earlier garden. One of the major functions of these early institutions was undoubtedly the scientific collection of plants which was maintained to instruct students of medicine in the properties of the herbs which they would need to use as drugs in treating sickness. It was of the greatest importance that they should learn to recognize the plants individually and to know the properties which each one had (or was believed to have) in curing disease. Such gardens were known as physic gardens and some still retain this name in their present title, e.g. the Chelsea Physic Garden, and, until the nineteenth century, the Oxford (now Botanic) Garden, famous as the oldest in England. The hortus medicus was, in its early stages, closely connected with Faculties of Medicine, since it was intended for instruction and study, for doctors and medical students. Later, with the acquisition of new plants from overseas in great numbers, the attachment of botanical gardens to Medical Schools became less marked and such gardens were transferred to the care of Professors of Botany, the focus of these gardens having become scientific rather than medical. They then had the function of a collection used to instruct students examining the

plants from a scientific rather than a medical point of view.

Present-day universities, with their double purpose of teaching and research, continue this tradition. The modern student of botany needs to see living plant collections as well as dried specimens in the herbarium. The university botanical garden is therefore an integral part of a Department of Botany.

In these circumstances the first priority is providing for the needs of the Department, whether in teaching or in research. This does not mean that University botanical gardens do not, and should not, carry out other activities. A number of them are open to the public, especially, it appears, in towns where there is no municipal botanical garden. These university gardens are paying considerable attention to amenity and public education. Their activities in these fields are discussed in later chapters.

Nevertheless, if the point is raised, as it is from time to time, that botanical gardens need to justify their existence in terms of value for money, the contribution which university gardens make in the work of a Department of Botany is sufficient to remove them from any suspicion of being expendable luxuries. Some university gardens are almost entirely restricted to the teaching and research work of their own Department, and this situation is sometimes indicated by their name of 'Experimental' Garden rather than that of Botanical Garden.

Without going into detail about the scientific work in which gardens are involved, this chapter discusses the different aspects of their activities in the capacity of open-air, or glasshouse, plant collections. Some of the experimental work in progress in these gardens is also referred to, though this is intended as a sample only and is not comprehensive.

The collection of dried plant material in the herbarium is also of major importance in both teaching and research. The greatest herbaria in this country are at the British Museum (Natural History) and at Kew. Smaller collections serve a practical purpose in other institutions, especially when they contain specimens of the local flora, some species of which may no longer be found in the district.

The emphasis of this account is particularly on the changes which have taken place in recent years, and which continue to occur in botanical gardens. It is worth noting, however, that the functions of teaching and research are in no sense new but are in a long-established tradition. The content of the teaching and the objectives of the research are set in the context of modern scientific knowledge, but the functions themselves are basically the same as in the past. They provide an element of continuity where many things are rapidly changing.

If the amount of plant material required for teaching

purposes justifies it, a garden may exist specifically to satisfy such a demand. The Botanical Supply Unit of London University at Egham (Englefield Green) is a good example. Similar arrangements may be advantageous for classroom supplies in schools; in some cases they already exist.

At Hanover there is a very successful arrangement in operation. A central unit supplies plant material to all the schools in the town, an economical mode of operation much to be recommended. It is not necessarily the function of a botanical garden to carry out such a scheme, however, and if space is limited it may not even be advisable to attempt it.

This function of providing plant material for education and study is easily appreciated. No attempt at detailed discussion of individual research projects on plants is made here, though no detraction is implied from the importance of this function. Since research is one of the main constituents of academic work, it is obviously in the botanical gardens of universities and of other educational institutions that experimental botany is likely to be pursued, rather than in the municipal botanical gardens. In the latter the purpose is different, because of their differing origin and role in relation to the community.

The distinction to be made between 'pure' research and research which is carried out for definite economic reasons is not always as clear-cut as it might

seem. Research specifically motivated by some economic purpose, whether connected with food, medicine, domestic or commercial uses, is discussed in Chapter 4. 'Pure' research, originally undertaken to increase scientific knowledge, may well, of course, result in discoveries which later prove to have important practical uses.

At a time of financial stringency it is understandable that work directed towards a definite commercial end may receive more favourable treatment from the bodies responsible for funding such projects. Nevertheless it would be unwise to accept too easily the idea that research for its own sake is expendable. Valuable advances have come in the past from work which looked unlikely to produce economic results, and even if it is not given the highest priority it would be short-sighted to discontinue it. This problem affects mainly the gardens of academic institutions. In botanical gardens administered by local authorities, research normally forms only a small part of the activities and so this particular problem scarcely arises.

Any assessment of the importance of the research function in botanical gardens needs to recognize that other bodies are also engaged in scientific research on rather similar lines. The Experimental Horticulture Stations of MAFF carry out research to assist commercial growers of vegetables, fruit and flowers and to find new and better varieties for the market. They undertake detailed programmes on which they report to the horticultural trade; they also hold open days at the various stations, which growers can

attend. The responsibilities of the Forestry Commission include 'pure' as well as economically-based research on trees, especially conifers. Their research stations, for example the one at Alice Holt Lodge, carry out research of very considerable importance.

The research aspect of the modern botanical garden's work is different from the situation in earlier centuries, when the institutions mentioned above did not exist. While the roles of the various organizations are similar, they are not identical, and it may be concluded that botanical gardens serve a research function that only they can exercise.

The 'education' discussed in this chapter is the scientific education of botanists and horticulturists. Professional training of horticulturists, leading to a formal qualification, is undertaken by the two national gardens, at Kew and Edinburgh. Horticultural education is also provided at colleges of Agriculture and Horticulture, a number of which have interesting and important special plant collections.

The educational services provided for the general public (e.g. talks and demonstrations), whether in botanical matters or in gardening practice, are treated in Chapter 7 on Public information and education services, public recreation facilities.

An interesting custom connected with the training of young gardeners at Kew still survives. This is the annual 'Clog and Apron' race for apprentices, held for many

years. It is described in a Press Notice as follows:

The event recaptures some of the ancient apprenticeship traditions and colour of former days. The competitors - all of whom work at the Royal Botanic Gardens, Kew - dressed in horticultural aprons and heavy clogs, will pound the full length of Broad Walk, a wide, 375 yard long avenue running between the Palm House Pond and the Orangery, constructed in the 1840's to a design by W. A. Nesfield, the famous Victorian landscape gardener. Lady students are given a 50 yard start.

It is pleasant to find a traditional custom still being observed when so much has changed in the horticultural world. To maintain some links with the past seems specially important at a time when technology is developing so fast that it is difficult for the ordinary man and woman to understand its implications.

One sign of changing attitudes to the public, on the part of gardens formerly devoted entirely to research, may perhaps be found in the opening of Chelsea Physic Garden for a few hours each week. After the centuries when it was restricted to research workers and students, the new managers decided to allow the public restricted access to it as from April 1983. A new administration has led to different conditions. This made the decision easier and more desirable than it would have been formerly. Initially the garden was opened only on Wednesday and Sunday afternoons and at Bank Holidays.

Botanical gardens are sometimes accused of thinking

only about their research, thus preventing the public from enjoying the amenities which the gardens can offer. This is not an easy choice, however, and the problems of the gardens' owners and/or managers should be sympathetically understood. The conditions needed for research projects do not always combine easily with the presence of visitors. It is not necessarily a desire for exclusiveness which leads to gardens being closed to all but a restricted few. Opinions vary according to the point of view of the individual, both within the gardens and in the community. Some compromise seems the best solution that can be found.

Modern Research Projects

The following list is a selection of current or recent research projects at botanical gardens in Great Britain. The choice of projects has been made from those mentioned in replies to Grenville Sheringham's questionnaire in 1982, with regard to the research activities of the gardens.

Replies showed a wide range of research schemes, and they have been chosen to demonstrate something of the variety of important work currently being carried out. Predictably, some of the research in progress reflects the special knowledge and interests of the staff of the Department of Botany, possibly that of the Head of Department. Such work as the preparation of Floras and plant identification is found particularly, and expectedly, at Kew and Edinburgh.

Some similarities appear, however, between the type of research being undertaken at different institutions. This is especially so in the gardens of academic establishments, since the work of the garden is there geared to the specific needs of the academic department.

Acknowledgement has already been expressed to Mr. G. Sheringham, for permission to include this information, which he collected when he was preparing his series of articles for GC & HTJ magazine.

The projects fall into various categories, such as:

Taxonomy: taxonomic work on selected families and genera, identification (Kew), reclassification (Edinburgh), work on preparation of Floras (Kew)

Biosystematics

Fern work (pteridological)

Ecology

Pollination ecology

Cytology

Genetic studies: plant breeding (especially Egham)

Plant pathology: work on fungal diseases; Mycology

Parasitism

Palatability of plants for snails etc.

Experimental horticulture. Economic value of plants.

Full entries for the research projects selected for inclusion here are given below, as they were set out on the questionnaire returns.

Research in Botanical Gardens

Germination of British orchids

(Bristol University)

Includes taxonomy of Geranium and work for the new European Garden Flora

(Cambridge University)

Flowering behaviour of field beans

(Durham University)

A long programme of study of mutants produced by hard radiation just finished. Joint study with RHS into loss of rust resistance in Antirrhinum and subsequent breeding programme. Storage problems in the carrot. Plant breeding improvement in Teff (Eragrostis abyssinica) varieties (Ethiopia). Striga parasitism on Sorghum. Orobanche parasitism on several different economic species. Fungal diseases on Pistachio. Investigation of the cause of grain sprouting in the head of Wheat, and a possible cure. Several different taxonomic problems. 12 different seed multiplication projects.

(EGHAM - London University Botanical Supply Unit)

(ENGLEFIELD GREEN)

Mycology. Several investigations into important fungal diseases, i.e. Rhizoctonia solani on lettuce; Ascochyta fabae on beans; Sclerotium cepivorum on alliums; Phomopsis sclerotioides on cucumbers. Antibiotic production by Rhizoctonia spp.

Genetics Unit. Cyanogenesis.

Ecology. Internal aeration in roots.

(Hull University)

Herbarium - 4-5 million dried plants, 35,000 preserved flowers in jars, fruits and seeds for preparation of floras and other taxonomic work and identification (50,000 a year). Staff botanists assisting on floras of Cyprus, Iraq, East Africa and elsewhere.

'Kew Bulletin' records current research.

'Index Kewensis' records new generic and specific name changes.

Library - nearly $\frac{3}{4}$ million items, many old and rare. Annual bibliography published.

Jodrell Laboratory - research, mainly anatomical. Currently looking at problems of seed germination - important for conservation.

(Kew Royal Botanic Gardens)

Ecological

Pathological

Biosystematic

Pteridological

(Leeds University)

Taxonomy of Ribes and of various European grasses, including Festuca and Brachypodium. Photobiology of plants.

(Leicester University)

Natural selection due to extreme environmental conditions, e.g. lead, copper wastes, sulphur dioxide - separate experimental area can look irrelevant to public. Created artificial 40 yard by 40 yard waste site - annual meadow grass. Use of some herbicides - effect on plants. Development of resistant crops.

(Ness Gardens, Liverpool University)

An enormous variety, from cytological/genetical work on, e.g. Koeleria to work on NFT [Nutrient film technique], crop growth, plant pathology etc.

(Manchester University)

- 1) Taxonomy of Genisteae
- 2) Taxonomy of Viciae
- 3) Biosystematics of Silene
- 4) Aphid ecology
- 5) Beetles on cereals
- 6) Genetics and behaviour of blackbirds
- 7) Pollination ecology of Ulex, Cytisus etc.
- 8) Plant palatability experiments
- 9) Vicia and Psophocarpus plant breeding
- 10) Cereal rusts
- 11) Bee keeping, also Reptile and Amphibian enclosures

(University Botanic Garden, Southampton)

Conifers and Rhododendrons
Rhododendrons - reclassification, taxonomy
Gesneriaceae
Gingers - taxonomy, distribution
Conifers

(Royal Botanic Garden, Edinburgh)

Some orchid research

(Glasgow City)

Taxonomy of wild British Composites such as ANTHEMIS, CHRYSANTHEMUM, and these plots are located in the main Botanic Garden.

(Swansea University College)

Chapter 3

Reference Material

- 1) Walters, S.M., The shaping of Cambridge botany (1981)

The formal teaching and the research carried out in the botanical garden of a university or college are the responsibility of the academic department concerned.

Literature on the subject, often in periodical form, is usually of a specialized scientific nature and is outside the scope of the present account.

This authoritative history of the Cambridge University Botanic Garden by its Director, with a chapter on the modern garden, can, however, be enjoyed by the general reader as well as by the specialist.

Predictably, great emphasis is placed on the invaluable Cory Bequest which has made possible many important developments during the modern period of the Garden's existence. The name of Reginald Cory is commemorated by Cory Lodge, the house which is the official home of the Garden's Director. Dr. Walters writes:

The happy, successful partnership of John Gilmour as Director and Bob Younger as Superintendent in the task of extending the Garden to its total site is such recent history that the process they so effectively initiated and shaped is not yet quite complete. So far as University teaching and research are concerned, the combination of Cory money and new direction brought about within ten years the realisation of the vision that Bateson had had half a century earlier, namely the establishment on the former allotment land of the present 'Research and Experimental Area',

including a new laboratory and service building erected in 1956 and its adjacent glasshouse and field plot facilities. Within the Garden itself, the new Director instituted a two-year student gardener training scheme, which happily combined the need for a larger labour force with the provision of valuable training in horticultural botany. For the general public, the 'new look' was most obvious in the construction of the limestone rock-garden by the Lake, and in the entirely new features in the 'New Area', such as the scented garden and the unique chronological bed....

In these, as in several other ways, we can now see the Garden fulfilling a role not essentially different from the one which Walker and Henslow in their different periods foresaw, perhaps more consciously and, so far as conservation is concerned, more urgently and practically. The new concern for an ecologically-based conservation role is particularly fitting in the Tansley tradition, for the whole of the official provision for the conservation of nature in this country is heavily indebted to Tansley, who typically saw the need and offered both an outline scheme and his personal service in the post-war establishment of the Nature Conservancy. As a representative of that generation - the first - which grew up in an atmosphere of concern for the fate of wild plants and animals, I can see my personal indebtedness to Tansley through the influence of his pupil, Sir Harry Godwin. A Cambridge tradition of enthusiasm for the whole plant 'in the field', involving scientific study in the garden and in the laboratory, is something which I have come to appreciate with increasing force over the years: it is a tradition which shows every sign of helping future generations as it undoubtedly helped past ones.

- 2) Mason, Jerry, Chelsea's four acres of physic.
New Scientist, 19 April 1984, pp 40-1.

This interesting account was written to mark the beginning of the second year in which Chelsea Physic Garden opened its doors, for a few hours a week, to the general public. The first year's opening had proved a considerable success.

The article mentions a number of important research projects, some based at the Garden in the past and some which are current. The account also refers to some of the very unusual plants and trees to be found there. It is illustrated with general views of the Garden, as well as with some close-up photographs of plants.

Chapter 4

Chapter 4

ECONOMIC BOTANY (1): plants with domestic and medicinal uses

The gardens of monasteries and convents, where plants were grown for medicinal use in the religious community and for treating local people, are one of the origins of the modern botanical garden. From the Middle Ages until the Dissolution of the Monasteries, herbs were cultivated in monastic gardens, their curative properties known and the knowledge handed on. After the Dissolution, country people were left without this care and began to grow herbs in their own gardens, for medicinal and other domestic purposes, on a much wider scale. This is the origin of the traditional cottage garden so well known outside this country as an essential part of the English country scene.

Of interest is the recent revival in herbal remedies and the frequent publication of books on herbs. Such remedies have always been available, from herbalists, for those who preferred them to more usual drugs, but recently the demand has grown. New herbal and health food shops are opened. Articles in the popular press on herbal remedies are not uncommon.

One old-established firm in Sheffield, founded many years ago, has reported that business at present is excellent, with new customers being added to the regular ones. A lengthy feature article was devoted to this shop

in the local press. A journal, The Herbalist, specializes in information on herbal remedies.

On a wider scale, it has been recognized that there must be very many other plants, of potential use to man as cures for various diseases, whose healing properties are not yet known. So-called 'primitive' peoples have been using medicinal plants for centuries and so have experienced their effects over a long period. It is being increasingly realized in western countries that knowledge of these plants needs to be discovered while the people of these tribes and the plants themselves still exist. The study of only a few herbs which seem to be yielding valuable results in this country suggests that many more potential remedies might be available. The great cost of the research required to discover perhaps only one plant of medicinal value seems a strong additional reason for trying to get such information quickly from the native peoples which may point research in a profitable direction.

Herbaria can be searched for the same purpose, as has been done in the United States, where an attempt was undertaken to find plants potentially useful as drugs (p 64, Harvard investigation).

The advantage of consulting the native peoples, especially in the Amazon basin, lies in the fact that they have already used the drugs for many centuries. The need for lengthy testing is widely recognized, before

new drugs can be safely used as everyday remedies, but this type of enquiry would reduce the need for such testing.

The discovery of new herbal drugs from tropical sources is probably not something likely to involve many botanical gardens in Great Britain. Kew Gardens are always active in this field, as is the Chelsea Physic Garden.

The herb gardens which exist in botanical gardens in this country, or new ones being planted, are usually for the interest of students and the public, a type of demonstration garden or special collection, in fact. There is a herb garden in Cambridge University Botanic Garden, a fairly new one at Ness Gardens, and there are others in National Trust and in various privately-owned gardens.

Some botanical gardens may have connections in other ways with research into the use of plants as drugs. An interesting example was the former contract between Cambridge University Botanic Garden and ICI, by which the garden guaranteed to supply each year a quantity of plant material for research purposes. A member of ICI's staff was engaged on full-time research using this material.

Some of the new public interest is probably due to publicity given to plants, and their uses, on television. Several series of programmes have concerned the use of herbs for various purposes, including medicinally, and

have usually been accompanied by a book on the same lines, so that the information is made generally available.

One plant currently being investigated for its medicinal properties is the feverfew. It is a very old remedy, once used, as its name suggests, for reducing fevers. At present it is thought that it may be effective in the treatment of migraine attacks; clinical trials are being carried out. This topic was discussed in some detail during one of Richard Mabey's television programmes. The plant has also received considerable publicity in the daily press. Another use of feverfew might perhaps be in the treatment of rheumatism.

Not only has there been a significant revival of interest in plants useful for medicinal, culinary and other domestic purposes, but herb gardens as a form of horticulture have enjoyed renewed popularity. A well-made herb garden is as attractive as it is practical. Perhaps the link with the past, the continuing of a form of gardening practised through the centuries, adds to its appeal for the modern gardener. Kay Sanecki, one of the experts on the subject, wrote a chapter in the Victoria and Albert Museum volume (The Garden: a celebration of one thousand years of British gardening, ed by John Harris) included here in the bibliography. Her essay is discussed in the second part of this chapter.

Enthusiastic gardeners can get helpful ideas from

those botanical gardens which have included a herb garden in their collections. But botanical gardens have no monopoly of this feature; a number of other gardens open to the public also have a herb garden amongst their attractions.

A good example of the use of television in order to give information about wild plants was Richard Mabey's series of programmes 'Back to the Roots' (ITV, Channel 4, 1983). The series had an accompanying book of the same title, but which includes rather different material. The research for this series, as for most television programmes dealing with plants and gardens, seems to have been carefully conducted. Authorities and organizations are duly acknowledged. It would be difficult to overestimate the influence of even a single programme, since its potential audience is so large.

Back to the Roots considered not only the uses of plants but various aspects of conservation such as the risk to some fruits, vegetables and older varieties of roses, now in danger of disappearing. These topics are dealt with under Conservation (Chapter 8).

Television must be counted amongst the most important new factors affecting the world as a whole, and, not least, botanical gardens.

Chapter 4

Economic Botany (1)

Reference Material

In recent years a number of books have been published on herbs for the general reader. They cover the lay-out of a herb garden, growing the plants, and their uses for various domestic purposes, for example in medicine, cooking, dyeing and air-freshening.

These books are not directly relevant to the work of botanical gardens, but the trend is interesting, since their publication may be seen as satisfying a demand arising from reawakened interest. Alternatively, the books may create the demand; it is difficult to say whether such books precede public interest or result from it. Certainly there is an interaction, nowadays often fostered by television programmes.

The whole pattern of subject coverage in book production is interesting, though sometimes puzzling. There must be some reason why books appear in groups, frequently after a long interval during which nothing has been written on that particular subject. This can be unfortunate, since the best book does not necessarily appear first. An enthusiastic buyer may seize the first book if nothing has appeared for a long time in that field, only to find that a better work appears in the succeeding months. With money limited, this results in

a problem for the buyer, whether an individual or an institution.

A good example of the appearance of books in groups is provided by the case of ferns. Until recent years there was nothing up-to-date either on wild ferns or on garden varieties. One book then appeared, followed shortly afterwards by several others. It is difficult to account for this. Especially with regard to non-academic books, there may be no easy way for an author to know that others are working on the same lines; the waste of effort is regrettable.

A 'television' book by Richard Mabey ^{and Francesca Greenoak} on plants as herbs is 'Back to the Roots' (1983). It differs in some ways from the original programmes which dealt with more advanced scientific matters, such as, for example, current medical research on the efficacy of feverfew for migraine sufferers and the storing of seed supplies under deep-freeze conditions to safeguard genetic variation.

One of the most attractive of the general books is Richard Mabey's 'Plants with a purpose' (1977), illustrated by Marjorie Blamey. It is described as 'a guide to the everyday uses of wild plants' and includes notes on, for example, walking sticks, hop pillows and rushmats.

Eagle, Robert, Herbs: useful plants (1981)

This book, like Back to the Roots by Richard Mabey, is connected with a series of programmes, in this case on radio (Radio 4, 1981). Interesting information is given, including a reference to actual and potential research into using more plants medicinally, by studying herbarium material. An extensive investigation carried out at Harvard, under the direction of Dr. Siri von Reis Altschul in the early 1960s, led to the suggestion that a similar search might be made in this country. In such a search some botanical gardens, especially RBG Kew, could play a key part.

Robert Eagle says:

In the early 1960s a team of researchers at Harvard University led by Dr. Siri von Reis Altschul thought it might be interesting to look through the university's archives. These archives contained no less than two-and-a-half million specimen sheets which had been left with the university by botanists during the preceding two centuries. The specimen sheets gave the name of the plant, its habitat and notes on the uses, if any, to which the plants had been put by local people. The team set out to find all the plants which were alleged to have some value as food or medicine. After four-and-a-half years they had identified 5,000 plants from this collection which they thought would be worth taking a closer look at.

In Britain we have two major plant collections, at Kew and in the British Museum, which contain three times as many specimens as the Harvard collection. The eight million specimens come from all over the world and have represented the botanical research of more than three hundred years. The specimen sheets are

in many cases the only written record of the plant in question, because they were brought from places where the inhabitants did not write. Over the years many of these tribes have been wiped out or dispersed, taking their traditional knowledge with them: all that remains of their plant lore are the odd jottings of the itinerant botanists.

In 1980 pharmacist Dr. Peter Hylands of Chelsea College, London, and Dr. Malcolm Stuart, director of the Economic and Medicinal Plants Research Association (EMPRA) in Cambridge launched an appeal for funds to get these British collections investigated as the Harvard ones had been. Judging by the success of the Harvard study, Hylands and Stuart are confident that they should be able to identify 40,000 useful plants. They point out that the English collections are much bigger than the Harvard ones and that their study would not be confined to foods and medicines; if timbers, dyes and fibres were included the yield could be twice as large. They estimate that the project would cost about a million pounds, a tidy sum for running through the archives, but not so expensive if they were really able to identify 40,000 'new' useful plants.

Peplow, E. and Peplow, R. (1984), Herbs and herb gardens of Britain: a comprehensive guide, published in association with the Herb Society.

Elizabeth and Reginald Peplow have compiled an informative guide to many different aspects of the growing and use of herbs. The material is clearly arranged and has a glossary, so that the book is easy to consult. At the same time it is attractive in appearance. Some of the sidelights mentioned could well encourage the interested reader to pursue the subject further. The directory of gardens where there are collections of herbs is arranged regionally. The list includes botanical gardens such as Ness Gardens, RBG Edinburgh and Glasgow Botanic Gardens.

The following extract is taken from the publisher's note in the volume:

Elizabeth and Reginald Peplow introduce about ninety of their favourite herb gardens across Britain, savouring the individual flavour of each. They sample diverse herb gardens attached to abbeys, stately homes, universities, nurseries and the humble cottage, inviting us to share their knowledge and enjoyment of the harmonies of setting and design, form, texture and colour, and discover for ourselves these peaceful and invariably fragrant spots.

Chapter 4

ECONOMY BOTANY (2): plants of commercial importance

Botanical gardens overseas have, in the past, played an important part in the economic development of their home country. The transfer and acclimatization of plants as food crops, from one part of the world to another, has been a vital economic concern for various countries including Great Britain. This aspect of economic history is discussed by W.H.G. Armytage in the section entitled 'The Plantocrats' in his book The Rise of the Technocrats: a social history (1965). *

This has not been a function in which botanical gardens in Great Britain have been deeply involved, with the exception of Kew Gardens, where work of worldwide significance has been carried out. RBG Edinburgh has played an important part in the staffing of British colonial botanic gardens.

Plants are the source, directly or indirectly, of man's food supply. Their domestic uses mentioned in the first part of this chapter have caused country people especially to be well aware of the close link between plants and people.

At present much of the commercial research into improved types of vegetables, fruit and flowers, as mentioned in Chapter 5, is undertaken by bodies such as the Experimental Horticulture Stations (MAFF) and AFRC,

* Routledge and Kegan Paul, London.

and so is not the responsibility of botanical gardens. The gardens can, nevertheless, have useful and important links with these other bodies, and give them the benefit of research undertaken in the course of academic projects. At Sheffield University, for example, AFRC research is carried out in close co-operation with the Department of Botany.

Plants for economic uses in commerce and industry are also the responsibility of bodies other than botanical gardens. The Forestry Commission is responsible for carrying out both pure and applied research on trees.

This question of overlap with other bodies has already been mentioned (cf research function of botanical gardens, Chapter 3). It recurs later in the chapter on Functions of gardens: the problem of overlap (10). Duplication of effort and expenditure needs to be avoided, and botanical gardens must be seen as a part of a larger picture, not as existing in isolation. The point is a significant one, when the potential functions of botanical gardens in the future are being considered.

The picture is constantly changing. No institution can stand still; as change forms part of healthy development, botanical gardens, it can be assumed, will continue to evolve. Recent years have seen particularly rapid change in that evolution.

Some functions, therefore, have less significance nowadays than in the past, but new ones are appearing as

the rightful responsibility of modern British botanical gardens. There is no need to assume that their importance is lessened by the change; in fact it may well be greater for the community than in the past. It need not be a matter of anxiety that economic botany is not, apart from some research in academic institutions, a primary function in today's botanical gardens in Great Britain.

Although this study concerns British botanical gardens, it would be misleading to give the impression that their achievements are necessarily unique. Kew can probably claim, if any institution can, to have played a leading and influential part in the history of botanical gardens and their functions. Even then, it may be more a question of the scale of the undertakings rather than the fact that no other garden has pursued similar activities. Kew's vital role in the history of economic botany has been emphasized repeatedly. The Gardens are as important today as they have been in the past, in searching for and growing useful plants. Still regarded as the foremost botanical garden in the world, Kew's role in research into such plants is one of international significance.

In this function, the other botanical gardens in Great Britain are not involved in the same way as Kew. The Chelsea Physic Garden may play an important part in future. The facilities required for such scientific research are obviously very expensive to maintain, so that a state garden is the natural place for the work to

be based.

An occasional example of activities in a foreign garden is included here for comparison. For instance, the very important Spanish botanical garden at Orotava, Teneriffe, in the Canary Islands may be mentioned. The Canary banana was cultivated here and found to be so well suited to local climatic conditions that it eventually became the staple crop of the islands, thus making an invaluable contribution to their economy. The Garden was originally established for the acclimatization of plants brought back from the New World by Spanish explorers. Some of these plants were found to be too tender to grow satisfactorily on the mainland of Spain. Today the Garden still flourishes as a major tourist attraction, with a fine collection of tropical trees and shrubs.

An example of the continuing search for wild plants which may be useful economically is the hunt for the 'wild chocolate' tree. The search was reported even in the popular press. It is a reminder, not only of the wild origin of our everyday foodstuffs, but of the need to conserve the genetic base of plants and to explore even more energetically their potentialities, especially of plants of which our knowledge is not extensive.

Developments in biotechnology are helping to lead to the rapid production, by new means, of foodstuffs. Such research may bring a revolution in supplying the necessary food in the future. It is an area of science

where developments are so rapid that knowledge becomes out of date very quickly. Here again, programmes on television have helped to make new discoveries more understandable to the layman. Micropropagation, it may be said, is an aspect of biotechnology with great significance for the future of horticulture and gardens in general. For a number of plants, this new technique may well replace traditional methods of propagation, and indeed is already beginning to do so for some species.

Chapter 4

Economic Botany (2)

Reference Material

Brockway, L.H., Science and colonial expansion: the role of the British Royal Botanic Gardens (1980)

This detailed and thoroughly researched account is primarily a history of the invaluable part played by Kew Gardens in the economic development of plants in the world. The influence of Kew has been exercised in many different ways; the plant-hunting expeditions organized, the overseas gardens advised and directed, the experiments carried on at Kew itself are widely recognized.

By bringing the story up-to-date, Lucile Brockway shows that a continuing influence is exercised by Kew, as befits the most famous of all botanical gardens.

Writing about the importance of Kew in British, and world, economic history, she says:

Kew Gardens and the Scientific Elite

In examining the growth and development of Kew Gardens as the central institution of a global network of scientists specializing in economic botany, I hope to demonstrate the close connection between imperial expansion and government support for science. From its inception Kew Gardens had the support of the royal house and of influential men in the Cabinet and in Parliament. Parliament regularly funded Kew's annual budget and the budgets of the satellite gardens, which were charged to the Colonial or India offices. In the expansive mood

of the nation after the Napoleonic Wars and up to World War I, funds for science and colonial activity received high priority. Britain was in a period of prosperity and economic growth, the leading manufacturing and trading nation in the world. Domestically, she had been the first nation to harness capital, technology, and a large labor force in industry and to put her agriculture on a capital intensive, scientific basis.

Chapter 5

Chapter 5

HORTICULTURE: the acquisition and cultivation of plants in botanical gardens

Horticulture, in the literal sense of cultivating a garden, must be considered the essential function. Without it there would be no garden of any kind; maintenance depends on constant attention. Amateur gardeners know only too well how quickly the change from cultivation to wilderness can begin; a short absence on holiday may be sufficient to produce the first signs of the process. Even the wildest of 'wild' gardens needs some maintenance to prevent it from reverting to natural confusion. Horticulture, therefore, from the beginning of botanical gardens, has formed the basis for all their other activities.

In a wider sense, horticulture includes much more, implying the acquisition, care and frequently subsequent distribution of plants (and seeds). It may also involve the acclimatization of exotic plants, perhaps those intended for useful purposes although this is not often a function of botanical gardens in Great Britain. The emphasis in university and college gardens is usually on the scientific aspects of these activities.

It seems likely that in future the methods used in horticulture will be radically affected by new techniques. As earlier noted, micropropagation is already in use on a commercial scale for the rapid multiplication of plants.

In the meantime, good horticulture in the traditional manner remains of great importance.

The training of professional horticulturists, in the various sections of the profession, and at different levels of responsibility, has received a good deal of attention recently. Courses available are listed annually in GC & HTJ magazine, as well as in other reference works. The variety of options is wide.

The British botanical gardens involved in practical training are Kew and Edinburgh. Training is also available at universities (degree courses), colleges, and schools such as that at Threave (School of Practical Gardening) which is under the auspices of the National Trust for Scotland.

The administration of botanical gardens may be suitably discussed here. At management level the arrangements vary considerably from one type of botanical garden to another. In university gardens the overall responsibility may rest with the Head of the Department of Botany, under whom there is usually a curator, or a member of staff with a different title but fulfilling that role. There may be, as at Cambridge, a Director who is engaged full-time in supervision of the Garden.

In municipal gardens, the final responsibility usually rests with the Director of Recreation, Leisure, or Amenity (the titles vary considerably), and under his authority the garden is managed as a rule by a curator

who is allowed considerable autonomy.

Research on hybridization, to produce better varieties of flowers for the commercial market, is not usually a botanical garden's function. Reference has been made in Chapter 4 (under aspects of economic botany) to the work of the Experimental Horticulture Stations of the Ministry of Agriculture, Fisheries and Food. For example, two of the stations in the South-West, at Trewarne near Truro and in the Isles of Scilly, have done much work on the production of early flowers, especially bulbs, which are more disease-resistant and have superior colour and shape. The sale of such flowers is, of course, one of the main elements in the economy of that area of the country. The stations also keep in touch with growers and others in the Roscoff district of northern Brittany, which similarly produces early flowers, fruit and vegetables for the Paris market.

In addition to the work of the EHSs, many new and better, or at least different, cultivars are produced by commercial nurserymen, some of them well known specialist plantsmen.

Hybridization is also carried on in some private gardens, if the facilities and the interests of the owner make it possible.

It was in order to grow exotic plants in this country, however, that many botanical gardens were founded by private societies, mainly in the nineteenth century.

Plant-hunting expeditions were sent to little-visited parts of the world and returned with many hitherto unknown species. It was fashionable, though a genuine interest also, for the educated classes of the day to wish to see and study these new specimens.

This is another of the origins of the modern botanical garden, descended as it is not from one but from several predecessors. Most of the gardens founded, usually in the larger towns, as a result of this interest have now disappeared, though a few still exist. Birmingham is the only place where the Garden remains in the hands of the original private society. Elsewhere, the Garden has been taken over by the local authority.

Social conditions have changed so much since the time when these gardens were started that part of their purpose is no longer as important as it was. Easy travel and longer holidays for the population as a whole make it possible for people to visit distant countries, where they can see some of the plants for themselves. Films, especially on television, have enabled experts to show, in colour, plants in their natural habitats. Rapid air communications and modern methods of refrigeration make it possible for sprays of flowers flown from the other side of the world to decorate the tables at a dinner in London.

For all these reasons, the novelty of seeing strange plants growing and flowering in a botanical garden has

undoubtedly diminished to some extent. It should not be forgotten, however, that at the time of their foundation, in the eighteenth and nineteenth centuries, botanical gardens of this type provided considerable interest and pleasure for their visitors. And it is still true that there is satisfaction in seeing a growing plant rather than a film of the same plant. In a Garden time can be spent examining each specimen, whereas there may be only a glimpse of it during a film.

The same type of collecting and cultivation also took place through the initiative of private gardens. Expeditions were often sponsored by individuals with the necessary financial means, and there was a certain social status in having a better collection of plants and trees than one's neighbours. Many arboreta were made for this reason.

Botanical gardens are, therefore, not the only places where such horticultural activities have taken place. It is now much more difficult, however, than it once was for private owners to maintain large gardens, unless they use them commercially. Tom Wright's book Large gardens and parks (1982) deals very knowledgeably with this, a subject urgently in need of study.

The National Trust has rescued many gardens which might have disappeared or at best have lost their original importance. As garden owners and administrators, they set a high standard in horticulture, taking pains to

maintain a garden, or to restore it to its original state. They have the obvious advantage of advice from garden experts.

The overlap of activities between botanical gardens and other institutions and private establishments is a subject featured in this account, underlining the view that botanical gardens cannot be studied in isolation. Their interests are related to those of other sections of the community, and their value is increased by this involvement. They have no need to be unique to be important. Each different type of garden has its own aim and reason for existence. The English tradition encourages various organizations to exist side by side. Naturally, however, it is important that overlap should not lead to waste of money and resources.

Plant sales

The sale of plants, where the regulations of the Garden allow it, can be a useful source of income. The suggestion that botanical gardens might engage more widely in commercial enterprises is quoted in the final article of the interesting series by Grenville Sheringham in GC & HTJ magazine (1982). Financial problems can be serious ones, especially at present. Further possible developments, solely for commercial purposes, would doubtless have to be considered fully alongside priorities for other activities. (Seed distribution schemes are

mentioned elsewhere in this study.)

Plants which are specially connected with a particular garden can be sold to the public as a happy souvenir of a visit. Such plants might be thought of as 'specialities of the house', or, rather, of the garden. It would be unfortunate if the need to make money caused botanical gardens to lose some of their own purpose and resemble too closely the commercial nurseries which do a good job in this field. Botanical gardens, to survive, must retain those characteristics which make them different from other horticultural establishments.

In emergency conditions, engaging in commercial enterprises may be advisable, indeed necessary. It is not a completely new idea. An interesting incident involving a botanical garden in this connection occurred at the Berlin Botanical Garden in the middle of the eighteenth century. The Director, the Professor of Botany at the University, decided to use a part of the Garden as a tree nursery, in order to grow young specimens which could be sold to the public, so providing some badly-needed funds. It was the academic Director, Professor Gleditsch, who was enthusiastic about this scheme, and the Curator, a practical gardener, who bitterly opposed it. After attempting to prevent the idea from being put into practice, the Curator was helplessly obliged to accept it. The affair is mentioned in Timler and Zepernik (1978, pp 15-16).

The essential importance of horticulture in botanical gardens is emphasized by the authoritative comments of Edward Hyams, in his introductory essay to Great Botanical Gardens of the World (Hyams and MacQuitty, 1969). Horticulture, he says, has always been one of the major functions of a botanical garden. There can be no doubt that this will continue to be true.

Television garden programmes

The part played by the media in informing the public about plants and gardens is now so important that the subject could deserve a separate study.

A popular series by horticultural experts has been Gardeners' Calendar (ITV, Channel 4). The monthly visits to Wisley are devoted to practical advice, suitable for the average amateur gardener. The series started in its first year with fairly elementary material, developing later at a more advanced level, to keep pace with a gardener's own growing knowledge. The contributors are subject experts, who can adapt their knowledge to the needs of amateurs. The programmes also give an interesting glimpse of the work in one of the important gardens in this country.

The series is accompanied by a book with the same title. The custom of issuing books to accompany television programmes is no doubt commercially attractive. It is

also helpful to the serious viewer, reinforcing the programmes.

Plant names: meaning and pronunciation

Plant names are often pronounced in different ways; to judge by broadcast and televised programmes, this is not only by amateurs. Literature is available on the meaning and pronunciation of botanical Latin and Greek, for wild plants. Some attempt has also been made to rule on the pronunciation of cultivated plant names. Reference material is discussed in the bibliographical section of this chapter; however, some printed sources may not be easily available to the amateur gardener.

This matter is perhaps an opportunity for botanical gardens to assist; their practice is to label the specimens in their collections, so a guide to pronunciation, especially of 'difficult' names, might possibly be included for the non-specialist.

Glasshouses

New horticultural developments bring to mind the work carried on at Kew. The standard of excellence for which the gardens are famous is maintained by the new Alpine House. Visually striking, it is admirably suited to its function.

Such a structure is very expensive to build and to maintain. A state garden should have the best

accommodation for its unique collections. Elsewhere, if suitable glasshouses are not already available, it may be difficult for a garden to afford the expense from the funds at its disposal. The imaginative design of current British Government publications is illustrated by the leaflet issued to mark the completion of the new Alpine House. It is an attractive example of public relations through official printing.

Arboreta

Arboreta are included in the present study, as a specialized type of botanical garden. Arboriculture is therefore included in this chapter on horticulture.

Trees have a particular appeal for many professional horticulturists, as well as for amateurs, and several societies are devoted to different aspects of growing and studying trees. One intended for both amateurs and professionals is the International Dendrology Society (IDS). The Society, founded in 1952, gives its aims and objects as follows:

"The idea of a Society to bring together dendrologists of all countries arose between Mr. Robert and Mr. George de Belder, Dr. Gerd and Mrs. Krüssmann and Mr. Jacques Lombarts, during a drive in Belgium on 7 May 1952. By the time of the first General Meeting, on 17 and 18 September of that year, at which five countries were represented, there were some 50 members. Now it is 44 countries and 750 members.

A news bulletin called Dendron was published in 1954, followed by a series

of News Letters, 16 of them. These were replaced by Year Books from 1966. The original name, the International Dendrology Union, was changed to International Dendrology Society in 1965.

The aims of the Society are to promote the study and cultivation of woody plants, and to preserve and conserve those that are rare and endangered. Members do not need to be scientifically qualified or be specialists, but must have a serious interest in trees."

The Yearbook is useful as a reference work.

Visits are arranged each year to gardens abroad and shorter trips in Great Britain, including botanical gardens. These visits and excursions are fully reported in the Yearbook.

Chapter 5

Reference Material

A clear historical account of the horticultural aspects of botanical gardens is given by B. F. Bruinsma (Leiden Botanic Garden, Netherlands), in an article entitled 'Past: aims and objectives', a paper read at the First Kew Conservation Conference in 1975. It has particular relevance to the history of gardens attached to academic institutions. The general lines of development are similar in the older university gardens of Great Britain and of other European countries.

Codes of nomenclature

For botanical gardens, the two official codes of plant nomenclature are important reference works: the code for wild plants (known in brief as the 'Botanical Code') and the code for listing cultivars (the 'Cultivated Code').

An extract from the 1980 edition of the 'Cultivated Code' is quoted below, with publishing details.

Both codes are revised and reissued from time to time.

Changes in the naming of plants, a source of inconvenience to botanists and gardeners, professional and amateur, are made necessary by fresh knowledge in the subject, and historical research.

General Considerations and Guiding

Principles

Article 2

The International Code of Botanical Nomenclature (Botanical Code) governs the use of botanical names in Latin form for both cultivated and wild plants, except for graft-chimaeras.

Categories and Their Designations

Article 10

The international term cultivar denotes an assemblage of cultivated plants which is clearly distinguished by any characters (morphological, physiological, cytological, chemical, or others), and which, when reproduced (sexually or asexually), retains its distinguishing characters.

The cultivar is the lowest category under which names are recognized in this Code. This term is derived from cultivated variety, or their etymological equivalents in other languages.

Note 1. Mode of origin is irrelevant when considering whether two populations belong to the same or to different cultivars.

Note 2. The concept of cultivar is essentially different from the concept of botanical variety, varietas. The latter is a category below that of species. Names of botanical varieties are always in Latin form and are governed by the Botanical Code. Rules for the formation of cultivar names are set out in the present Code.

Note 3. The term cultivar is equivalent to variety in English, variété in French, variedad in Spanish....

Note 4. The terms cultivar and variety (in the sense of cultivated variety) are exact equivalents. In translations or adaptations of the Code for special purposes either cultivar or variety (or its equivalent in other languages) may be used in the text.

Note 5. Usually a cultivar will comprise a part only of the species, botanical variety or other botanical category under which it is classified. A cultivar may however be co-extensive with any of these.

Note 6. When a forestry provenance is clearly distinguished by one or more characters and, when reproduced, retains its distinguishing characters, it may be treated as a cultivar.

Article 11

Cultivars differ in their modes of reproduction.

[Five examples of distinguishable categories are given.]

International code of nomenclature for
cultivated plants - 1980.

Formulated and adopted by the International
Commission for the Nomenclature of Cultivated
Plants of the IUBS. Edited by C. D. Brickell
et al.

- 1) The New York Botanical Garden Illustrated
Encyclopedia of Horticulture (1980-1982)
by T. H. Everett, 10 vols.

This is a major English-language reference work, prepared from one of the great botanical gardens in the world. In view of the high cost of producing such a series of volumes an enterprise such as this can only be undertaken very occasionally. It is now many years since the Royal Horticultural Society issued its Dictionary of Gardening (in 1951-6 and 1969). The RHS set of 6 volumes remains a standard reference work, but there have naturally been many changes in the world of horticulture in the intervening years.

The New York Encyclopedia contains some fine colour photographs, though many are in black and white only, surprisingly perhaps, considering the value of coloured illustrations in this subject.

... the complete encyclopedia will doubtless be a work of tremendous value to anyone connected with horticulture, both amateur and professional.

Kew Bulletin vol. 37, no. 2, 1982.

- 2) Prest, John (1981) The Garden of Eden: the Botanic Garden and the Re-creation of Paradise

John Prest's book has an unusual theme. Briefly, his theory is that men searched for centuries for the site of the original Garden of Eden, and, having failed to find it, started to recreate small-scale reproductions of Paradise for themselves by collecting plants from all parts of the world and arranging them in botanical gardens. This is his explanation of the geographical arrangement usually attributed to scientific needs. The symmetrical layout he considers is due to the four continents, all that were then known. As an Oxford man, he devotes a considerable part of his book to Oxford University Botanic Garden. The fine illustrations mostly depict biblical subjects.

John Prest has expounded an original idea, with which others may or may not agree. The publishers' notice reads:

Throughout the middle ages people believed that the Garden of Eden still existed. With the 15th century voyages of exploration hopes ran high that the Garden might yet be rediscovered. As the 16th century wore on, and no authentic Paradise was found, men began to think, instead, of searching the globe for the scattered pieces of the creation, and collecting them together into Botanic Gardens. This book explores the development of the Botanic Garden in Europe and shows how the famous early gardens in Paris, Oxford, Padua, Leyden and Uppsala sought to re-create the Garden of Eden.

The book was reviewed by S. M. Walters in Nature, Vol. 296, 22 April 1982.

A television series, in the summer of 1984, also linked gardens with the idea of Paradise. This was In Search of Paradise (Channel 4), a history of the great garden styles, up to modern times, with some references to botanical gardens.

In both these cases the word 'Paradise' is used in the biblical sense.

There is, of course, another meaning of the word which links it even more closely with gardens. This is the use of 'paradisus' in the sense of an enclosed garden or park, as in John Parkinson's Paradisi in sole, paradisus terrestris of 1629. This title is a play on words (Paradisus in sole = Park in sun), a 'conceit' of which writers at that time were particularly fond. 'Paradise' in this case is an idea of Persian origin.

There is a considerable difference between this type of 'earthly paradise' and the theological concept behind the book by John Prest, discussed above. The link between Paradise, the Garden of Eden, the first garden according to the thought of Western man, and gardens in general, often considered as earthly retreats of peace and happiness, is an understandable one.

It is worth examining the entry in the Oxford English Dictionary for the word 'paradise'. The origin is given as follows:

Used in Gr. (first by Xenophon) for a (Persian) enclosed park, orchard,

or pleasure ground; by the LXX for the garden of Eden, and in N.T. and Christian writers for the abode of the blessed, which is the earliest sense recorded in Eng.

The various meanings relevant to the present aspect are listed as:

1. The garden of Eden. Also called earthly paradise, to distinguish it from the heavenly paradise.
2. Heaven, the abode of God and his angels.
 - b. The Mohammedan heaven or elysium.
3. A place like or compared to Paradise; a region of surpassing beauty or delight, or of supreme bliss.
4. An Oriental park or pleasure-ground, esp. one enclosing wild beasts for the chase. Hence sometimes applied to an English park in which foreign animals are kept.
5. A pleasure-garden in general; spec. the garden of a convent. Obs.

3) Wright, T.W.J. (1982). Large gardens and parks: maintenance, management and design

The subject of this well-planned book is the cost-effective maintenance of large gardens under modern economic conditions, with even the possibility of making a profit by various commercial enterprises. The book does not deal specifically with botanical gardens, but since these usually are large gardens, the author's recommendations on dealing with high labour costs by using modern machinery and techniques could be applicable.

Tom Wright, a lecturer at Wye College, is professionally well equipped to tackle this subject, which had not previously received much attention in the literature. He includes case studies of large English and French gardens, those usually still in private hands. Particular attention is given to gardens open to the public, including suggested methods such as plant sales to help with maintenance costs.

The layout and arrangement are particularly clear, so that the book is easy to consult.

4) Macleod, Dawn (1982). Down to Earth Women

Women have played an important part as practical gardeners for a long time, as an example, the nuns in medieval convents who grew plants for their own community and for the neighbouring villagers who depended on them for medicinal herbs.

This book's connection with botanical gardens arises from the account included of the original women gardeners at Kew, the 'women in bloomers', a source of considerable interest to passers-by.

The author, herself a practical gardener, was for many years Mairi Sawyer's assistant at the famous garden at Inverewe in Wester Ross, created by Mairi's father, Osgood Mackenzie.

4a) A study of the position of women in horticulture today was carried out by Sue Gregory, then a horticultural

student at Kew RBG. Her thesis, entitled Women in horticulture, was reported in GC & HTJ magazine, in two articles by Sue Gregory, on 18 and 25 June 1982.

The account investigated the career prospects of women at various levels in the horticultural profession, including their salaries, and the prejudice (justified or not) shown against them as practical gardeners because of their physique.

5) Koppelkamm, S. (1981). Glasshouses and Wintergardens of the Nineteenth Century

Botanical gardens are traditionally associated with glasshouse design. Some of the best examples were created for great botanical gardens, while private gardens, such as Chatsworth, have also played an important part in their development.

Cultivation of tropical plants has been generally thought to be a function of a botanical garden, so that glasshouses have become to some extent a popular symbol. A recent fine example of a modern glasshouse was, however, erected in Roundhay Park at Leeds, a public park. There is no municipal botanical garden in that city; the new glasshouse is intended for exotic plants, grown for the interest of the public. This is, in fact, the sort of function which led to the foundation of some nineteenth-century botanical gardens.

The book has full-page photographs of structures

from different countries. The illustrations are an important part of this interesting and attractive book.

- 6) Lemmon, Ken (1983). Harlow Car. The Garden, March, pp 85-90.

This informative article about the Northern Horticultural Society's garden is by a well-known horticultural author who also gave lectures on gardening and garden history. He was in addition Honorary Editor of the Northern Historical Society. Ken Lemmon died in February 1986.

The article is illustrated with several colour photographs of the Society's grounds.

The following note forms the first paragraph of the article:

It was the ineradicable difference in climate and the upsurge in the popularity of gardening after the last war which led to the creation of the Northern Horticultural Society and its trial grounds at Harlow Car, Harrogate, as a northern horticultural station. Although the NHS did not start until 1946 at an inaugural meeting in Manchester, during the first world war Sir Frederick Keeble, a former Director of Wisley, came north to help to spread the idea of a northern trials ground among members of the North of England Horticultural Society who run the popular Harrogate Spring and Autumn Flower Shows.

An official guide to the Harlow Car Gardens is also available.

- 7) Mitchell, A.F. and Westall, A.W. (eds) (1972)
Bedgebury Pinetum and Forest Plots, 4th ed

Arboreta are included here, and consequently pineta, which are a favourite form of arboretum, never restricted, in practice, to pine collections. The Forestry Commission currently has responsibility, amongst its functions, for promoting the more economic production of softwood timber and also for scientific research into growing coniferous trees.

Bedgebury, the site of the National Collection of conifers, plays a considerable part in forestry development in Great Britain.

Although scientific research is carried on at Bedgebury, provision is also made for the public, experts and general visitors, seeking information combined with amenity.

- 8) Coombes, A.J. (1985). The Collingridge dictionary of plant names

This is a useful reference book, giving information previously not easily available.

Plants grown in gardens are the subject, including some wild species. The pronunciation, derivation and meaning of botanical names are covered. Entries are arranged in a single alphabetical sequence; a very helpful feature is the cross-referencing from popular to scientific plant names.

As the book is intended for horticultural rather than botanical purposes, some of the suggested pronunciations may be considered rather 'scholarly'. It seems unlikely, however, that this book, or perhaps any book, could put an end to the agreeable variety in pronunciations which are found.

Chapter 6

Chapter 6

AMENITY: plants for pleasure and interest

The first known examples of botanical gardens are those in Ancient China. In them the two functions, a) scientific study of plants for useful purposes and b) amenity, are found combined. It can be said, therefore, that amenity is another of the original functions of a botanical garden. Provision of amenity distinguishes a garden from other types of research grounds and the title 'garden' usually indicates an element of pleasure for the visitor. A distinction can be made between the 'pleasure' garden and the continental type of kitchen garden.

The relative significance of amenity in botanical gardens is still discussed, now more than ever. Some amenity has been an integral part of botanical gardens since the beginning of their history; the extent of amenity provision varies, naturally, from one country to another and at different times.

The English genius for creating an informal garden design, whether in a small space attached to a cottage or, by landscaping, in the grounds of a great country mansion, has made the 'English garden' world famous. This ability to make a natural garden had its influence on the plan of our botanical gardens in the eighteenth and nineteenth centuries as also on private gardens. It is in contrast with the formal style often to be found in other European countries.

A striking example of differing traditions is provided by the history of the Royal Botanic Gardens at Melbourne in Australia. Here the original formal, scientific design was created by Baron von Mueller, the German-born expert in taxonomy, who was appointed first Government Botanist of the colony of Victoria. The Gardens owe to him a very large collection of extremely important plants. It was when William Guilfoyle was appointed in 1873 as Director that the Gardens were re-designed on English landscape lines, incorporating the important plant collections of Sir Ferdinand von Mueller yet at the same time making the grounds into a colourful, attractive place which visitors enjoyed seeing.

A research station which exists specifically for carrying out research, botanical or horticultural, is not concerned primarily with amenity, though some amenity function may be served. The need to combine different functions in a botanical garden leads, especially at present, to much heart-searching about objectives. This combination, however, also gives these gardens their particular quality.

The term 'amenity' makes an interesting study in itself. The Latin word amoenitas from which it is derived is translated by Lewis and Short's dictionary as:

pleasantness, delightfulness,
loveliness. Lit., of places
(as scenery, a garden, river,
etc....).

'Amenity' is now so well established in the vocabulary of horticulture that it is easy to use it without much thought for its derivation. The Oxford English Dictionary gives its origin, and ^{the} meaning as follows:

The quality of being pleasant or agreeable: a. of places, their situation, aspect, climate etc.

In addition to these general uses, the word has acquired a specialized, fashionable meaning in the context of public leisure facilities. It appears in the title of some local government officials; the older term Parks or Recreation Manager is sometimes replaced by that of Director of Recreation and Amenities, or Leisure and Amenities.

Another example of its use is in the name of organizations. As from January 1983, the Institute of Park and Recreation Administration amalgamated with three other similar bodies to form the new ILAM, the Institute of Leisure and Amenity Management.

A garden must therefore be a pleasant place, in order to be a garden in the real sense of the word. This applies to many types of garden, public and private, and to other places such as public parks. Botanical gardens have no monopoly of amenity; the extent to which it should be provided in botanical gardens of differing types has to be decided by the managers of individual gardens.

Amenity may be considered particularly important in the national Gardens at Kew and Edinburgh and in gardens

administered by local authorities and therefore automatically open to the public, rather than in the gardens attached to universities and other academic institutions. Only a few municipal gardens exist in this country, very few large-scale ones. The list (Chapter 9) illustrates this. In these gardens much attention is paid to amenity, its importance being taken very seriously. A survey was carried out at Edinburgh RBG some years ago, and the public referred mainly, amongst their reasons for visiting it, to the 'peace' and the 'beauty'. These factors should certainly not be underestimated, especially in gardens in cities, where such attributes, unfortunately, are often lacking.

The suggestion that amenity in university gardens might be of lesser importance does not necessarily always apply. Attention paid to amenity in university gardens may put it, there also, amongst the important functions. The situation varies very much, depending on historical and other factors. The historical background of the garden is important, for example in the case of Ness Gardens, now belonging to Liverpool University, but originally a private estate bequeathed to the University with a stipulation that the grounds should remain open at all times to the public. The condition has been admirably fulfilled; Ness Gardens have become a tourist attraction of considerable importance in the North West of England. They give pleasure each year to many visitors.

At Oxford University Botanical Garden, the old

grounds (originally the Physic Garden) are separate from the experimental area where scientific research is carried out, thus leaving the Botanical Garden free to concentrate on academic and public education and amenity. Cambridge University Botanic Garden is an example of an establishment where amenity, for the public, together with other equally important functions, is taken very seriously.

Where gardens are not open to the public at all, e.g. Birmingham University and Leeds University, amenity may still be taken into account, if the garden provides a leisure space for members of the university. It seems natural to find amenity taking second place to research in gardens which are 'experimental' rather than 'botanical' in the popular sense of the latter word, and this does appear to be the case.

Botanical gardens which are able to combine public amenity with research activities, and can be seen to be doing so, are undoubtedly carrying out a good job of public relations.

The risk inherent in undue emphasis on amenity is that such gardens may be regarded primarily as places of recreation and so their serious scientific work may not be appreciated by the public. If public funding is involved, a difficult situation may arise.

Amenity is provided by many other types of locality so that the public are not entirely dependent on botanical gardens in this respect.

Garden-visiting is an extremely popular leisure activity, promoted by various public bodies such as the English Tourist Board. It may sometimes happen that visitors really wish to visit a garden rather than any particular type of garden. The opportunity needs to be taken, therefore, to draw their attention to the differing activities of botanical gardens during their visit.

Rousseau: plants as things of beauty

On plants and flowers as a source of pleasure because of their beauty, a remark made by Jean-Jacques Rousseau in Botany: a study of pure curiosity may be mentioned. "It is a pity", he writes, "that plants were considered for such a long time as useful things because it prevented people from thinking of them as objects of beauty".

An unusual theory about the origin of amenity in botanical gardens is set out by John Prest in The Garden of Eden: the Botanic Garden and the Re-creation of Paradise, discussed in the bibliographical section of Chapter 5.

Arboreta

Arboreta have been mentioned already as a specialized type of botanical garden. In the eighteenth and nineteenth centuries, the fashion amongst private landowners to create arboreta, or pineta, led to some fine collections. Pineta were especially popular in Scotland, where climatic conditions are favourable for the growth of coniferous trees. Some of these private collections still exist,

though others have disappeared, or have ceased to be maintained in their former condition.

Arboreta, or so-called arboreta, have also been established in some cities, e.g. Leicester and Derby. In the latter case the Arboretum is, in fact, a public park.

Modern arboreta are often annexes of a main botanical garden. Edinburgh RBG has an arboretum at Benmore in Argyll and Manchester University's Granada Arboretum at Jodrell Bank is interesting as a new university collection.

Arboreta of great importance are those at Bedgebury, in Kent, (the National Pinetum), and Westonbirt (maintained by the Forestry Commission).

Amongst private collections, the Pygmy Pinetum at Wansdyke Nurseries is an outstanding collection of dwarf conifers. It was started by H. J. Welch, an enthusiastic expert on dwarf conifers, in 1959.

The enjoyment of looking at trees and studying them has been fostered in recent years by publicity. Help has been sought to protect the national heritage of woodlands. There have been 'Tree' years and 'Tree' weeks. A special effort has been made to educate schoolchildren in a responsible attitude. They have been shown that existing trees need to be preserved, and new specimens planted in place of those lost through age, disease and, unfortunately, vandalism.

Examples of amenity

Ness Gardens on the Wirral, mentioned earlier, is an outstanding example of a garden which combines amenity with research. Amenity is provided by botanical gardens and also by many others. The work of the National Trust is admirable in garden care, giving much pleasure both to members and to other garden visitors. Private gardens which open regularly or occasionally combine necessary financial benefit to themselves with a genuine service to the public. Botanical gardens, it has already been stressed, cannot be studied in isolation; the contribution made by other types of garden must always be remembered. Since amenity is so much a shared function amongst gardens, this is a good place to consider amenity provided by gardens of a different type, through reference to a few non-botanical collections. Two gardens under local authority control and two administered by the National Trust have been chosen as examples representing many others. Each of these four has individual features which make it a desirable place to visit.

It can, in any case, be difficult to decide which gardens should be included in a list of 'botanical gardens'. About some, e.g. Kew RBG, Edinburgh RBG, Oxford University and Cambridge University Gardens, there is no difficulty. Others, however, carry out some functions of a 'botanical' garden (and may do so to a greater extent than gardens officially called 'botanical'). This explains why lists of botanical gardens differ, including in each case the

examples selected by and so reflecting the views of the compiler.

Bodnant

Bodnant, the first of the four examples chosen, is situated near Conway, in North Wales. Now in the care of the National Trust, it is associated, of course, with the present Lord Aberconway, an eminent gardener and former President of the RHS, and with his father. At their family home, much important horticultural work has been carried out, under the supervision of successive owners and their gardeners. Like Ness Gardens, Bodnant has the advantage of magnificent distant views. A garden which in addition to its own beauty offers wide views beyond its boundaries is in an enviable position. In Ness Gardens, the view is of the River Dee and the mountains of North Wales, at Bodnant it is a magnificent vista along the Conway Valley. Both gardens are set high on the slope of a hill, and this is another attraction for visitors. At Bodnant, which has had considerable publicity, including a television programme in the 'Gardener's World' series, one of the best-known features is the fine laburnum walk, under a row of trees forming a tunnel, when in flower a magnificent sight. The fine rhododendrons, some of them Bodnant varieties, are another feature which impresses all visitors.

Inverewe

Inverewe, now a property of the National Trust for

Scotland, was originally a private garden also. Mairi Sawyer wrote as follows in the foreword to the 1952, 1st, edition of the official guide:

During the summer months hundreds of visitors wander through the gardens of Inverewe. Almost everyone expresses surprise at finding them here at all and is amazed to see what trees, plants and shrubs flourish. Having motored, cycled or walked through many miles of peat-hags, bogs and wild rocks, they realise what this estate must have been like when my father, Osgood Mackenzie, bought it in 1862.

He has described the gardens and their favourable position in his book 'A Hundred Years in the Highlands', first published before he died in 1922 and since issued in a new edition. There he tells how the proximity of the Gulf Stream provides the required warmth and almost entire lack of frosts; and how he could grow in the open air at Inverewe, as we still can, as many plants, and as good, as is possible at Kew under glass....

Most people first become acquainted with this country in the spring or summer, and do not realise what gales and driving rain will come during the rest of the year. The everlasting hills and everchanging sea are always there, but as time goes on they may feel that a belt of trees for shelter, some attractive shrubs around their home, and an interesting garden would be a great joy. If I can impress on them that with knowledge and perseverance it can be done, as it was at Inverewe, I shall indeed be glad....

Facilities for visitors are very good. Everyone who visits this unique garden seems to retain vivid memories of its atmosphere; one understands what the garden meant to Osgood Mackenzie and to his daughter Mairi Sawyer. She lived at Inverewe for many years after

his death, continuing to care for the grounds with real dedication.

A notable extract from the remarks about Inverewe Gardens in the Shell Guide to Gardens, ed. by A. Hellyer (1977, p 159), is as follows:

Today a list of plants grown at Inverewe reads like the catalogue of a botanic garden. Rhododendrons, celmisias, primulas and meconopses are specialities grown here as well as (in some cases better than) in any other garden in the British Isles. But there are so many other good things that it is useless even to attempt to list them in a brief guide such as this. The National Trust for Scotland, which has owned Inverewe since 1952 and has constantly improved and developed it ever since, issues an excellent illustrated guide with a good list of the most interesting plants.

Llandudno (Happy Valley)

The third garden featured here is in the Happy Valley, on the slopes of the Great Orme at Llandudno. Administered by the local authority, it has formed one of the attractions of the resort for many visitors. On this limestone headland, a true maritime garden, rock plants flourish. Inverewe gains some shelter from being within a loch, but the Great Orme garden faces the open sea. The proximity to the sea, however, reduces the risks from frost, and the situation is sunny and well-drained.

Sewerby Hall

The fourth example of a garden chosen is on the East Coast, in contrast with the other three, all on the western side of Great Britain. Sewerby Hall and its Park are situated on the cliff top a short distance north of Bridlington, to which town they now belong. Sewerby was originally a private house and garden, taken over by the local authority and very well maintained. The house is now used partly as a museum.

The grounds in front of the house are landscaped, running uninterruptedly to the cliff edge, where there is a narrow footpath. A well-preserved ha-ha, a short distance from the house terrace, still provides interest for visitors but now serves no practical purpose.

Behind the Hall, a large garden, sloping upwards inland, has a central path flanked by lawns, flower beds and large specimen trees of monkey-puzzle (Araucaria araucana). Across a narrow lane from the main garden are two walled gardens. Here roses and bedding plants are grown. Red-brick sheltering walls support espalier fruit trees. The greenhouses are used to prepare plants for the garden.

The original atmosphere has been well recreated. Popular additions such as an aviary, wallabies and other livestock have been added in the Park, and the café in the house.

These National Trust and local authority gardens are only a small sample. There are also many gardens still in private hands, open frequently or occasionally, offering great interest to visitors, and forming part of the popular leisure occupation of garden-visiting.

The importance, relative to other functions, of amenity in botanical gardens, will no doubt continue to be debated. As an early feature, even in a scientific garden, amenity still plays an important role, not lessened by the existence of other, 'pleasure', gardens. The extent of amenity provision must depend on the main purpose of an individual botanical garden, with its own historical background.

Amongst overseas and foreign gardens are some outstanding examples of amenity. Montreal Botanic Garden, for example, offers the public the chance to enjoy its collections in very beautiful surroundings.

Chapter 6

Reference material

The functions of the modern British botanical garden are considered here in the context of other institutions and the community. A survey of literature about the gardens' activities must similarly include material about gardens of other types. This is particularly true of amenity, important in botanical gardens open to the public, and equally in National Trust and private gardens.

The following books do not all deal specifically with botanical gardens in Great Britain - the best source of information on amenity in these is usually the official guide - but they are significant for other reasons, such as the status of the author or the connection with an important organization.

- 1) Forsyth, Alastair, Yesterday's Gardens (1983), Royal Commission on Historical Monuments, England.

This book is included because it shows the recognition now accorded to great gardens, as to buildings of historical importance. Both suffer from problems. Buildings can be damaged, by accident, neglect, or military operations. Gardens, if not constantly maintained, are destroyed even more rapidly, by reverting to nature. Both need public attention if for some reason the original owners are no longer able to care for them.

As a historical survey this book comes into the category of background material in this account.

Gardens illustrate particularly well that the history of a subject is essential to an understanding of its present situation.

2) Reprints of gardening classics

Two important examples of the current trend of reprinting older garden books are the reissue of William Robinson's The Wild Garden (1983) and the reprints of Gertrude Jekyll's complete works on gardening. A considerable interest in the study of garden history is indicated, because books are not reprinted, even books by authorities such as these two garden experts, unless it is a commercial proposition. The interest in garden history exists along with the demand for new popular, practical books on modern design and cultivation in gardens.

3) General books on British gardens

Many good descriptive books and series exist dealing with the gardens of this country. Some include notes on botanical gardens. The series of regional volumes entitled Gardens of Britain published by Batsford, with a separate volume for Scotland by P. Verney, is an example. Individual volumes are planned according to the preference of the author; some of the books give interesting and unusual information about gardens.

It is not possible, nor necessary, to refer to all the available general books on the existing gardens of Great Britain. The following book will serve as an example of a large category:

Sales, John. West Country Gardens: the gardens of Gloucestershire, Avon, Somerset and Wiltshire (1980)

The author is a well-known writer and lecturer on the subject. This volume was written in his capacity as Gardens Adviser to the National Trust, member of the Garden History Society and the U.K. Historic Gardens Committee of ICOMOS, and therefore an active participant in garden conservation.

4) Batey, Mavis. Oxford Gardens: the university's influence on garden history (1982)

Oxford, like the counties of England covered by the West Country gardens of John Sales, is in a favoured part of the country for horticulture, since, in a good year, spring comes early. As the oldest botanical garden in England, Oxford University Garden always arouses interest. Mavis Batey, of the Garden History Society, has produced a well-researched study, which forms a serious contribution to the history of botanical gardens.

The publisher's description says:

Mavis Batey's account of Oxford gardens starts with the early monastic foundations, the cloisters, quadrangles and knot gardens of medieval times. She tells of

the effects of Renaissance, Reformation and Civil War on Oxford. She traces the origin and great influence of the Oxford Physic Garden, now known as the Botanic Garden. Further chapters depict the evidence of the great aesthetic movements; the Grand Manner at New College and Trinity; the picturesque movement at Worcester College - and its rejection at Magdalen. The ideals of the Victorians, still with their half-remembered familiarity, are shown in their buildings - and in their development of the North Oxford suburb. Into this century the influences of Gertrude Jekyll and the Arts and Crafts movement are also seen in Oxford.

Mavis Batey's book is an enlightening and intriguing combination of history and anecdote.

Chapter 7

Chapter 7

PUBLIC INFORMATION AND EDUCATION SERVICES; PUBLIC RECREATION FACILITIES

Public information and education, as opposed to the formal instruction of students of botany and horticulture (Chapter 3), is discussed here, with various aspects of recreation and leisure provision.

'Education' sounds rather a serious word for what is essentially a voluntary and an enjoyable occupation. 'Information' is an associated but not identical function, since it lacks, in this context, the element of tuition.

Some botanical gardens undertake formal teaching by the reception of parties of schoolchildren on organized visits. This is a valuable service, undertaken in collaboration with the education authorities. Plant material may also be supplied for classroom use. Public education or information, for the community as a whole, can be considered to be a modern function.

Societies who founded botanical gardens, mainly in the nineteenth century, were groups of people with a special interest in plants, particularly in the newly-found exotics being brought home from plant-hunting expeditions overseas. The members of these societies were not representative of the population as a whole.

Parks and gardens were made in towns in the nineteenth century, but their purpose was to provide fresh air

and a place where people could take exercise after a day's or week's work, rather than to give botanical information as such.

It might seem likely that municipal botanical gardens today, rather than university ones, would mainly carry out this public education function. Gardens administered by local authorities usually provide facilities of this type, but it would not be correct to assume that university gardens do not.

As with amenity, some university botanical gardens take pains to help the public to enjoy, and to understand better, the plant collections that they see on their visits. The publicity encouraging such visits is proof that visitors are welcome in the gardens.

Increasing leisure is constantly forecast for the working population of this country. A shorter working week, longer holidays and earlier retirement are already a fact. The trend is likely to continue rather than to be reversed. Changes in everyday life have taken place through the centuries; and only the speed of change is different from the past. Retirement is, however, a comparatively recent development, not usual for working people until the twentieth century.

These changes are all potentially beneficial, though sometimes the dream is more attractive than the reality. It is now realized that provision needs to be made for leisure, just as education and other services are planned.

With leisure time increasing, interest in gardening as a hobby is likely to grow even more, so that such a service would be a good investment for the future.

The terms 'information', 'education' and 'recreation' are used separately in the title of this chapter; in fact they are so closely connected in this context that they cannot be treated separately. Few hobbies can be pursued satisfactorily without learning something about the subject; one of the pleasures of an occupation is to find out more, in order to enjoy it more. The keen gardener is always ready to learn about the subject.

People who have a good reason for learning will learn easily and fast. The staff of a botanical garden can impart information in various ways, such as talks, 'gardeners' question-time' sessions, guided tours, and through printed guides. Talks by subject experts, at different levels of knowledge, are likely to find an appreciative audience.

Different ways in which botanical gardens can carry out an advisory service for the community are discussed in Chapter 11, Sheffield Botanical Gardens. This municipal garden provides a good example of how to foster relationships with local people, making use of the local press and radio.

The 'public education' included in the present chapter does not cover education specifically about conservation. The need to inform the public on this subject, in order to

enlist their help, forms part of Conservation (Chapter 8).

A helpful way for botanical gardens to offer the public their expert advice is by devoting garden plots to plants especially suitable for the soil and climate of their own particular area. Where this practice has been tried, it has been much appreciated by the gardeners in the local community. Advice can, of course, be obtained elsewhere. Local nurserymen and the staff of garden centres are naturally ready to give it; it is to their own advantage that the plants they sell should flourish if they are to have satisfied customers. A permanent garden cannot usually be maintained on such premises, however. With a botanical garden, the public can return, as often as they wish, to see plants growing as if in a private garden.

Probus Gardens

An outstanding collection of such 'demonstration' gardens is provided by the Education Committee of Cornwall County Council at Probus, near Truro. Here a number of different 'Trial Gardens' are maintained; tours are carefully organized, a member of staff showing round groups of schoolchildren, adults, parties from societies, etc. The tours are so popular that arrangements have to be booked in advance. Special features include a collection of Cornish wildflowers, to show the public what these plants look like, so that they will recognize them in the wild and be less inclined to pick the scarce ones. Explanatory leaflets

about the gardens are issued. Altogether this is a most imaginative enterprise, and at present unique.

International influences

Through international botanical conferences in the 1970s and the early 1980s, the botanical gardens of Great Britain came into closer contact with foreign gardens. The purpose of the conferences was primarily conservation, but the opportunity was taken by delegates to discuss other aspects of their work.

Some European gardens provide facilities for their visitors, such as open-air refreshments and music, which could be of interest to those British gardens mainly concerned with the public rather than with research. The exchange of ideas can only do good for all the gardens involved.

A specialized form of international co-operation, actual or potential, arises in those towns in Great Britain which are officially twinned with a town abroad. This subject is discussed in detail later (Chapter 12). As co-operation becomes more general between gardens, internationally, as it probably will, some of the differences in practice between gardens may be modified, as good ideas from one country are adopted in others.

Opportunities for botanical gardens

It can be said that there is a real opportunity here, a real need, in the field of recreation and leisure, for the

public facilities that a botanical garden can provide. In all age-groups, especially perhaps amongst those who are retired, free time needs to be spent in an absorbing occupation in order to be satisfying. In some ways the word 'retirement' is perhaps an unfortunate one. It suggests a withdrawal from the active pursuits of everyday life, a 'sitting back' attitude of mind, inappropriate when retirement, for some people, is now at 60 years of age or even younger.

A botanical garden can become a centre of botanical and horticultural activities in its area by providing advisory services. Examples are 'plant surgeries', plant sales or exchanges, and contacts with local specialist plant societies.

In the technical terms of the recreation services, these activities are 'passive' rather than 'active' leisure. Walking round a garden, studying the plants, following (local) wild plant nature trails, all count as 'passive' occupations. Compared with playing football in a public park, this is, of course, accurate. The most 'passive' of all, for which a botanical garden is ideally suited, is best described in Andrew Marvell's poem The Garden:

Annihilating all that's made
To a green thought in a green shade.

English Tourist Board

In late 1983, the English Tourist Board decided to promote a scheme encouraging garden visits during 1984; the

necessary arrangements were put in hand. Considering the growing public enthusiasm in this country for the pastime of visiting other people's gardens, and the fame of the 'English garden' in countries abroad, such a scheme could hardly have been unsuccessful.

International Horticultural Festival, Liverpool

The Tourist Board's scheme was intended to coincide with the 1984 International Horticultural Festival at Liverpool. This was expected to bring many gardening enthusiasts, amateur and professional, as, in fact, it did, to this country. The International Festival was being held here for the first time. The layout achieved, prepared in a shorter time than is usual in other countries, was remarkable. Expert opinion was divided about whether the time of preparation was adequate or should have been longer. The 1984 International Horticultural Festival, through the preliminary competitions for garden designs, the personal visits of experts and the public, together with media coverage and literature produced, has certainly had a significant influence on gardening in this country.

One of the two student awards for a garden design was given to students at Kew RBG. The garden was then built by the students, to their own specification, on a site at Liverpool.

Young visitors to the Festival found a book which had been specially written for them. Teddy Edward's Garden Souvenir, by Patrick and Mollie Matthews (1984), shows the

well-known bear with Jasmine, the white rabbit, in several parts of the Liverpool garden. The main section of the booklet, however, consists of pictures of the pair in eighteen countries which exhibited at the Festival. There are colour photographs of flowers, gardens and buildings in each country featured, with a short account giving the information about plants and gardens which would interest a young child. With the youngest age group, parents could read the text and explain the pictures. It is an attractive production; many of the photographs are from official national tourist sources. This kind of small book could give a young child a lifelong interest in plants, by association with a well-loved favourite like Teddy Edward. The layout of the booklet is an example to publications for adults.

ILAM

For staff working in the administration of public parks and gardens, the beginning of 1983 was a landmark. Four professional organizations, including the Institute of Park and Recreation Administration (IPRA), were amalgamated to form a new body, the Institute of Leisure and Amenity Management (ILAM). This combination of professional resources was seen as a welcome opportunity to achieve one, new, stronger association representing the various interests. To mark this occasion a new journal, also called ILAM, began publication.

Council of Europe

The Council of Europe plays an important part in wild plant conservation. The conservation aspect of the Council's work is discussed in Chapter 8; it also takes considerable interest, however, in the provision of public recreation facilities, and in wildlife information services for non-specialists (in scientific matters).

Naturopa, the publication issued by the Council's European Information Centre for Nature Conservation, is an interesting journal for both scientists and laymen. World experts contribute articles in their own field; the scope includes wildlife and plant conservation, planning, and legal aspects of the natural world. Articles are perhaps becoming more specialized in content, but the journal remains, as a whole, suitable for the general reader. Reference to this journal is made in the bibliographical section of this chapter. It is mentioned here as an indication of the value of the Council's work on wildlife conservation problems.

Key Documents (Chapter 2) also contains information on Council of Europe publications.

Overseas gardens

Occasional reference is made in this account to gardens overseas which provide an example, worth noting, of the function under discussion. Another outstanding Canadian botanical garden (Montreal is mentioned in Chapter 6) is at Vancouver. This garden puts great emphasis on facilities for the public.

From consideration of botanical gardens in different parts of the world, it can be seen that, apart from the effects of major differences in climatic conditions, the aims and objects of the gardens are similar in many respects. They are, in fact, divided much more by status than by national differences.

The area of responsibility in which gardens do vary geographically, more widely, is conservation. The differing floras of temperate and tropical zones, and of different temperate zones, bring different implications for conservation.

Advice on gardening

One of the most valuable functions of a botanical garden in public recreation must be offering expert guidance and practical example to local amateurs. Gardening certainly has the status of a national hobby, never more popular in this country than at present.

Those involved, professionally or personally, in future use of increased leisure welcome gardening as a proved favourite in recreation activities. Joe Gormley, speaking at the 1979 Labour Party Conference, recommended the provision of allotments on a widespread basis. This old custom, especially popular in Sheffield, is mentioned in Chapter 11 (Sheffield Botanical Gardens).

Wherever keen gardeners live - enthusiasm is not linked to the size of the garden, whether private or an

allotment - the need exists for an advisory service from professional experts. A good deal of information can be obtained from books, radio and television. Additionally, however, it is helpful to see plants growing, and to ask questions personally about gardening problems.

Within the area of gardening and plant conservation, botanical gardens have to share the leisure time of the community with other organizations. This country is particularly well provided with societies and institutions, statutory and voluntary, which offer recreation opportunities, both active and passive. Useful information about courses for gardeners is given in journals, especially in The Garden and Amateur Gardening.

Recreation for conservation

The Nature Conservation Corps, of Conservation Corps Volunteers, makes good use of energy from the most active members of society, for the reclamation of areas of the countryside becoming useless and unsightly, or already in a state of neglect.

This activity is an aspect of conservation, but as a spare-time pursuit it is also a form of recreation, and therefore needs a mention in this chapter.

Specialist plant societies

For the community, the relationship between a botanical garden and local specialist plant societies leads to an important part of the Garden's work. This certainly applies

allotment - the need exists for an advisory service from professional experts. A good deal of information can be obtained from books, radio and television. Additionally, however, it is helpful to see plants growing, and to ask questions personally about gardening problems.

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at Sheffield (Chapter 11, Sheffield Botanical Gardens).

The keen interest shown by amateur gardeners, including those who have an allotment, or 'leisure garden', is not new in gardening history.

The chapter on Sheffield Botanical Gardens illustrates a historical situation common to other industrial towns. Gardeners of all classes, including those working long hours at a trade, gladly spent their brief leisure time cultivating flowers and fruit to a high standard. The annual show and competition was the highlight of the year's activity. The present and future, with the promise of ever-increasing leisure, offer easier conditions for this hobby.

It can be surprising to discover how many specialist societies exist in this country. Comprehensive lists of their names and addresses are available; further information is given later in this chapter.

Specialized botanical gardens, and arboreta

Arboreta, as already mentioned, are included in this account, as specialized botanical gardens. Botanical gardens in this country are generally of the type including a wide range of plants. In other parts of Europe more specialized gardens exist, however. The Jardin Exotique, in Monaco, with its magnificent collection of succulent plants, is an example. There are mountain gardens in the alpine regions of Europe, sometimes annexes of a university

botanical garden, as at Munich. At Bremen, the botanical garden has a Rhododendron Park adjacent to it. Rhododendrons flourish in the prevailing local conditions of climate and soil.

In public recreational terms there can be a particular attraction about trees for both amateurs and professionals, an interest shared by people of all ages from children to the elderly. An interest in coniferous trees is a special form of this attraction, encouraged by visiting pineta. These may exist primarily for scientific purposes; they also have an appeal for the amateur tree-lover.

The Forestry Commission now has a section of its administration concerned specifically with public recreation and leisure facilities. The profession concerned with recreation provision is a growing one, likely to expand with the increase in leisure time. Efforts to provide for this leisure time may, however, bring the problem of over-use of areas, with detrimental effects on the habitat concerned.

Recreation ecology is a fairly recent study, resulting from the changes in the way of life of the community. It is not a question basic to botanical gardens, since its effects occur in wilder areas including national parks and nature parks.

An arboretum or pinetum needs protection, with the provision of footpaths, and sign-posting, to guard the trees, especially young specimens, from the less responsible members

of the public.

Gardens on television

References are made here to the importance of the media, especially colour television, in informing the public about garden matters, plant habitats, and wildlife.

The following list names botanical gardens (mainly British) which have featured in television programmes during recent years. The list is not exhaustive; it includes only programmes seen, or known to have been shown. Others, from regional stations, have probably not been shown nationwide. Nevertheless, it proves that some botanical gardens are well aware of the value of publicity in their relations with the community.

British botanical gardens featured on TV

1) National

Edinburgh (Gardeners' Calendar Roadshow)

Kew (a) (The World About Us)

(b) (In Search of Paradise)

(c) (Nature Watch, ITV, Julian Pettifer,
tour with John Simmons)

Wakehurst Place, Sussex (Kew and National
Trust), (Great Plant Collections, Roy Lancaster,
Channel 4)

Westonbirt (Forestry Commission),

(a) (Great Plant Collections, Roy Lancaster,
Channel 4)

(b) (Programme about Alan Mitchell)

2) University

Cambridge University BG

(a) (Gardeners' World) (1)

(b) (Interview with Dr. Walters)

(Gardeners' World) (2)

(2 programmes)

Ness Gardens, Liverpool, (Gardeners' World)

3) Local authority

Sheffield BG (Calendar Calling)

Swansea (Singleton) Botanic Garden (Gardeners' World)

4) Private society, etc.

Chelsea Physic Garden

(a) (Back to the Roots, Richard Mabey)
(shown twice)

(b) Included in 'Fiddling with Nature'
(Yehudi Menuhin, ITV)

Harlow Car (Great Gardens)

Wisley (Gardeners' Calendar) (series)

5) General references

Botanical gardens, importance as oases in polluted world (Düsseldorf, etc.) (In Search of Paradise, Channel 4).

Kew has, predictably, been particularly featured on television. A programme called 'A Prospect of Kew' (The World About Us series) was preceded by an informative introduction in the Radio Times, These Growing Pleasures.

This article could rank as bibliographical material; most people, unfortunately, think of such writing as ephemeral and do not keep it.

The Radio Times and the TV Times frequently provide useful background information, not always covering exactly the same ground as the relevant programme. Television producers have the considerable advantage of assistance from a team of experts and research staff in preparing programmes.

The BBC Wildlife magazine (monthly) maintains a high standard in its coverage of natural history topics. It lists relevant programmes on both BBC and ITV channels, as well as lectures and other events in different parts of the country.

Gardens for recreation

The subject of recreation facilities is currently receiving a good deal of attention nationally. It is the 'passive' variety of leisure which concerns botanical gardens, as already mentioned, 'passive' recreation including in this context the pleasures of standing or sitting, and strolling, and walking round the grounds.

The reasons why people visit botanical gardens, and other gardens, are varied, depending on personal interests. A survey of visitors was carried out at Edinburgh RBG, and it was reported at the first Kew Conservation Conference in 1975 that the reason most frequently given for visiting

the Garden was to enjoy the 'peace and beauty'.

This reason applies particularly to a garden in a large, busy city. The locality of a botanical garden may be very significant for its use by the public. Located near a town centre it may have a different function from a garden such as Ness, in the Wirral, which is not so near to a built-up area. The 'peace and beauty' in the reply also involves 'amenity' as one function again overlaps with another. (Some reasons for visiting Sheffield Botanical Gardens are suggested in Chapter 11.)

Several themes recur during this study. One is variety in botanical gardens, due in part to differing status. Status is not the only reason, however. Within the category of university botanical gardens there is a wide range, from the experimental botany garden (not usually open to the public) to the garden combining research activities with a public educational role. In the latter, amenity is provided, and an information service probably including botanical, horticultural and conservation topics.

Cambridge is an outstanding example of a garden of this type. The University Botanic Garden there demonstrates how an institution can combine advanced scientific research with a serious commitment to public education. It is hardly surprising that such an example is given by one of the most important universities in Great Britain. (Cambridge University BG has the advantage of substantial funding from the Cory Bequest.)

Aviaries and aquaria in botanical gardens

Including animals in botanical gardens, to provide an added attraction for visitors, is not new.

In the Botanical Gardens at Sheffield, when they belonged to the local Botanical and Horticultural Society, there was for many years a bear-pit, with live bears on show. Reference is made to this in Chapter 11 on Sheffield Botanical Gardens.

Nowadays at Sheffield there are collections of birds and fish, housed in the glass-houses (the so-called 'Paxton' pavilions), no longer used for the exotic plants once grown in them.

At Belfast Botanic Gardens there were Garden anniversary celebrations in 1983, in the style of the old days - hot-air balloons^o once made ascents from the lawns there and visitors were offered various other forms of entertainment, so that the Gardens were a real social centre in the city.

This type of popular entertainment was, and is, the prerogative of public, usually municipal, gardens rather than academic ones.

Animals, including birds and fish, certainly do provide an attraction for visitors. A small informal investigation carried out locally amongst acquaintances during the course of this study is reported in Chapter 11 (Sheffield

Botanical Gardens). An interesting finding was that several, mainly those with young families, particularly mentioned the aviary and aquarium.

A different combination of animals and plants is found at some zoos, e.g. at Chester and the zoo on the island of Jersey. Here plants provide a suitable native background for the animals, tropical plants at Chester and a collection of Australian trees and bushes for the Australian mammals at Jersey Zoo.

Open-air exhibitions

Large gardens open to the public provide a good setting for exhibitions out-of-doors. An example is the collection of sculpture on display in the gardens of Harlow Car during the summer of 1986. This exhibition, 'Modern Sculpture for the Garden', was arranged with two objectives. One was to show visitors how attractive modern sculpture can look in a garden; the second was to provide an opportunity for sculptors, especially young artists, to display their work. A large garden with many different environments is clearly an ideal place to stage such a display; the exhibition adds to the amenity of the gardens and at the same time attracts the people most likely to be customers for the exhibits.

An illustrated account of the exhibition, by Dr. Rowena Lawson, the organiser, and Paul Cooper, a lecturer at Lancaster University, was published in The Garden, May 1986, pp 213-7.

Chapter 7

Reference Material

- 1) Walters, S.M., Education in the modern botanic garden (1979), The Garden, September, pp 374-9.

Although written some years ago, this article remains a valuable short survey of the work of a modern university botanic garden. As a botanist and former Director of Cambridge University Botanic Garden, the author is well qualified to describe the different functions of this Garden, which combines its responsibilities for student education with provision for education, information and amenity for the visiting public. Both historical and modern information about the Garden is given, and research, Dr. Walters emphasizes, must remain the primary function. Nevertheless, Cambridge University Botanic Garden has set an example in catering also for the public.

The Garden has featured in television programmes. Two visits were made in the 'Gardeners' World' series.

In his article, Dr. Walters writes:

The modern Cambridge garden, then, like most botanic gardens of the nineteenth century, is open to the public who receive both "instruction" and "recreation" in it. A university garden does, however, have different emphases, on the one hand, from the two great national botanic gardens of Kew and Edinburgh and, on the other, from gardens such as Birmingham Botanical Gardens created and administered by local societies with or without financial help from local

government. In the first place, the primary educational role of the Cambridge garden must be, as it always has been, to provide facilities for teaching and research within the University. It is, of course, extremely fortunate - as Henslow clearly saw - that the demands of botanical teaching (and even research) concerning the whole plant are very easily reconciled with an educational and even a recreational function for the general public; it remains true, nevertheless, that the priorities at Cambridge rightly remain with the research and teaching facilities, many of which are not normally shown to the public. To meet this difficulty, we have found it useful at Cambridge in recent years to offer an "Open Day" from time to time, so that interested local people can be shown something of the work behind the scenes. We are also beginning to use more plant material from "education" or "research" sources in the garden in special displays, both temporary and permanent, mounted in the public part of the garden....

- 2) Brooks, Audrey V. and Knights, Ian. Review of plant troubles 1980-1983 (1984). The Garden, March.

The Gardens at Wisley and Harlow Car of the RHS and NHS respectively are not botanical gardens in all senses and some writers do not include them in a list of such establishments. They carry out, however, several of the usual functions of a botanical garden, and some additional ones.

This article is an example of one service available. The authors, members of the Wisley Plant Pathology Department, describe here the types of enquiry received about diseases which have affected plants belonging to members of the Society.

This is a valuable advisory service from experts to amateurs. The pattern of diseases most frequently encountered at any one time is fairly consistent, certain diseases being prevalent at particular periods.

The previous review of this type was published in The Garden in 1980.

3) Hepper, F.N. Bible plants at Kew (1981). HMSO.

Some features of Kew Gardens, such as the tropical plant collections, are familiar by reputation all over the world. Other plants may be less well-known.

This informative account by Nigel Hepper describes a group of plants of interest to many people. It is not the only collection of biblical plants in Great Britain: there is another at Bangor, in Wales, in the gardens of the Bishop's Palace, and probably others.

Public seminars and short courses

Some interesting courses on gardening studies have been held in different parts of the country, at places as far apart as the University of Durham and a hotel in Torquay. These meetings, whether one-day seminars or short holidays, are intended for the general public and are mentioned in gardening publications such as Amateur Gardening. The Royal Horticultural Society arranges talks for members and the public, and (members') visits to gardens. The International Dendrology Society also arranges members' visits; the Society's interests cover gardens in general, as well as trees specifically.

4) Specialist plant societies

One of the best ways for a botanical garden to keep in touch with the community is by contact with local branches of the specialist plant societies. Not only does this give the Garden a link with some of the most enthusiastic local amateur gardeners, but by providing accommodation for their annual shows it attracts visitors who might not otherwise come to the Garden. Enthusiasts are prepared to travel considerable distances to see their own special flower and plant shows.

The non-specialist may be surprised to find how many plant societies exist, ranging, for example, from the British Bromeliad Society to the National Viola and Pansy Association. Lists are published in various places; one of the best is in Amateur Gardening each year, in the last number in December, under the title 'Know your societies'. The list includes brief notes on the aims and objects of the societies, and as it is re-issued annually it can be kept up-to-date with officers' names and addresses, an advantage over directories less frequently updated. Nothing is more annoying than reference information which was accurate a few years ago, but is now out-of-date; everyone is familiar with the time that can be wasted writing, for example, to the former secretary of a society.

5) Wilson, R.W. (1974). Useful addresses for science teachers, 2nd ed.

It is clearly important to give active encouragement

to children's interest in the natural world. Their life will be enriched in the future by information about all types of wildlife. Additionally, for conservation, it is essential that the next generation should play a key role in caring for the environment, and the animal and plant life. This book has a list of arboreta suitable for visits by parties of children; the arboreta include both institutional and private gardens.

Chapter 8

Chapter 8

CONSERVATION: wild and cultivated plants in danger

The changes in British botanical gardens today can be regarded, in themselves, as a normal sign of development. Society and its institutions change all the time. The factor which probably makes the present situation different, everywhere in the world, is the speed of change. Those sectors most affected by new developments in technology naturally show the effects of change most noticeably. Botanical gardens, with other institutions, reflect the changes in their own way.

New technological methods in industry and farming have encouraged expansion at an increasing rate worldwide, using up land previously left in a wild state and changing practices on land already utilized. These developments have made even more urgent the need for conservation of natural resources. The growing realization, at least in some quarters, of the danger facing threatened animals and plants has led for some decades to the creation of conservation bodies and, in recent years, to increased international co-operation between botanical gardens. The extent of this co-operation by botanical gardens could, however, be still further increased, with advantage.

Conservation organizations

Threatened Plants Committee

Conservation bodies have existed for many years. In 1948 Sir Julian Huxley, then Director-General of UNESCO, was responsible for the foundation of the International Union for Conservation of Nature (IUCN), as part of UNESCO. The Threatened Plants Committee (TPC), a sub-division of the Survival Service Commission of IUCN, followed as part of the World Conservation Strategy. The European Sub-Committee of TPC was founded afterwards, and the European Botanic Gardens Conservation Project, following the 1975 Kew Conservation Conference, with the Botanic Gardens Conservation Co-ordinating Body established at the request of the Kew Conference of 1978. The Conservation Co-ordinating Body issues a newsletter. The IUCN European Threatened Plants Unit (TPU) is based at Kew.

IABG

The International Association of Botanic Gardens (IABG), whose parent body is the International Association for Plant Taxonomy (IAPT), was founded in 1954, becoming more active from 1960. IABG publishes the International Directory of Botanical Gardens (IDBG), the 3rd ed., 1977, incorporating revised material. Each edition has a useful, different, introduction. Plenary sessions of the IABG are held every six years, the latest at Canberra in 1981, where the possibility was discussed of forming regional

groups. A more informal European meeting of some members was held in 1982, as part of the International Horticultural Congress at Hamburg. At this meeting a European Committee of the IABG was set up. The inability of the IABG, for various reasons, to establish such a committee had caused TPC's European Sub-Committee to form its Botanic Gardens Conservation Co-ordinating Body. The decision is minuted in the proceedings of the Kew Conference of 1978. The object of this Co-ordinating Body is:

To find out which threatened plants are in cultivation and where, and to keep botanic gardens informed of current conservation activities.

The project concerned is mentioned again later.

Many organizations, statutory and voluntary, are involved in the work of nature conservation. Lists of these bodies, with details of their foundation, aims and objects, are given in reference sources, e.g. in Nature Conservation in Britain by Sir Dudley Stamp (New Naturalist Series 1974), and the Guinness Book of Wild Flowers by Mary Briggs (1980).

Substantial notes on major organizations are given by Gren Lucas in his paper 'Organizations and Contacts for Conservation throughout the World' delivered at the Kew Conservation Conference, 1978, (Survival or Extinction, ed. H. Synge and H. Townsend).

European Conservation Year

1970 was declared European Conservation Year. In preparation, the BSBI held a conference in 1969. Resulting from this meeting, The Flora of a Changing Britain,^{ed.} by Franklyn Perring, was published (1970, paperback 1974). *

Conservation Conferences

Plenary sessions of the IABG were held at Moscow in 1975 and Canberra in 1981, and two Conservation Conferences at Kew (1975 and 1978) followed by a Conservation Conference at Cambridge University in 1980. The published proceedings of the Kew and Cambridge conferences form valuable source material on the work of botanical gardens, not exclusively in conservation.

Botanical gardens and conservation

It was during the 1970s and early 1980s that botanical gardens became actively involved in conservation to a substantial extent; responsibility for the protection and preservation of scarce, threatened wild plants, especially native plants, can be considered the latest function of British botanical gardens.

Measures have been taken, nationally and internationally, to meet the plant conservation problem. There has, however, been criticism from time to time, for inadequacy in tackling a very urgent situation. Plant
* 1970, BSBI, 1974 (paperback), E.W. Classey Ltd, Faringdon.

conservation may arguably provide new justification for the continuing existence of British botanical gardens. Important as it is, however, the conservation function does not necessarily detract from earlier functions which botanical gardens still carry out.

Many issues affect conservation, which is considered from somewhat different viewpoints by the particular organizations involved. However, the influence of numerous factors and developments on the vegetation and flora of this and other countries is widely recognized. Encroachment by industrial developments, new motorways for fast transport, building projects for new housing, modern intensive agriculture, including the draining of wetlands and utilization of marginal land are examples. According to the individual point of view, they may, or may not, be a necessary part of contemporary life. Such developments certainly constitute a serious menace to wildlife. Endangered and threatened species are in urgent need of attention, though more in some countries than in others, (the problem is by no means at its worst in northern Europe).

Plant conservation, wild and garden flowers

In a garden context, the term 'plant conservation' does not imply that only wild species are under consideration. The threats to cultivated plants are perhaps less immediately obvious, but nevertheless very real. Changing fashions in flowers, and commercial considerations (including the

effect of EEC regulations) have been recognized as a serious danger to the continuing existence of certain 'cultivars', some of them old, popular favourites. Some older varieties of fruit and vegetables suffer the same risk.

Amongst the directors and curators of British botanical gardens, there are several schools of thought about which plants it is most important to conserve. One opinion favours British wild plants, especially those found in the locality of the garden. Another section gives priority to endangered wild species from other parts of the world, where the problem of preservation is much greater. A different point of view is held by curators who believe that their Garden's resources should be used to preserve cultivated plants in danger of disappearing.

An interesting article supporting the case for garden plants is by David Stuart in The Garden, January 1983. Entitled 'Cultivar conservation', it demonstrates the arguments for this view. Details are given below in the bibliographical section.

As noted earlier, it is not possible to refer to all the articles published in the popular press on conservation topics. They appear frequently and to some extent duplicate one another.

In the rescue of both wild and garden plants, botanical gardens can play a significant part. The

gardens' participation is sought in the National Collections Scheme of the NCCPG (see pp 167-9); some gardens are taking an important share in this work.

In this chapter an attempt is made to describe the various strands involved in plant conservation at present in this country.

Kew Conferences

For botanical gardens, the Conservation conferences held at Kew in 1975 and 1978 are of the greatest importance. The conferences themselves provided a platform for the expression of ideas and exchange of views. The proceedings, published very promptly, in the year following the conference, repay careful reading. They describe the professional experience of directors and curators from many parts of the world. The dates of these meetings serve to underline the recent development of this international co-operation. The first Kew Conference, held under the auspices of NATO, was entitled 'The Function of Living Plant Collections in Conservation and in Conservation-Orientated Research and Public Education'. The proceedings were published in 1976 as Conservation of Threatened Plants (Simmons, J., Beyer, R., and Brandham, P., eds.). The second Conference, three years later, was 'The Practical Role of Botanic Gardens in the Conservation of Rare and Threatened Plants', published in 1979 as Survival or Extinction (Synge, H., and Townsend, H., eds.).

The European Botanic Gardens Conservation Project, set up following the 1975 Kew Conference by the European Sub-Committee of IUCN's Threatened Plants Committee, has been responsible for an important conservation undertaking. A list of scarce and threatened wild plants was circulated to botanical gardens, to determine the relative scarcity of each species and the gardens where the plant in question was being grown and therefore receiving some protection.

At the Kew Conference 1978, TPC's European Sub-Committee agreed to accept wider responsibilities, as far as funds and staffing permitted, including the small permanent secretariat based at Kew.

World plant conservation problems

The problems of plant conservation are worldwide; it is therefore necessary to look at the global situation to see what part British gardens should play in the urgent programme. The areas where the need for action is greatest are the tropical regions, with extremely rich floras, unlike the relatively restricted flora of Britain. To save as many as possible of these plants, seriously endangered, needs immediate action. For many it is already too late.

More than one view exists about the best way for British botanical gardens to help. Many botanists believe (and it is scientifically well-based) that the right place to conserve endangered wild plants which cannot safely be left in their habitats, is in botanical gardens in the

country concerned, where climatic conditions enable the plants to be grown easily, and economically. In temperate areas special arrangements, such as provision of glasshouse accommodation, are needed.

If the areas concerned are in underdeveloped countries where provision for a national flora is impossible, international financial aid is desirable. Where professional expertise is lacking, staff from more fortunate countries may be able to go on secondment or on exchange, with advisory visits by scientific experts. Some of these measures are already practised. Staff have gone to tropical botanical gardens from this country, especially from Kew. Visits have been made by botanists, to help the gardens to safeguard their rich floras. IUCN continues to play an essential role in these developments.

Scientists believing that the right place to conserve any country's flora is in the same locality, might add that the primary responsibility of British gardens is to protect the British flora, especially that of their own local region. The same principle would apply in other European countries. If the existing machinery works efficiently, it is claimed, there is no reason for any further European wild plants to become extinct.

There are other curators of British gardens, appalled by the often-quoted figure of 25,000 endangered species in the world, who feel strongly that our gardens should

provide a home for some of these tropical plants.

Kew's facilities for growing tropical species are excellent; Kew, however, does not represent the typical British botanical garden. Other gardens do have collections of exotic plants already flourishing, for example, the orchid collection in the Liverpool Gardens. Where such glasshouse facilities already exist, a garden may be able to take part in such conservation, but the cost of building and maintaining glasshouses, with the loss of valuable groundspace, make it a difficult proposition elsewhere.

It seems logical to make such decisions at an international, rather than a national, level; they must be made quickly to be at all successful.

Though experts may differ about the true function, in conservation matters, of gardens in this country, it seems reasonable that the gardens should play an important part in preserving the flora of Great Britain. To do so most effectively some regional arrangement is desirable, to avoid overlapping or gaps in coverage of species and of regions.

The prevalent view of botanists, therefore, is that conservation of wild plants is, ideally, conservation in their habitats, where conditions are favourable for their growth. Only if the habitat is threatened would the removal, on a wholesale basis, of plant populations be approved. Where the number of individuals of a rare species

becomes dangerously low, however, it may be necessary for a garden to collect some specimens, preferably by seed, and grow them on its own ground, thus providing extra plants to 'bulk-up' the total population and forming a reservoir of specimens from which plants can be returned to the original habitat. This process was carried out, for example, at Liverpool University's Ness Gardens, with Saxifraga cespitosa from a habitat in the mountains of North Wales. A short account is included in the proceedings of the Kew Conference, 1978.

This country is well provided with different organizations taking a prominent part in plant conservation. The Botanical Society of the British Isles (BSBI) is the national association for botanists, professional and amateur; one of its important activities is maintaining close links between these two groups. The Natural Environment Research Council (NERC), a National Research Council and a statutory body, has a role to play in conservation activities, and the Nature Conservancy Council (NCC), a separately constituted statutory body, is much concerned with conservation matters and has links with the NERC.

Regional organization

Reference has been made to the possibility of some regional organization for wild plant conservation in Great Britain. Ideally, throughout England, Scotland and Wales a network of centres, probably based in botanical

gardens, would be responsible for monitoring the wild plant populations of each area, with special responsibility for scarce or endangered species. Such plants would, if necessary, be grown in the garden and later returned to the original habitats, as mentioned above. Present arrangements already fulfil the needs of such a scheme in certain botanically important areas in Great Britain. Cambridge University Botanic Garden has a well-established scheme for monitoring the Breckland area, one of the most interesting botanical sites. An Ecological Flora of Breckland, by F. Trist, was published in 1983. The Cambridge scheme is under the auspices of NERC, which considered it so successful that a similar scheme was set up, based on the University of Newcastle-upon-Tyne and funded by NERC. This scheme covers North-Eastern England. Wakehurst Place ('Kew in the country') is responsible for the flora of Sussex, an important southern botanical area. The trial gardens at Probus, near Truro, mentioned earlier, have a collection of Cornish wild flowers, forming a nature trail. The purpose is to attract public attention, and by giving information, to protect the same species in their habitats. This activity is somewhat different from the schemes mentioned above.

Even where no formal arrangements exist, other university gardens in Britain are taking an interest in their local flora, as shown in the list below.

British native wild plant collections

1. Bristol University: South-West England
2. Cambridge University: East Anglia (NERC)
3. Durham University: Teesdale
4. Hull University: local flora
5. Manchester University: Teesdale
6. Newcastle-upon-Tyne University: North-East England (NERC)
7. Probus (Cornwall County Council): Cornwall (public interest rather than conservation)
8. Scilly Plant Garden, Longstone Centre, St. Mary's (native and alien plants of the Isles of Scilly)
9. Southampton University: local flora
10. Wakehurst Place (Kew): Sussex (Weald)

Such interests in the local flora are not restricted to this country. As a foreign example, Bremen Botanical Garden, in North Germany, has a 'Heimatsflora' collection representing species typical of the adjacent heathland and the coastal dunes.

Garden plants

So far, the role of botanical gardens has been discussed only in relation to conservation of wild species, although reference was made earlier to conservation measures which protect garden plants, especially 'old-fashioned' flowers in danger of being replaced by new cultivars. Roses and pinks are good examples. Older varieties of fruit and vegetables in danger of disappearing are also

receiving attention. The Royal Horticultural Society (RHS), realizing the threat to some older garden plants, was responsible for setting up the National Council for the Conservation of Plants and Gardens (NCCPG) in 1978. This body, with its own independent administration, has made significant progress. The plan was well-publicized, especially in the RHS's monthly publication, The Garden. An appeal was originally made, and repeated, to individuals and to gardens sharing concern about the problem, to report holdings of scarce older flowers, in cultivation, so that a record could be compiled. An invitation was issued to gardens, groups and individuals to become responsible for a particular species, guaranteeing to grow specimens under suitable conditions. The number of such groups has grown rapidly until there are many in the country. It was emphasized that botanical gardens would, it was hoped, play an important part in the scheme; some already do so, for example the municipal Botanical Gardens at Sheffield are responsible for Diervillas.

Concern for conservation

The field of conservation demonstrates the particularly English ability to combine the efforts of individuals and public bodies in an informal but effective manner. The NCCPG has other aims also, not directly relevant to botanical gardens.

The danger to fruit and vegetables of older varieties comes not only from the appearance of new varieties but

also from restrictions imposed on growers by the regulations of the Common Market. Some of the older varieties are still popular with the consumer, however, and a determined attempt is being made to keep them in existence. Lawrence D. Hills has taken an active part in this matter, but it is not an undertaking in which botanical gardens are especially involved. Friends of the Earth are attempting to save non-commercial plant varieties.

The National Trust does valuable work in conservation, as well as in its overall care of gardens. It has prepared and will, (on request) distribute lists of special plant collections. These include lists of individual species, showing where they are grown, and of gardens, showing what special collections they contain. The NT has compiled lists of both ongoing and closed collections.

The list published some years ago by the Bentham-Moxon Trust, An Index of the Living Plant Collections in the British Isles by J. T. Williams (Williams, 1974), is particularly interesting as a rather early example of an organized record of plant collections.

Botanical gardens, it is clear, can play an important part in the work of plant conservation, possibly even more important for wild plants than garden ones; for cultivated plants there are other gardens, those belonging to institutions, especially the National Trust, and private

gardens, large and small. For wild plants, however, it seems unlikely that they could be grown and protected anywhere as well as they are in botanical gardens. The process of monitoring the flora of an adjacent area, studying scarce plants and rescuing those endangered, can most satisfactorily be based on a scientific institution with the necessary expertise.

Botanical Gardens: co-operation

Through their common concern about conservation measures, botanical gardens have been brought into closer contact with one another. This sense of co-operation, a comparatively recent development, will no doubt develop, leading to greater collaboration nationally and internationally on matters other than conservation. Closer relationships must be beneficial; the prospect of continuing co-operation is cheering for the future of botanical gardens.

At the 1978 Kew Conference, the Threatened Plants Committee of IUCN agreed to send a newsletter to botanical gardens. There already exists the Gärtnerisch-Botanischer Brief, published at Göttingen, acting to some extent as a newsletter for European botanical gardens.

Vandalism

Wild plants, even growing in a garden, may not be out of danger. Vandalism is an unfortunate feature of gardens open to the public at any time. With very scarce

plants, some specimens need to remain in a closed part of the grounds, with a duplicate collection, if possible, on show to visitors.

An exceptional instance of damage may be mentioned here. In 1806, during the French occupation, the Berlin Botanical Garden was officially plundered, many of the most important rare plants being taken back to the Jardin des Plantes in Paris. This experience, fortunately, has not been suffered by any botanical garden in Great Britain. The episode is mentioned in the official monograph on the history of the Berlin Botanical Garden by Timler and Zepernik (p 26).

The need for conservation

The importance of plant conservation is being increasingly recognized; whether the action is in time will be seen in coming years. Expert opinions vary, though views are not over-optimistic.

The Dutch owner of the famous Pygmy Pinetum, Dick van Klaveren, wrote in Amateur Gardening in 1983 that, as the new cultivars are better horticulturally, they should be chosen and grown by amateur gardeners. For the sake of the maintenance of the genetic stock, however, older varieties still need to be retained, certainly not allowed to disappear altogether. A plant, once extinct, cannot be recreated; it is essential to ensure the persistence of at least some specimens of older varieties, for possible future needs in breeding.

Council of Europe

Council of Europe publications concerning plant conservation are important; they are mentioned in Chapter 2 (Key Documents). The Council exercises influence in more than one way. It initiates projects, offers eminent scientists a platform for their views (in its magazine Naturupa and in other publications), and aims to inform the public about conservation and so enlist their practical help. The Council of Europe has described its own situation, as far as organization, promotion of legislation, etc. are concerned. This statement is printed in Naturupa (details are given later here).

The Council's activities are one of the factors in the increasingly international attitude to wildlife, including plant conservation. Science has always been international, of course, in the sense that scientists have, although sometimes with difficulties, kept in contact with foreign colleagues. The Council of Europe, as an international body, can promote movements and encourage legislation on an international basis. Conservation needs this international approach; one of the projects promoted by the Council for the preservation of natural habitats is a European network of biogenetic reserves. This idea is described in Naturupa (see Chapter 2, pp 35-6). Schemes of this type are relevant to British botanical gardens, since the activities that the gardens need to undertake are affected by other types of conservation provision.

The activities of the Council of Europe range, of course, over the whole field of wildlife conservation and the legislation promoted by the Council is correspondingly wide. It is only in the area of plant conservation that these activities are specifically relevant to the subjects in this study, so other branches of the Council's conservation work are not considered here.

This chapter needs a reference to important documents closely connected with conservation (Chapter 2 is, of course, devoted to Key Documents in general). One is a publication of the Council of Europe, Resolution 77(6): a statement on rare and threatened plants, setting out recommendations, and giving information on their implementation by various countries. Botanical gardens are clearly involved, since conservation is now an important function.

The recommendations and legislation of the Council become legally binding only when countries adopt them officially.

International influence is valuable in plant conservation, as already mentioned, not least by encouraging less forward-looking countries to follow the example of the more active.

The activities of the European Community in the cause of conservation are indicated in extracts from Europe 84 (p 13), a publication of the European Commission:

COMMUNITY ACTION TO SAVE OUR
WILDLIFE

With public attention concentrating on problems of acid rain, lead in petrol, or dangerous waste, it is easy to overlook the Community's wide-ranging measures for nature conservation....

But the Community is not only concerned about exotic species. It is already a signatory of the 1979 Berne Convention on the Conservation of European Wildlife and Natural Habitats, and to the Bonn Convention on Migratory Species. It also commissioned a study from the UK Nature Conservancy Council (NCC) on threatened species of wild flora and vertebrate fauna in the EC, as guidance for possible action.

According to the study, the greatest threat to survival of European species is posed by tourism, both inland and in coastal areas. This, together with agriculture (wetland drainage) and urbanisation (weirs and dams built to regulate water levels) cause a greater pollution burden and disturb, if not destroy, deciduous and coniferous woodlands, calcareous grasslands, heaths, moors, mudflats and sand dunes, rivers, streams, ponds and lakes....

Of the 11,000 plant species native to the EC countries, almost 2,000 are threatened to some degree....

(Europe 84, p 13)

Conservation and the public

Governments and official bodies are aware that they cannot deal successfully with urgent conservation problems without voluntary organizations and the active support of the public in different areas of conservation. The multiplicity of organizations can make the situation complicated,

with a risk of overlap of activities. The committed conservationist can find a suitable outlet for available time and energy in active physical work, with the British Trust for Conservation Volunteers, or in less strenuous ways by financial and moral support. The first essential is to make the public aware of the need for their help. In this, botanical gardens have a valuable part to play, e.g. by drawing attention to the local flora, especially to the existence of rare and endangered plants. Botanical gardens are certainly not the only agents in the cause of conservation, but their contribution is a valuable one.

The European Committee for the Conservation of Nature is concerned with problems affecting wildlife, including wild plants, at a European level.

Plants and botanical gardens in Great Britain cannot be treated in isolation; recent developments in conservation have shown that the problems of gardens, at least in temperate countries, are often similar. Much can be learnt from the experiences of foreign directors and curators.

Circumstances have changed from earlier centuries. Many new, or comparatively recent, organizations are fitted to share some of the work and responsibilities once the province of botanical gardens almost alone.

Conservation is perhaps the function in which the existence of other institutions and bodies is particularly noticeable, and in which, to assess the present importance of the gardens, it is necessary to see them as part of the conservation movement.

The example of other countries can be a powerful incentive to the less committed. This does not apply in general to Great Britain, regarded on the whole as an enlightened country in conservation matters.

It sometimes happens that few delegates from Great Britain attend international botanical or horticultural conferences (Peter Maudsley, of Durham University Botanic Garden, is one who has referred to this). The reason, undoubtedly, is not lack of interest, but lack of time or funds. It is also logical that delegates from less conservationally developed countries have, in practical terms, the most to gain from such international discussions and meetings.

Conservation legislation, then, to be effective, must be on an international basis. In Europe, although problems are common to the whole continent, some areas, especially the Mediterranean, are in greater need than others.

Plant conservation in Great Britain: scale of problem

Comparative plant statistics help to maintain a sense of perspective about the scale of conservation problems. 25,000 is generally given as the number of endangered plants in the world. In Europe, 1400 or 1500 is the usual figure quoted. Compared with these, the total of 21 given for this country in the first edition of IUCN's Threatened Plants Committee seems very small. With

Britain's relatively small flora (compared even with some European countries) it might appear that serious problems do not exist here. In Southern Europe, certainly, action is very urgently needed. There is no room for complacency in Britain, however, since habitats can change rapidly. The fact that our flora is a restricted one is an added reason not to allow present members to disappear; it is a situation to be monitored by conservation bodies and botanical gardens.

Plant and animal interaction

With modern thinking on ecology, animals and plants are increasingly seen as part of the totality of living organisms in a habitat, interacting on one another. If they are to be considered together, this can complicate the functions of botanical gardens.

There is now a tendency (as already mentioned in Chapter 7) to have plants and animals (including birds and fish) in some botanical gardens or zoos, e.g. Chester, Jersey. This, however, is often for recreational rather than conservational purposes. (The importance of plant-insect and plant-bird relationships in private gardens is referred to below, p 163).

Wild flower cultivation

The availability of wild flower seeds to the public commercially is a fairly new development. Nostalgia for flowers, remembered from childhood, rarely seen nowadays

in the countryside, leads to a ready market for these seeds. Enthusiasm for conservation on the part of a few specialist growers is making them available; some use of wild flower seed mixed with grass has been made by public authorities on motorway slopes and in parkland. Farmers, it is suggested, might consider growing and selling wild flower mixtures as an alternative crop, where modern monoculture in farming has resulted in over-production with the risk of subsidies being withdrawn. Growing wild plants in private gardens is discussed in the following paragraphs.

Publicity for wild flower conservation was provided by the annual Sunday Times garden design competition at the Chelsea Flower Show of 1982. A different theme is chosen each year for this competition. In 1982 the title was a 'Conservation Garden', incorporating an area devoted to growing wild plants. These would, in turn, encourage birds and butterflies. (It was not intended that the whole garden should be given over to wild plants.) The winning entry was a cleverly designed garden, by Kevan Chambers, in which the 'wild' section was set at one end and merged into a plot containing more usual garden features. It was reported in The Sunday Times, 16 May 1982. The whole area was not large; the design was a successful example showing how gardeners with a comparatively small amount of ground can enjoy the pleasure of wild flowers as well as cultivated varieties.

Evidence of public interest in conservation, and of attempts by enthusiasts to enlist their help, is frequently seen in articles in the press on wild plant and 'weed' gardens. Books and articles on all aspects of gardening are published in a constant stream. Literature on deliberate cultivation of wild flowers is perhaps a fairly recent phenomenon, apart from information on their use for medicinal and domestic purposes. The latter aspect was an old interest in plants, commoner in earlier centuries than in modern times, until a recent revival of interest.

Growing wild flowers in a garden at the present day is naturally connected with the scarcity of such flowers in the countryside. Earlier generations who could see the plants growing freely in the fields and hedgerows had no need to cultivate them for decoration (as opposed to practical uses).

Nevertheless, the scarcity of once common, familiar wild flowers has led to modern interest in giving them a place in the garden. There is the additional advantage of attracting butterflies, birds and other wildlife, whose existence is closely linked with the plants; in 'wild' areas of botanic gardens this is also becoming the custom (as mentioned on p 161).

The new demand for wild flower plants to grow in gardens is encouraged by a range of packets of wild flower seeds in garden shops. This collection includes many

well-known favourites remembered from childhood.

Now that it is illegal to dig up any wild plant without the specific permission of the owner, such an alternative is timely. In addition a few specialist nurseries are advertising wild flower seeds for sale by post (e.g. in The Garden, March 1983). Harvesting such seeds is a slow and expensive process, so that it does not seem at present to be promising for nurseries run on highly cost-effective lines.

An interesting scheme was found at a flower shop in Sheffield (Lockwood's in Surrey Street), to whose owners, Mrs. Anne Carroll and Mr. Tom Sleight, gratitude is expressed for information supplied. The owners have a nursery in South Yorkshire, at Tickhill, from which they brought small plants, already in flower, to their four shops, at Sheffield, Rotherham, Worksop and Newark. The plants on sale have been cowslips and wild violets. In one season approximately 1,000 cowslip plants were sold and about 200 violets, proof that the cowslips were extremely popular. Plants were taken away to other parts of the country by purchasers pleased to see cowslips again, a plant which seems to have a special attraction as a reminder of childhood, especially perhaps for older people.

Since it is quicker and easier to grow plants than to sow seeds, the provision of wild plants might be an idea for some botanical gardens. Where the garden is permitted