METHODS OF ENCOURAGING AMATEUR PARTICIPATION IN NATURAL HISTORY DATA COLLECTING

A STUDY UNDERTAKEN IN BRITAIN, EUROPE AND NORTH AMERICA

by

Kevin F. Kenneally

WESTERN AUSTRALIAN HERBARIUM

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"It is argued by some that conservation as an academic subject cannot be taught to any but a few who have a very firm grounding in ecological sciences. While in this day of specialization such groups are rare, much can still be achieved if we accept that conservation is rather an attitude of mind which should be and can be implanted in all men"

R.D. Piesse and A.A. Strom (1970)

CONTENTS

FIGURES

APPENDICES

(Appendices 2-9 not reproduced in this report)

CHURCHILL FELLOWSHIP STUDY TOUR - BRITAIN, EUROPE AND NORTH AMERICA

SUMMARY

Objectives: (1) To study methods of encouraging amateur participation in natural history data collecting.

(2) To further my studies on the flora of Western Australia by examining historical plant collections, archival materials and consulting with specialists in the botanical institutions visited.

Study programme: A Fellowship of 14 weeks was granted to undertake project (1) listed under Objectives. I sought and received the Churchill Trust's permission to enlarge my study programme by nine weeks (at my own expense) to include project (2) listed under Objectives. The additional time also meant that I could expand my initial programme in England and Europe; examine the role of amateurs in North America and study aspects of tropical botany in Hawaii and Fiji. The latter study is related to my research into the botany of the tropical Kimberley region of Western Australia. In all, over 26 overseas institutions were visited and specialist personnel consulted (Appendix 1).

Date commenced: May 25, 1979.

Study tour completed: November 3, 1979.

Progress since completion of study tour:

(i) Contact has been made with colleagues in other Australian States interested in this work and a brief summary of the trip has been forwarded to them.

(ii) Public lectures on the results of my study tour have been presented to the W.A. Naturalists' Club, the W.A. Wildflower Society, the W.A. Organic Growers' Society, and the W.A. Gould League.

(iii) Contact with senior educationalists in the metropolitan area and discussions with amateur groups and teachers at Mukinbudin, Bunbury, Newman, Karratha, Halls Creek, Port Hedland and Kununurra have taken place.

(iv) As a result of discussion with experts at the Royal Botanic Gardens, Kew, England, a study has been undertaken on Kimberley legumes by Dr Verdcourt and Dr Polhill. Several new records for the Western Australian flora have been added and a number of new species will be described.

(v) Discussions with Dr van Balgooy, Rijksherbarium, Leiden, concerning identifications of plants collected by myself in 1977 from the islets of the Ashmore Reef, Timor Sea, has cleared the way for the results to be written up for publication.

(vi) Research in the archives of British botanical institutions into the collections of John Gilbert, a natural history collector who made important plant collections in this State (particularly in the Wongan Hills) between 1839-42, revealed much new information. This will be written up.

(vii) A field study of Fijian mangroves was made.

Publications proposed: (a) Notes on the natural history of the Ashmore Reef, Timor Sea.

(b) John Gilbert's plant collections in Western Australia.

(c) Mangroves of Western Australia.

(d) The distribution of Boraginaceae in Western Australia.

(e) A new species of Microcorys (Lamiaceae) from the Wongan Hills, Western Australia.

INTRODUCTION

There is great public concern over the environmental problems confronting us all, and the philosophy of conservation strives for wiser use and management of our natural resources. Progress towards this ideal depends upon knowledge and balanced judgement, and the aim of natural history organisations should be to extend environmental knowledge through the programmes they conduct.

With rising costs of travel and the uncertainties created by the 'Energy Crisis' and world instability, more people than ever are looking again at the opportunities on their own doorsteps - where they can gain a deeper knowledge, appreciation and understanding of their own countryside.

As a botanist with the W.A. Herbarium and President of the W.A. Naturalists' Club I had become aware that there was an ever-increasing demand at both the amateur and professional levels for information on the natural history of Western Australia. Since this State is large and the number of professional staff involved in documenting the fauna and flora relatively small, amateurs can play an important role assisting in the collection of scientific data.

The W.A. Naturalists' Club Inc. (established 1924) has for many years initiated programmes involving Club members of all ages in the collection of field data. Two major projects currently in progress and under the guidance of professional scientists are biological surveys of Lake Richmond and Melaleuca Park. The results of a four-year study of the natural history of the Wongan Hills undertaken by members of the Club have been published (Kenneally, 1977). This study also involved close co-operation with residents of the country Shire of Wongan-Ballidu thus resulting in community involvement.

The Club realised that although theoretical training was provided in schools, until recently there was little or no practical training in field observation and recording techniques, these being essential prerequisites in the collection of natural history data. In 1975, in an attempt to overcome this deficiency the Club applied for, and was granted, funds from the Federal Government Schools Commission (Innovation Through Education) for the establishment of a non-residential field study centre at Tomato Lake (near Perth) where these skills are now being taught. This is only the first of many study centres the Club would like to see established.

A consequence of training and involving amateurs in the collection of natural history data has been to increase their awareness of the environment. This in turn has created a need for more knowledge to be made available on the flora and fauna of the State. In this respect the Naturalists' Club undertakes to promote natural history through the media (a film has been made on the Club's achievements at Tomato Lake) and by publishing a scientific journal and handbooks to fulfil this need. At present the Club has published 12 handbooks, the most recent being an account of the mangroves of Western Australia (Semeniuk, Kenneally & Wilson, 1978). Two additional handbooks, one on butterflies, and another on fungi, are currently in preparation.

PURPOSE OF STUDY

In my application to the Trust, I proposed to visit organisations in the United Kingdom and Europe which effectively involved amateur groups in a co-ordinated fashion to collect natural history data. I nominated organisations such as the Botanical Society of the British Isles, the Biological Records Centre at Monkswood and the British Trust for Ornithology, as examples of British groups that encourage and rely on amateur involvement. The Trust for example has a staff of 15. Outside Britain, Project Linne in Sweden uses amateurs to gather data on threatened plant species.

I also planned to visit field study centres and consult with amateur groups on the way they saw their role in the collection of data and to discuss with them effective methods of disseminating the results of such work. At the same time the opportunity would exist to further my studies of the State's flora by examining historical Western Australian plant collections housed in British and European institutions. This would assist me in preparing the results of natural history surveys for publication.

Subsequent to being granted a Fellowship of 14 weeks I sought, and received, the Trust's permission to enlarge my study programme by nine weeks (at my own expense) so that I could include institutions in the United States of America, Canada, Hawaii and Fiji. This additional time allowed me to expand my programme in England and Europe, examine the role of amateurs in North America, and to study aspects of tropical botany in Hawaii and Fiji. The latter study is related to my professional research into the botany of the tropical Kimberley region of Western Australia.

PROGRAMME

The programme approved by the Churchill Trust is shown below. However, once the study programme commenced modifications resulted after consultation with overseas colleagues. The final programme is also shown.

Programme approved by Trust

May 25	Perth to London	Air	
	United Kingdom	Brit.	Royal Botanic Gardens, Kew
		Rail	British Museum Natural History
June 18			Biological Records Centre
			Royal Society for Protection of Birds
			British Trust for Ornithology
			Society for Promotion of Nature Conservation
			Lincoln Records Centre
July 16	London to Paris	Air	Museum Nation D'Histoire Naturelle
July 23	Stockholm	Air	University of Uppsala (Project Linne)
July 30	Copenhagen	Air	Botanical Museum and Herbarium
Aug. 6	Amsterdam	Air	Rijksherbarium (Leiden)
Aug. 13	Munich	Air	Botanische Staatssamlung
	Munich to London	Air	
	United Kingdom	Brit.	Wildfowl Trust
		Rail	National Museum of Wales
			Royal Botanic Garden, Edinburgh
			Scottish Wildlife Trust
Oct. 15	London to N.Y.	Air	The New York Botanical Garden, Bronx, N.Y.
Oct. 21	Toronto	Air	Department Botany, University of Toronto
Oct. 26	San Francisco		Department Botany, California Academy of Sciences
Oct. 29	Honolulu		Department Botany, University of Hawaii
Oct. 31	Nandi, Fiji		
Oct. 1	Sydney		
Nov. 2	Perth		

Final overseas study programme, 1979

May 25	Perth to London	Air	Royal Botanic Gardens, Kew
			Chartwell, Kent
			Blenheim, Oxford
			British Churchill Trust
			BBC TV "Bellamy in Australia"
			British Museum (Natural History)
			Nature Conservancy Council, Huntingdon
			Biological Records Centre, Monks Wood
			SPNC, and Watch, Lincoln
			RSPB, Sandy
			Museum Mankind
July 5	London to Channel Is.	Sea	
July 12	London		Royal Botanic Gardens, Kew
			British Museum (Natural History)
July 16	England to France	Air	Museum National D'Histoire Naturelle, Paris
			French Ministry Conservation
			SNPN
			Field Trip with SNPN
July 23	France to Sweden	Air	University of Uppsala
			Natural History Museum, Stockholm
August 1	Sweden to Finland	Air	Botanic Gardens
August 2	Finland to Norway	Air	Botanic Gardens
August 4	Norway to Sweden	Air	University of Uppsala
August 6	Sweden to Denmark	Air	Botanical Museum & Herbarium, Copenhagen
			Ministry of the Environment
			Danish Nature Conservancy Council
August 9	Denmark to Sweden	Sea/ Rail	University of Lund
August 10	Denmark	Rail/ Car	Field Trip (N. Zealand)
August 15	Denmark to Holland	Air	Rijksherbarium, Leiden

August 18	Holland to W. Germany	Air	Botanische Staatssamlung, Munich
			Field Trip, River Isar
			Konigsee National Park
			Berchtesgaden
August 29	England to Channel Is.	Air	Guernsey (Societe Guernesiaise)
			Sark
			Alderney
			Jersey
Sept. 11	Channel Is. to England	Air	Royal Botanic Gardens, Kew
			Spelthorne Natural History Society
			Linnean Society, London
			Amateur Entomological Exhibition
			World Wildlife Fund
Sept. 23	England to Scotland	Rail	Royal Botanic Gardens, Edinburgh
			Kindrogan Field Study Centre
Sept. 28	Scotland to England	Rail	Royal Botanic Gardens, Kew
			British Museum (Natural History)
			London Zoo (Regents Park)
			Royal Horticultural Society, Wisley
Oct. 15	England to U.S.A.	Air	New York Botanical Gardens
Oct. 19	U.S.A. to Canada	Bus	Niagara Falls
			Hamilton Naturalists
			Toronto Science Centre
Oct. 22	Canada to U.S.A.	Bus	Grand Canyon National Park
			Muir Woods National Monument
Oct. 29	San Francisco to Hawaii	Air	Bernice P. Bishop Museum, Honolulu
Oct. 31	Hawaii to Fiji	Air	Nandi
Nov. 2	Fiji to Australia	Air	Perth

COMMENCEMENT OF STUDY TOUR

As a botanist I chose to base myself at the Royal Botanic Gardens, Kew, England. This afforded me the opportunity to talk to staff members and a large number of international visitors, many of whom are involved in some way with amateur groups. Also the Herbarium at Kew holds many important dried plant collections relevant to studies of Australian botany. The Kew Library

contains some 55,000 volumes which makes it perhaps the most comprehensive botanical library in the world and their archival collections are rich in Australian material. Visits were also made to the British Museum of Natural History to consult their vast botanical collection.

Soon after arrival a visit was made to Sir Winston Churchill's house at Chartwell, Kent and to Churchill's birth-place at Blenheim Palace, Oxford. The visit to Blenheim was not without incident. The day chosen to visit was a very wet one and coincided with the Woodstock Horse Show. The Palace was packed with hundreds of people and horses, reducing the grounds to a quagmire.

A visit was also made to the British Churchill Trust and discussions held with Major General Lascelles. I also availed myself of the facilities of the English Speaking Union and was made an honorary member for 12 months.

During October and December 1978 I acted as a botanical advisor to Dr Mike Weatherley the producer of a BBC-TV natural history series being filmed in Australia. The series of five programmes, each with a specific theme, is titled "Up a Gum Tree" and was presented by Dr David Bellamy formerly of Durham University (see Appendix 2).

On my arrival in England I was invited by Dr Weatherley to attend the film editing sessions at Cine Lingual Studios, particularly those featuring Western Australia, to advise on botanical accuracy.

Dr Bellamy also appears in another programme on BBC-TV which involves young people in gathering data for natural history projects and environmental monitoring. He will be visiting Australia as a special guest of the XIII International Botanical Congress in Sydney in August 1981.

BIOLOGICAL RECORDS CENTRE, MONKS WOOD EXPERIMENTAL STATION, INSTITUTE OF TERRESTRIAL ECOLOGY (Figs. 1 & 2, Appendix 4)

The Experimental Station was originally established in 1961 under the directorship of Professor K. Mellanby and it takes its name from the National Nature Reserve adjacent to it. This oak/ash woodland was formerly part of Ewings-Wode belonging to the Cistercian Abbey at Sawtry Fen and from this Abbey comes the name Monks Wood.

Fig. 1. Monks Wood Experimental Station - Institute of Terrestrial Ecology. A view of the oak/ash woodland of Monks Wood, a National Nature reserve adjacent to the experimental station.

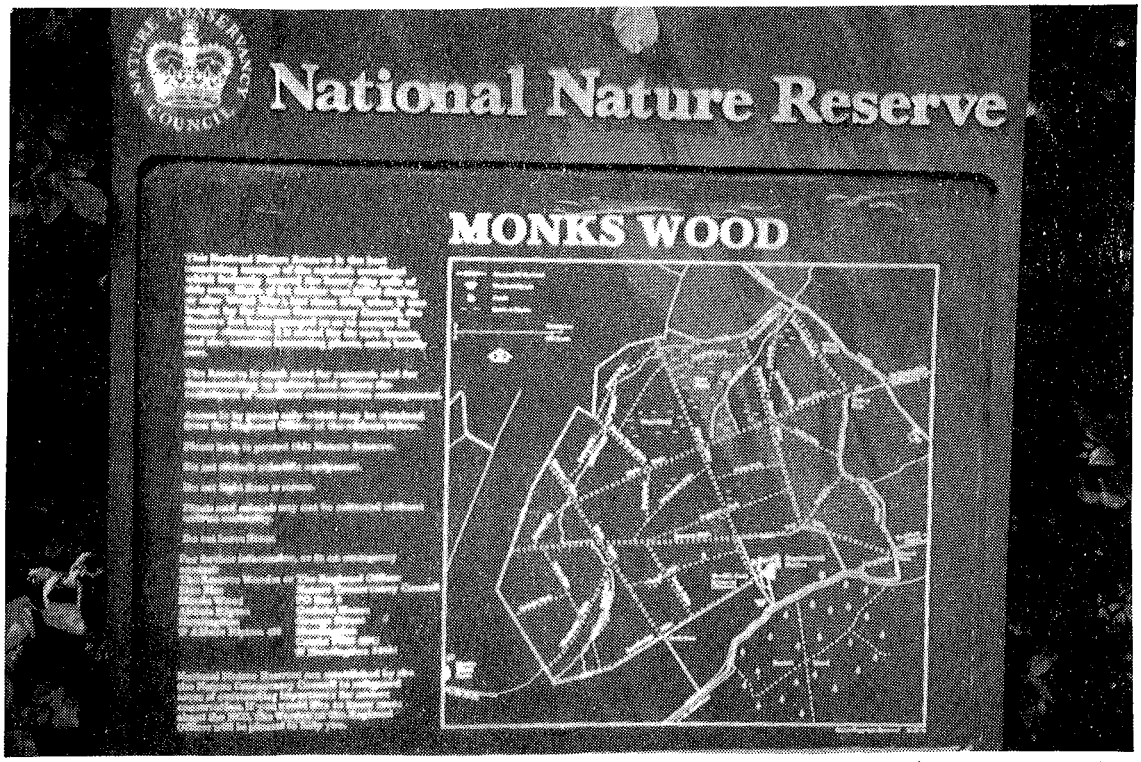

Fig. 2. Monks Wood National Nature Reserve. A map and information board clearly explains the function of the Nature Reserve.

Apart from the laboratories and library for the 80 or so ITE staff based here, there is a hostel of 14 study bedrooms, a conference room and laboratory facilities suitable for short residential field courses and conferences. There are two well equipped analytical chemistry laboratories and a small PDP 11 computer. The Station also has a telephone link to the Cambridge computer laboratory. A small workshop is equipped to build or modify equipment for research projects in progress and a fleet of estate cars and land rovers provides transport for the extensive field work necessary.

Forty acres of ex-arable land attached to the Station are used for experimental studies into the management of hedgerows and grasslands. In addition, Monks Wood has for many years been a ground meteorological station, sending daily records to the Meteorological Office.

The Biological Records Centre (BRC) was set up at Monks Wood Experimental Station in 1964 following the completion of the Botanical Society of the British Isles' "Atlas of the British Flora". Its main function was to utilise the immense wealth of knowledge of the flora and fauna possessed by the thousands of amateur naturalists in the British Isles to produce scientific information which could not be economically gathered by professional scientists alone.

As a result of this biological recording scheme the flora and fauna of Britain is better known and better documented than that of any other equivalent area in the world.

The use of the term 'biological recording' is defined by the BRC as "that body of knowledge which is built out of the simple observation that a particular species was seen at a place, or in an area, at a date, or within a period". In addition, associated features such as habitat, abundance, reproductive capacity, and associated species may be recorded. The information is based on observations by a field worker rather than on experiment.

The first objective of biological recording, and the one foremost in the minds of those who set out to survey the British flora in 1954, was to produce distribution maps as an accurate basis for studying the history of the flora and its phytogeographical relationships. In addition, an accurate

Fig. 3. Kindrogan Field Centre. A view of the large country house which provides accommodation, laboratories and a library for up to 60 students.

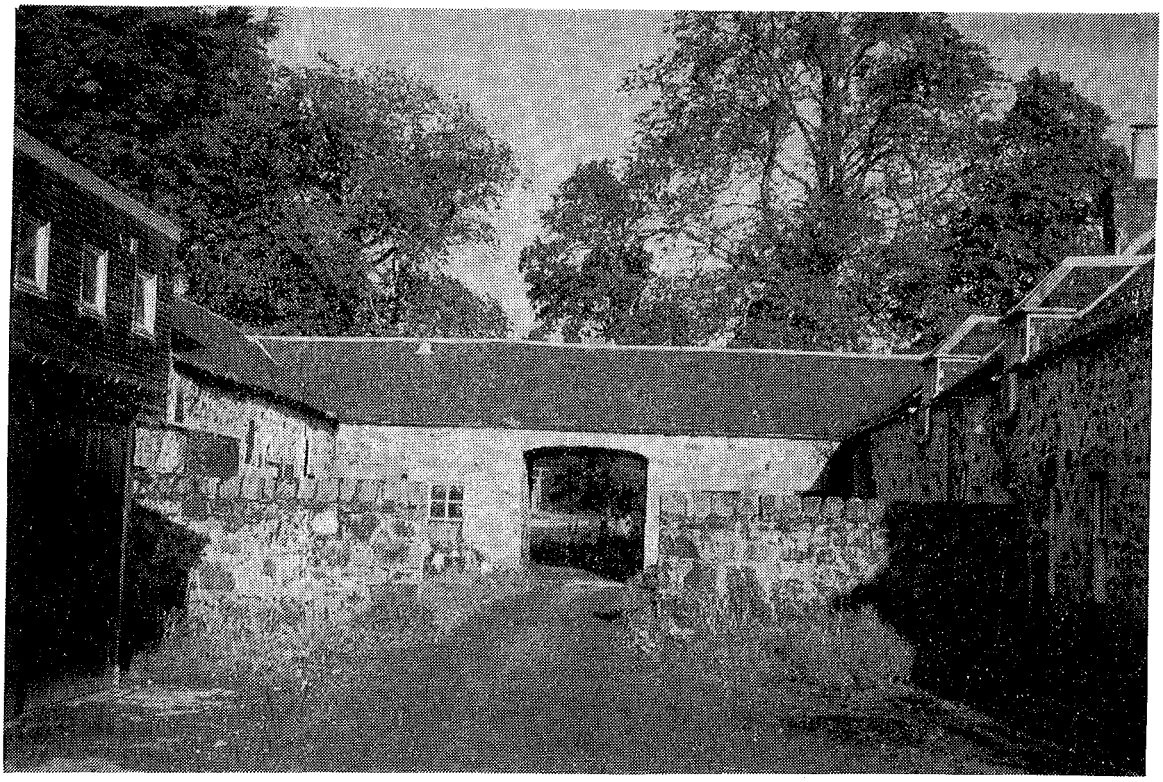

Fig. 4. Kindrogan Field Centre. Many of the original outhouse buildings adjoining the house have been maintained.

distribution map is valuable as part of the basic equipment required for autecological research on any species or group of species. It was quickly found in the 1950s that interim maps were in demand for this purpose - and not only the maps, but the data on which they were based. This demand continues.

The second objective must be to maintain a data bank to supply information by species or by area either to autecologists wishing to know as exactly as possible where to find the species they are working on, or to writers of Floras and Faunas who wish to assemble all available information on their species in a defined area. As an extension of this there is a growing interest in the association between species as, for example, in host parasite or food plant studies.

A third objective, which has now assumed greater immediate importance than the other two, lies in the field of nature conservation. Completed surveys of the flora and fauna make it possible to discover which species are rare and possibly endangered. If the surveys are repeated at regular intervals, any changes in the distribution of species can be detected.

THE ROYAL SOCIETY FOR NATURE CONSERVATION (RSNC)

The Royal Society for Nature Conservation arose out of the Society for the Promotion of Nature Reserves (SPNR) which was founded in 1912 and received its Royal Charter in 1916. Its early work was concerned largely with the collection of information regarding areas suitable for conservation as nature reserves - in the United Kingdom or elsewhere in the Commonwealth - and to prepare schemes accordingly, but it also had powers to acquire reserves by gift, purchase, lease or agreement and further to transfer such interests as it might require to suitable trusts, including the National Trust, and local bodies. It has thus become the father of the county trusts which have come to exercise such wide influence, especially in England and Wales. In recent years most of the Society's resources have been devoted to the promotion of the County Trusts. The management of the Society is vested in the Council which includes nominees of each of the 39 Trusts whose 70,000 members are also Associates of the Society. A small central secretariat now administers the affairs of the Association and the Society.

WATCH TRUST (Appendix 6)

WATCH is the national environmental club for children and young teenagers and the junior wing of the county Nature Conservation Trusts of England. It gives members the chance to play a useful and active part in conservation as individuals, not just as part of a school or youth group.

WATCH is run by the Watch Trust for Environmental Education Ltd., an independent charity sponsored by the Sunday Times newspaper and the Society for the Promotion of Nature Conservation, the national association of the nature conservation trusts. A wide range of interests and organisations are represented on the Watch Trust.

The objectives for which the Trust is established are to educate young people in an understanding and appreciation of nature and the environment and in furtherance of these objects but not otherwise:

(1) to promote and organise for young people practical conservation projects, environmental studies, surveys and research;

(2) to print, publish, circulate and sell books, papers, circulars, magazines and other material requisite for such purpose;

(3) to promote and encourage the said objects by means of lectures, conferences, courses, meetings, television and radio programmes, films, exhibitions, newspapers and periodicals and other means conducive to the dissemination of information about the environment and the said objects, and to manufacture, buy, sell, rent, let on hire and deal in all articles and commodities of whatsoever nature as may be desirable for promoting the said objects;

(4) to make arrangements for carrying out the said objects through or in conjunction with the Society for the Promotion of Nature Conservation or its associated Trusts for Nature Conservation, or with any individual or with any other incorporated or unincorporated body or any local authority, society or club now or hereafter constituted;

(5) to accept subscriptions and donations, grants, legacies, and bequests and apply the same for the purposes of the Trust;

(6) to purchase or otherwise acquire and take over all or any part which the Trust may lawfully acquire or take over, of the property assets, liabilities and engagements of any one or more charitable companies, societies, associations, clubs or bodies having objects altogether or in part similar to those of the Trust and to amalgamate with any such companies or bodies in so far as such amalgamation is legally possible;

(7) to act in concert, to enter into any covenants, or make any arrangements with any corporation, county council, district council, parish council, improvement commissioners or other local authority, now or hereafter constituted, or with any residents or property owners in the neighbourhood of property of the Trust pursuant to any of the objects and powers aforesaid;

(8) to adopt such means of making known the work and aims of the Trust and to take such steps by personal or written appeals and public meetings to procure contributions to the funds of the Trust as may be deemed expedient;

(9) to make, accept, endorse and execute promissory notes, bills of exchange, and other negotiable instruments;

(10) for all or any of the objects of the Trust to employ secretaries, clerks and assistants, together with lecturers, guides and professional assistance of all kinds, and to remunerate any person for services rendered;

(11) to purchase, take on lease or in exchange, hire or otherwise acquire any real or personal property and any rights or privileges which the Trust may think necessary or convenient for the promotion of its objects, and to construct, maintain and alter any buildings or erections necessary or convenient for the work of the Trust;

(12) to sell, let, mortgage, dispose of or turn to account all or any of the property or assets of the Trust as may be thought expedient with a view to the promotion of its objects;

(13) to undertake and execute any charitable trusts which may lawfully be undertaken by the Trust and may be conducive to its objects;

(14) to borrow or raise money for the purposes of the Trust on such terms and on such security as may be thought fit;

(15) to invest the moneys of the Trust not immediately required for its purposes in or upon such investments, securities or property as may be thought fit, but so that moneys subject or representing property subject to the jurisdiction of the Charity Commissioners for England and Wales shall only be invested in such securities and with such sanction (if any) as may for the time being be prescribed by law;

(16) to establish and support or aid in the establishment and support of any charitable associations or institutions and to subscribe or guarantee money for charitable purposes in any way connected with the purposes of the Trust or calculated to further its objects;

(17) to do all such other things as are necessary for the attainment of the above objects or any of them.

WATCH organises projects and surveys which are fun to work on during the holidays and in spare time. The results are often of practical value for conservation.

WATCH club members, through the link with the Nature Conservation Trusts, have the chance to take part in any local meetings, excursions or events. Members may also be able to visit and help with looking after local nature reserves. Local WATCH groups and projects are being started in several areas.

WATCH encourages personal initiative by inviting members to send in ideas, reports on surveys and tasks undertaken and proposals for action, as well as completed projects. Prizes are awarded for good work and about one in every 100 members is awarded a special WATCH merit badge each year.

WATCH is concerned with the environment as a whole and members are involved with a wide range of subjects including wildlife and nature conservation, pollution, planning, local history and archaeology, landscape and the urban scene.

WATCHWORD is the magazine of the WATCH club. It reaches members just before the start of each of the main school holidays. It prints what the members have to say, and it prints news about what members have done themselves. It gives news about wildlife and conservation.

A separate insert keeps members up-to-date with any local news, and activities organised by the county Nature Conservation Trust.

Some recent examples are, a clean stream project using indicator animals to determine pollution levels; the value of churchyards for wildlife; saving old barns; learning to read the landscape; beach life and pollution; the arrival of butterfly migrants; fine town buildings in danger; the state of our footpaths; medieval carvings in churches; creating garden nature reserves.

THE ROYAL SOCIETY FOR THE PROTECTION OF BIRDS (RSPB) - INCLUDING YOUNG ORNITHOLOGISTS CLUB (YOC)

The Royal Society for the Protection of Birds, Europe's largest voluntary wildlife conservation body is a registered charity governed by an elected council and supported by a subscribing membership of over 265,000.

The Society's headquarters is at Sandy Lodge, Bedfordshire, with regional offices in Scotland, Wales and Northern Ireland and a further five (shortly six) covering English regions.

At the RSPB I met Dr James Cadbury (head of research) and was given a tour of their headquarters at the Lodge at Sandy. After discussions with Dr Cadbury I was introduced to Dr Tim Stowe who is responsible for the Beach Birds Survey and for monitoring effects of oil spills and their impact on seabirds. Dr Stowe uses amateurs to supply information on pollution, particularly those caused by oil spills along the coast. He explained that there are still no effective methods of dispersing crude oil. Also after disasters by tankers at sea (e.g. Amico Cadiz) there was evidence that other tanker captains were taking advantage of the situation and discharging surplus oil. Dr Stowe commented that one of the problems he has with amateur naturalists is that many do not enter map grid references on their report cards.

I was also very fortunate to meet Mr Anthony Chapman an English Churchill Fellow who had recently returned from a study tour of Sweden. Mr Chapman is a paraplegic and is required to do all of his field work in a wheel chair. As such his study had been to investigate methods by which handicapped people could become more involved in natural history studies.

The RSPB produces a journal 'Birds' which is distributed to members. I spoke to the editor Mr Nicholas Hammond on financial aspects of its production.

RSPB objects.

Summarised from the Royal Charter, granted 1904:

- To encourage the better conservation and protection of wild birds, more particularly of rare and interesting species, by developing public interest in their place in nature, as well as in their beauty of plumage and note.

- In furtherance of the above to promote interest, research, or study, in all matters connected with birds by such means and in such manner as may seem advisable to the Society.

- To protect or assist in protecting wild birds and their nests and eggs.

- To hold land for the purpose of bird sanctuaries or reserves.

- To provide or subscribe to, or assist other persons or societies in providing watchers for the better protection of wild birds.

- To discourage the wanton destruction of any bird not killed for the purpose of food, but to take no part in the question of killing game birds and legitimate sport of that character.

- To work in conjunction with other bodies, societies or corporations having similar objects in the United Kingdom or anywhere else in the world.

History.

The Society was founded as the Fur and Feather Group at Didsbury in Manchester in 1889 to protest against the trade in birds' feathers for millinery. In 1891 the Group widened its objects and became the Society for the Protection

of Birds. It grew rapidly and was employing staff in London by 1897. It published its first Christmas card in 1898, one of the first charity cards. Bird Notes and News, the Societys' own magazine and forerunner of Birds, was started in 1903. The next year the increasing public interest in the Societys' work was acknowledged by the granting of a Royal Charter.

The original object of the Society -- to achieve legislation curbing the importation of the plumes of egrets and other birds was not achieved until 1921 when Parliament passed the Plumage Act. By then, many other threats to bird life had been recognised. The need for reserves, or sanctuaries as they were then called, was realised and the RSPB bought land at Dungeness in Kent. In the 1920s oil pollution became a major problem affecting seabirds, and by 1928 the Society was warning people against the unwise use of toxic chemicals in their gardens.

At the start of the Second World War, membership of the Society stood at 4,852. Despite the war, the Society's work continued, although at a reduced rate, and by 1946 membership was 6,000. The Junior Bird Records Club (now the YOC) was started.

Avocets were found breeding on marshland at Havergate and Minsmere in 1947 and both became RSPB reserves. The first regional office was established in Edinburgh in 1954. Ospreys were by then recolonising Scotland.

In 1961 the RSPB began investigating the effects of organochlorine pesticides and the Society's reports influenced the decisions to impose voluntary bans on some uses of these chemicals. The Society began to expand rapidly after it moved its headquarters from London to Sandy in 1961. The acquisition of reserves, and the extension of the Society's educational programmes, development of research, investigations and publications departments all followed fairly shortly. In 1966 the Society's magazine changed its format and title to Birds. Regional Offices were established in Northern Ireland in 1967, in Wales in 1971, in North England in 1973, in the South-East in 1974, in the South-West in 1975, and in the Midlands and East Anglia in 1978. An office in North-West England will be opened in 1979.

The work of the Society is organised into three main fields:

(1) Conservation of Wild Birds and Habitats:

- acquisition and management of nature reserves,
- protection of rare and endangered species,
- research and surveys,
- monitoring and response to development proposals, land use practices and, pollution which threaten birds,
- investigation of offences against the Bird Protection Acts.

(2) Information and Education:

- formal education in schools and colleges; informal activity for children, through the Young Ornithologists' Club,
- publications, including Birds, the members' magazine, and Bird Life the YOC journal; displays and exhibitions,
- production and distribution of films on birds; still photography,
- development of membership involvement, activity and support.

(3) Sale and Funding:

- direct mail and retail sale of goods designed to promote interest in birds,
- fund-raising by appeals and other means.

THE UNDERWATER CONSERVATION SOCIETY (UCS) (Appendix 5)

The Underwater Conservation Society (affiliated to The British Sub-Aqua Club) seeks to promote the study and protection of the natural and historical features of the underwater environment of value and interest to mankind.

History.

The Underwater Conservation Society or UCS as it is more often known, is the end result of a natural progression of events. It is also the beginning of a realisation by many people, especially divers that the sea and the life in it are under threat and that conservation measures are essential now to protect the marine environment.

It was this realisation that led to 1977 being designated "Underwater Conservation Year".

UCY was initiated by Triton (now Diver - the magazine of the British Sub-Aqua Club) at a meeting of diving marine biologists and conservationists in October 1975. An Organising Committee was formed from those present, chaired by Mr Bernard Eaton, editor of Triton, and including among others, representatives from the Nature Conservancy Council (NCC), The British Sub-Aqua Club (BS-AC), The Natural Environmental Research Council (NERC), and the Marine Biological Association of the United Kingdom. HRH the Prince of Wales agreed to act as President of UCY, which was officially launched in October 1976 by Dr Tom Pritchard (Director, NCC, Wales) and Dr David Bellamy at Brighton 76, the 10th International Conference of Underwater Activities.

UCY proved to be successful under the direction of Charles Shepperd the Projects Co-ordinator, and many of the initiatives developed during UCY were continued in 1978 under the heading of the Underwater Conservation Programme (UCP). The Projects Co-ordinator for UCP was Dr Bob Earll. UCP proved to be even more successful than UCY and many of the projects began to realise their full potential. Towards the end of 1978 it was decided to form The Underwater Conservation Society.

Organisation.

The Underwater Conservation Society is a constituted, non-profit making organisation affiliated to the British Sub-Aqua Club and administered by a Representative Council. The Representative Council has 12 nominated and 12 elected members. The nominated members come from The British Sub-Aqua Club, Nature Conservancy Council, World Wildlife Fund, Scottish Marine Biological Association, Diver, The Field Studies Council, The Underwater Association, The Society for the Promotion of Nature Conservation and The Nature Reserves Committee for Northern Ireland. The elected council is elected each year by the membership of the Society and will include representatives of regional organisations, project co-ordinators, and interested individuals. The Representative Council will meet to consider progress and policy, however the day to day management of the Society will be left to a management committee and specialist sub-committees.

Activities

1. Conservation. The Society will act as a responsible lobbying organisation on matters concerning marine, and freshwater conservation. Priorities will be given to coastal conservation, action to prevent oil pollution, and to conserve endangered marine species and habitats.

2. Projects. The Society promotes a wide spectrum of projects covering a wide variety of topics and enabling all ability levels to contribute. The projects have been designed both to enhance an awareness and an interest in the marine environment. Projects to date include habitat and species recording using record cards and underwater photographs, and more specialist projects on sea urchins, sea slugs, sponges and dolphins.

3. Expeditions. Yearly expeditions are mounted.

4. Education. The Society will continue to develop educational aides to further the awareness and understanding of the marine environment. Guides to the British Sea Slugs, General Marine Life and British Sponges have been produced to date and a guide to the British Sea Anemones is also planned. Educational slide sets have also been made available and guides to areas of the coast.

5. Publications. Regular newsletters and an annual report are produced, as well as reports on the projects and scientific papers.

PARIS HERBARIUM - JARDIN DES PLANTES

At the Paris Herbarium I met Dr Aline Raynal Roques who is interested in the role of amateurs in natural history studies. According to her there are no well organised projects in France. There are a number of amateur societies working to good scientific standards but they are not contributing to scientific synthesis on a broad scale. France in the last century was very natural history oriented but this has declined and become unfashionable since the 1890s. People feel that "it has all been done".

Dr Roques suggests that personalities teaching natural sciences are less effective than before as they are not world leaders. Therefore they command less respect especially when it comes to getting research money. People of world standing who emanate a charisma attract students, respect and money.

There is a tendency as more leisure time becomes available for French people to turn to nature as a recreational pursuit, i.e. they appreciate it but do not wish to study it. In academic circles in France (like elsewhere) there has been a swing to cellular biology. There is no teaching at present of systematics in French universities, as it is regarded as only for amateurs. Dr Roques suggests that if one teaches natural history from the biological point of view (chromosomal and evolutionary approach) then introduce systematics, students can see the importance and relevance. She has taken adult classes using this approach and has found them to be successful provided that one ensures that they are entertaining as well as informative. She has given lectures at the Club Mediterranean (which has clubs around the world) and spoken to people giving an outline of the vegetation, etc. or the vegetation of the country where the camp is situated. This type of extension is important as it makes people aware of the role and importance of natural history.

The problem with natural history studies is that they are a synthesis and as such it takes a long time to get meaningful results or trends. Dr Roques pointed to the approaching problems created by the fuel crisis. She said people will only realise the implication when it is too late. The fuel crisis is the first true world-wide event affecting the ecological balance. Its effect will be so far reaching that no country will escape its impact either directly or indirectly. One speaks of world wars but even in these not all countries were affected. In the ecological crisis created by the lack of fuel, even Third World countries will be affected in their balance of payments, thus leading to overcutting in many tropical rain-forests in order to meet their balance of payments.

In France the Ministry of Nature Conservancy is viewed by people in the narrow aspects of saving things for savings sake.

One cannot use "prettiness" as a reason for saving species. There must be more emphasis on the preserving of a gene pool for human resources. There must be new attitudes towards nature conservancy on a much broader scale. The Jardin des Plantes prepared an exhibition entitled "Sexuality in Nature" showing the roles from bacteria through to man. This emphasised the importance of keeping a large variety of genetic potential so that one can get the necessary adaptations. There is a need to impress on people that man is only a part of an evolving genetic world and that man's survival, like all

organisms surrounding him, is dependent on the environment which man and nature are constantly changing. One must preserve the largest possible gene pool to ensure man's survival particularly if there are problems. What must also be emphasised to people is the uncertainty of natural sciences because every kind of change can appear when we are least expecting it. You cannot predict living material.

The French are increasingly concerned with conservation but many people feel unable to do anything and this leads to frustration. Nature is becoming fashionable as a recreation. Medicinal herbs are very popular with sophisticated people.

In primary schools there are instructions to teachers on how to interest students in natural history studies. This is mainly done in discussion groups rather than by teaching.

In France there is also the problem of publishing costs. Handbooks are very expensive to produce.

Pressure groups in the environmental movement are not large enough or very strong, however they are very anti-nuclear. This is because they are afraid of what could happen if there are changes in the environment, for example, caused by the release of heated waters from nuclear reactors, or the possibility of other nuclear accidents.

One of the major problems Dr Roques sees is that many well-intentioned people have jumped onto the environmental bandwagon but they do not understand what they are speaking for as they lack the biological training and principles. As a result they tend to bring the movement into disrepute.

In Germany they have formed the Ecological Party which has no major party political affiliations but is trying to achieve a balance in environmental matters. The Ecological Party wants a programme on nature. A large number of people voted for the Party in the European elections but not sufficient votes to have a member elected to the European Assembly.

Dr Roques says that Latin people have an inherent desire to hunt. It is a symbol of manhood to own a gun and to kill. She says that there is a problem in these countries in preserving wildlife. One must adopt a broad scale publicity campaign to change these attitudes which are probably linked to the

thinking that man is the superior being and can achieve more than nature. This is expressed in gardening techniques where European gardens are all planned and designed around the buildings whereas most English buildings blend into their setting.

INSTITUTE OF SYSTEMATIC BOTANY, UNIVERSITY OF UPPSALA, SWEDEN

At the University of Uppsala Botanical Gardens I met Dr Olaf Nilsson. I discussed with him the Project Linne. In 1972 when this project began it had a slow start. It used the media to appeal to amateurs for help. It received 700 replies but many of these were not taken up. It established amateurs in each province of the country. These volunteers were supplied with what the project organisers considered a list of threatened plants. A list of plants for every province was sent out to the regional organiser. It must be pointed out at this stage that Sweden had a Flora. The project caught on like wildfire and started a floristics movement in Sweden. Amateurs became aware that they could be of great use. The project organisers drew up a list of plants in three categories.

(1) Red list of 170 species thought to be threatened.
(2) List of less endangered but rare species but not threatened.
(3) All rare species but not threatened.

The project was divided into three categories: inventory stage, analysis & publication, and preservation. The inventory stage, commenced in 1973 when amateurs went into the field to places where plants had been previously known. If they found a decrease in the number of localities and individuals one could say perhaps a particular plant or its population was decreasing. On the other hand one may find many new individuals and that the population is increasing. These results showed a lack of knowledge of these species and that species are decreasing. Very rare species are easy to count and make an inventory. Other categories are more difficult, especially plants which have been more common or are more common but not well represented in plant collections, therefore it is difficult to know what their status is. Common species give a better idea of what is happening. Nilsson has one assistant who corresponds with observers and recorders. There has to be personal visits and encouragement given to amateur groups. The project has no newsletter. Records received from the amateurs are analysed and the results published. All persons involved are named and they get reprints of the articles. The results are published in the Swedish Society of Botany.

Nilsson commented that many amateurs are better than professionals but many professional scientists look at their colleagues as second class scientists if they are working with amateurs. Recently there has been a slight change in opinion. The reason for the change is that students who have had a working contact with amateurs realise the knowledge of these people.

Many Swedish scientists are working on taxonomic groups outside their country because they say their own country's botany has been fulfilled. It is difficult now to do work on Swedish plants because there are only problem groups left. These groups require biosystematic studies but these are long-term and need team work to solve them.

What to do?

(1) Can protect rare plants by law.

(2) Make nature reserves (owner bought out but this is not popular). Then also need a management plan. A long term plan required because you cannot just finance and walk away.

The plan must ensure that the rare species being preserved do survive. Little is known about management work. Sweden has 750 nature reserves but over half are not managed correctly. A lot of money is wasted on "trying" to manage reserves.

How to conserve plants.

(1) Conserve the natural environment so species live in good health. However Nilsson believes that many rare species will be lost. Half the money spent on nature reserves in Sweden is spent on employing unemployed people.

(2) Botanical gardens as a method of preserving plants. But this does not always work. Difficulties arise from taking plants out of their natural environment. In a few cases it is possible, but in the long term not possible. Nilsson feels that botanical gardens are using this as a justification for being so expensive. In Europe the role of botanical gardens is particularly doubtful.

(3) Seed banking or gene banking. One can be optimistic. Long term conservation of seeds. In Poland they have an Arctic station and are using the permafrost to build chilling rooms to maintain seed, i.e. no requirement for fuel and can maintain seed at -5^{o} to -10^{o}C on a regular basis. This sort of research requires team work to solve future problems. Experience using cereal crops can be transferred to native plants. Barley can be kept for 1,000 years before sowing again. Many tropical seeds cannot be preserved this way, particularly big seeds because they have to be dried out. One has to learn to live with a changing flora whilst trying to conserve what we can, but recognising that there are limits.

One can make farmers more aware of the treatment and management of their land. In the woodlands of Sweden owners have to take particular care in the management of the land. Legislation has been enacted to save these woodlands and also to pay compensation to the farmers for any loss of income.

Why conserve plants?

There are several cultural motives behind it.

(1) Those plants that are directly or indirectly useful, i.e. they have some economic use. Indirectly useful may be the large species-rich areas which act as a "warning bell" for pollution so it is best that communities are kept intact, e.g. lichens as pollution indicators.

(2) Cultural values. Plants and animals feature in art, pottery, etc. and we would be lost if they were to disappear. The rich milieu of species gives us a better quality of life. Our impressions are expanded with nature around us.

(3) Loss of the natural connection between old houses and the environment that supported them, i.e. their setting and surrounding. One loses the ability to understand the philosophy of that time. There is a greater co-operation (in Sweden) between nature conservation and cultural conservation.

Fig. 5. Linnaeus's garden and orangery, Uppsala, Sweden. Carl Linnaeus one of Sweden's most famous scientists, recognised primarily as the father of modern botany had the orangery built in 1743.

Fig. 6. Linnaeus's summer house (Hammarby). Linnaeus built a dwelling-house at Hammarby, 10 km south of Uppsala in 1762. Students of botany flocked here to attend lectures or accompany him on field trips.

Ethical motives.

(1) Our right to eradicate other living organisms. Do we have this right, especially to give future generations a less species-rich area, i.e. a poorer natural heritage. As future generations may have better opportunities to use these natural resources.

(2) We do not fully know what plants are useful and therefore we should be careful in reducing genetic resources.

Energy crisis.

This will affect Third World countries importing from the western world. When wealth is diminished funds to aid conservation are diminished. Ecological changes are much more evident than before. The quality of life or the question of falling standards will rise to such a political dimension that we will be forced to change our way of living.

Over-population.

An example of a problem we have not learnt to cope with. Man's reaction is to put aside fundamental obstructions he cannot or will not face in a constructive way. Man's mental attitude may give us the answer why we cannot act for the future.

UPPSALA, LINNAEUS AND PROJECT LINNE (Figs. 5 and 6)

A generous financial donation from the Swedish section of the World Wildlife Fund (WWF), enabled the start of a project during the autumn of 1972 aimed at conserving as much of the Swedish flora as possible. The campaign was christened "Project Linne" by the Fund's General Secretary, Sven Wahlberg.

The project had evidently emerged as a result of the increasingly clear awareness that something had to be done quickly to prevent a number of Swedish plants from disappearing entirely, or from becoming very few in number. At that time reports were published of scientific investigations in Belgium, England, Switzerland and other countries, in which it was shown that a large number of plants had disappeared, or that their frequency had declined sharply. In Belgium, it was estimated that about 10 per cent of the country's species had become extinct during the last 100 years.

On the basis of the project's own and other's experiences a preliminary list was drawn up of species of Swedish ferns and flowers which may be threatened with extinction within the foreseeable future. The result was a list containing 170 names. This became the project's red list, and has been used as the starting point for the work of the project. Subsequent revisions have been carried out which have shown that some of the species were not threatened to the extent thought likely, while on the other hand some names have had to be added to the list. Lower forms of plant life have been completely excluded, such as fungi, partly because previous background information about them is so inadequate that it is difficult to assess whether they have become rarer or not.

Project Work Organisation

The intention of Project Linne was to increase the knowledge of the current situation of the plants threatened in Sweden, and to suggest suitable protective measures. They have also seen that it is a matter of extreme urgency that there is increased interest in the plants, thus creating greater understanding of the situation of the threatened species and the measures which must be taken to save them. In this context they have worked from the motto "You have to know them before you can feel for them".

The project's activities can be said to fall into three categories. The first one covers work by which they endeavour to obtain knowledge as to which species are under the greatest threat, and are nearest to extinction. For this they go out into the field and make inventories. Visits are made to all the known sites of the species concerned, and assessments are made of the number of plants in each species, and likely developments are mapped out. The latter must be based on previous information, and can at times be difficult. For this field work they have mainly had to depend on voluntary labour. Through direct contacts or through wide appeal they have been able to involve a large number of knowledgeable and interested helpers, throughout almost the whole country. Without their devoted assistance it would never have been possible to complete the field work within a reasonable period of time. Both amateurs and professional turned out, sacrificing time and travelling expenses, purely for idealistic reasons. As a result of this work, they have obtained currently valid data providing basic information on the position today of this or that species in Sweden. This work is now in its final phase and it is thought that it may be concluded during 1978. Altogether inventories have been made of about 150 species.

This work is accompanied by compilation and analysis. Not infrequently the latter shows that the conditions under which a species exists are so precarious that if protective measures are not taken immediately, the species will disappear within a short period, or they may also find that their fears were exaggerated and that there is no immediate threat of the species disappearing. Each species is then the subject of a brief summary of its status quo, comprising a number of points. This places the plant in a threat category of an internationally recognised type indicating the degree of threat to the plant. Suggestions are also given as to suitable protective measures, and an assessment of protective measures already carried out. These facts are published as they are completed in a series called "Report from Project Linnaeus" in "Svensk Botanisk Tidskrift" (Swedish Botanical Magazine). When all the species have been dealt with, a summary will be made and the whole project will then be presented to the nature conservancy authorities.

This is where we come to the third element of the project. The aim was to endeavour to preserve as large a part of the flora as possible. This will not be done by making inventories and collecting pieces of data. They are just a help. The project has no funds to pay for the tending or buying up land for nature reserves, etc., and can thus only act as a driving force, and create the basis for action. It can also check on the results of the action taken and initiate improvements. And finally, and this is important as mentioned above, it can create a broadly-based understanding of protective measures. In this capacity Project Linne has been consulted, as an expert consultative body, regarding matters related to the formation of nature reserves and proposals for official protective measures in close co-operation with the relevant authorities. Several species and habitats have been given an acceptable level of protection as a direct result of initiatives from the project. Several research projects regarding threatened plants and ways of preserving them have also been initiated.

The burden of work on the project has steadily increased. In spite of this, the number of persons directly involved in and reimbursed for this project has been able to be kept at a minimum, in fact, only one part-time position. This is thanks to the large number of volunteers.

Responsibiity for the project and its execution has been shared by the Swedish Museum of Natural History (Naturhistoriska riksmuseet), Stockholm, and the Botanical Gardens, Uppsala. The National Environmental Protection Board (Statens naturvardsverk) has supervised the project during the last few years, and has contributed funds towards services, materials and travel.

Seen in an international perspective the situation of Swedish flora is good. They have expert knowledge, they know what species are threatened, and they have an efficiently functioning nature conservancy authority. In other countries the situation is considerably worse. In many areas, particularly in Europe and North America, projects with similar aims to those described here have been established. Nevertheless, and this should be stressed, in those areas where the need is greatest, above all in the Tropics, there has been little initiative. Rapid changes are required in these areas since unique and extremely rich floras are involved. The European projects might serve as working models.

SWEDISH MUSEUM OF NATURAL HISTORY

At the Natural History Museum I spoke to Professor Santerson about conservation projects involving amateur naturalists. Professor Santerson gave an example of a mapping project they had done using amateurs. One of the grass species Agrostemma githago which when mapped was a common weed of cereal crops. However since there have been changes in agricultural techniques, e.g. seed cleaning, this particular species has now declined to such a state that it is considered rare and requires protection. It is often difficult to interpret the data that mapping programmes provide. He has calculated that it would take five botanists 100 years to put all the four million herbarium collections onto the computer. This figure is based on spending 10 minutes per specimen label. It is better to think of it as 20 to 30 botanists spending 10 years. Professor Santerson is doubtful about the information supplied by print-outs. For example, how does one know the accuracy of the determination on which the list is based.

We also discussed freezing techniques for sterilising herbarium material. He says that chemical fumigation is ruining herbarium specimens for future chemo-taxonomic studies. He suggests freezing specimens for no more than two days at -30°C. This method has no deleterious effects on material. The

material can be put inside plastic bags to prevent condensation wetting herbarium sheets. Stockholm has used this method for five years without any outbreaks of insects.

LUND BOTANICAL GARDEN, SWEDEN

I met Dr Almborn who is in charge of the University herbarium. He had arranged that the Australian specimens of Stylidium and Halgania were ready for my inspection. I discussed with Dr Almborn the role of amateurs at the Lund herbarium. He told me that they are welcome to come and use the collection. He introduced me to Sars Eric Muhr who is an amateur lichenologist and school teacher who had just participated in a lichenological expedition in Denmark accompanying professionals. This participation was by invitation. He said he found this sort of contact invaluable and felt that amateurs working alone often become frustrated at the delays in getting their specimens identified but he realised the time limitations of the professionals. He felt that the change in format of the Swedish Botanical Magazine was very important, i.e. it changed from being published in English to being published in Swedish which made it more comprehensible to the majority of Swedish amateurs.

BOTANICAL MUSEUM AND HERBARIUM, COPENHAGEN, DENMARK

At the Botanical Museum I renewed my acquaintance with Dr Bertil Hansen. Dr Hansen told me that the herbarium works on the taxonomy of tropical groups as well as the flora of Greenland. In Thailand they have an old commitment. Dr Hansen is involved in preparing a flora of Thailand. This is an international botanical project. They are also working on the flora of Ethiopia and contributions to South American floras. He feels that herbaria have a commitment to Third World countries as western institutions hold extensive literature and collections, particularly types. Denmark funds Thai botanists to come to Denmark and stay for one to two years. Dr Hansen introduced me to Mrs Jette Baago who is employed under grants from the Danish State Research Fund. Mrs Baago is involved with amateur groups. She showed me their journal, URT, which is sent to all members.

MINISTRY OF THE ENVIRONMENT, NATIONAL AGENCY FOR THE PROTECTION OF NATURE, MONUMENTS AND SITES, DENMARK

At the Ministry I met Claus Overson and discussed with him the structure of the Danish Ministry of Environment as well as the role of amateurs in Denmark. He told me that the Danish structure allows for active participation by amateurs and that one group, the Danish Nature Conservation Society has a statutory position in decision making. Claus arranged for me to meet members of the Danish Conservancy Council where I spoke to Peter Mellergard (botanist and information secretary), Lasse Edlev (biology teacher) and Ole Mommer (youth secretary) working with the Copenhagen group and Christian Licht (responsible for organising bus tours - mainly of natural history interest but structured to make a profit). Peter Mellergard is responsible for the publishing side of the department. They informed me that the organisation had a large membership but many members pay their fees but do not participate in club activities. The society receives no government grants and they say that this is an important principle to adhere to. They have staff who call people up on the telephone and ask them about becoming members. They have had great success with this method but estimate the first year's fee just covers the cost of getting them enrolled as members. Members receive:

(1) a quarterly journal;
(2) a coupon which gives them discounts on entrance to museums, etc.; and
(3) reductions on all published material the Society produces.

Nature and Youth is a separate organisation that is affiliated to the International Youth Federation for the Environmental Studies and Conservation which itself is under sponsorship from the International Union for the Supervision of Nature and Natural Resources (IUCN). Funding for the ICUN comes from the World Wildlife Fund (WWF). Seventy per cent of the money for the youth group comes from the Education Ministry. The youth group was started 20 years ago and has a present membership of 1,500 in 40 clubs. The society sees the most important role in the future to be the establishment of regional groups.

FIELD EXCURSION TO NORTH ZEALAND, DENMARK

Claus Oveson took me to the Farum Nature Park and Lake Bastrup So Nature Reserve. These areas are mainly used for recreation. From here we proceeded to the State Forests at Ganlose Eget which is mainly oak woodland. Stone

walls had been built around the woods as an exclosure system to enable the oak and beech to regenerate, otherwise animals got in and ate the seeds. A visit was also made to Smasoerne - a fenland with a rich flora which is being maintained by allowing horses to graze the area. From here we passed through Krogenlund forest west towards Langso Valley which is intended as a nature reserve then through to Bollind Peninsula Nature Reserve at Roskilde Fiord. This area is preserved for its scenic value, bird life and flora. It is constantly grazed by cattle and horses as part of a management regime.

RIJKSHERBARIUM, LEIDEN, HOLLAND

At the Rijksherbarium I met Professor Dr Kalkman and discussed my project with him. Professor Kalkman said that the Herbarium's main function is systematic botany, i.e. monographs, but they do become involved with amateurs and encourage them. In Holland at the moment they are preparing an Atlas of the Dutch Flora and a Dutch Moss Flora using amateurs. They are well off for angiosperm floras as they have three - two Dutch and one Belgium. However, there are many problems with the lower plants particularly algae and fungi. With regard to the Flora Malesiana, Professor Kalkman sees the role of his institution to continue the monographic studies as they have the collections and the literature. He believes that floristic lists and flora handbooks are best prepared by botanists living in these Asian countries with help from Leiden botanists.

PROJECTS INVOLVING AMATEURS IN HOLLAND

(1) Taxonomic studies - these are few because of the need to examine specimens and have access to literature.

(2) Mapping the Netherlands flora - many amateurs are involved but they are dealing with only 1,500 species. It is something therefore that they can do at their leisure. The Botany Society (to which many amateurs belong organises two meetings and one field meeting per year). The field meeting takes the form of an excursion to prepare an inventory of areas where information is lacking. Usually they are requested by local Government authorities who pay the cost of having the report published. The project was initiated when they were doing a rare species count. One of the problems appears to be exserting control on the information collected by amateurs.

Computerising herbarium collections.

This will not be done because:

(1) Not enough people to handle the task.
(2) No money to pay for it.

With the publication of the plant atlas it is possible that the printer will meet the cost of putting it on the computer.

Other amateur groups.

The Institute for Nature Education is mainly an amateur group paid for by grants mainly coming from Culture Recreation and Welfare Ministry. This Ministry also backs the plant atlas by employing one person for four years.

Nature conservancy.

(1) Approved groups look after national monuments.
(2) Provincial groups, i.e. backed by provincial and local Governments.
(3) Ministry of Culture, Recreation and Welfare together with Ministry of Agriculture.

The herbarium produces the journal Gorteria. There are six issues per year. The journal is devoted to floristics of the Netherlands. This is very much appreciated by amateurs. At the end of each year a list of the most important collections made during the year and named by the staff of the herbarium is published. If people send in a report of an interesting plant they may be requested to send a voucher.

Flora Neerlandica - this is the scientific journal published by the Dutch Botanical Society.

Royal Dutch Society of Natural History.

This is an amateur body which publishes handbooks. They have approximately 10,000 members and produce a semi-scientific journal called Natura. They have published handbooks on mosses, myxomycetes, butterflies, land snails and plant communities. The Leiden group of the society has separate study groups on fungi, bryophytes, higher plants and beach material. Most groups are trying

to prepare inventories of nature reserves. Dr Vinc has been marginally involved with conservation in Irian Jaya (West New Guinea). He has produced a publication entitled "Nature Conservation in Irian Jaya" field report of UNDP/FAO Nature Conservation and Wildlife Management Project INS/73/013, Bogor, May 1978 (Field Report 9) these are obtainable from Directorate of Nature Conservation, Jalan Ir. H. Juanda 9, Bogor, Indonesia.

MUNICH BOTANICAL GARDEN (Figs. 7 and 8)

Mapping of the Bavarian flora.

I spoke to Dr Wolfgang Lippert about their flora mapping project. He explained that Bavaria has had a Flora from 1914 and that the species are well known. There are some difficult groups which require specialist attention. Many amateurs are not prepared to collect specimens as many identify their role with conserving species. Therefore the resulting distribution maps are very patchy. Dr Lippert is researching Alchemilla (Rosaceae) which is an apomictic species which requires specimens for study and cultivation. He says that amateurs are not prepared to recognise infraspecific categories. Also, much information received from them is incomplete with such things as ecological notes missing. He suggested that using pro forma sheets that require only the marking or ticking of squares may have more success. He suggests that amateurs should be given projects that show results which the amateur can see. His comment is that the Bavarian maps are only at the first stage as good maps and the botanists will have to fill in the mising information. They supply amateurs involved in the mapping scheme with one newsletter per year which contains:

(1) Names of all amateurs involved in the project.
(2) Division of Bavaria into six regions with one co-ordinator per region.
(3) An annual report of how far the mapping has progressed.

The project is funded to allow three people to work full-time. With regard to computerising the herbarium the staff regard this as an impossible task. They suggest that one could do detailed mapping of critical species from herbarium material.

I also spoke to Dr Ernst Krack who had been employed for one year on the Bavarian mapping project before joining the herbarium. He said that it was his experience with amateurs that one needs to get to know the workers so that

Fig. 7. Munich Botanical Garden and Herbarium, (Botanische Staatssammlung), W. Germany. A view of the ornamental garden (Schmuckhof) behind the herbarium.

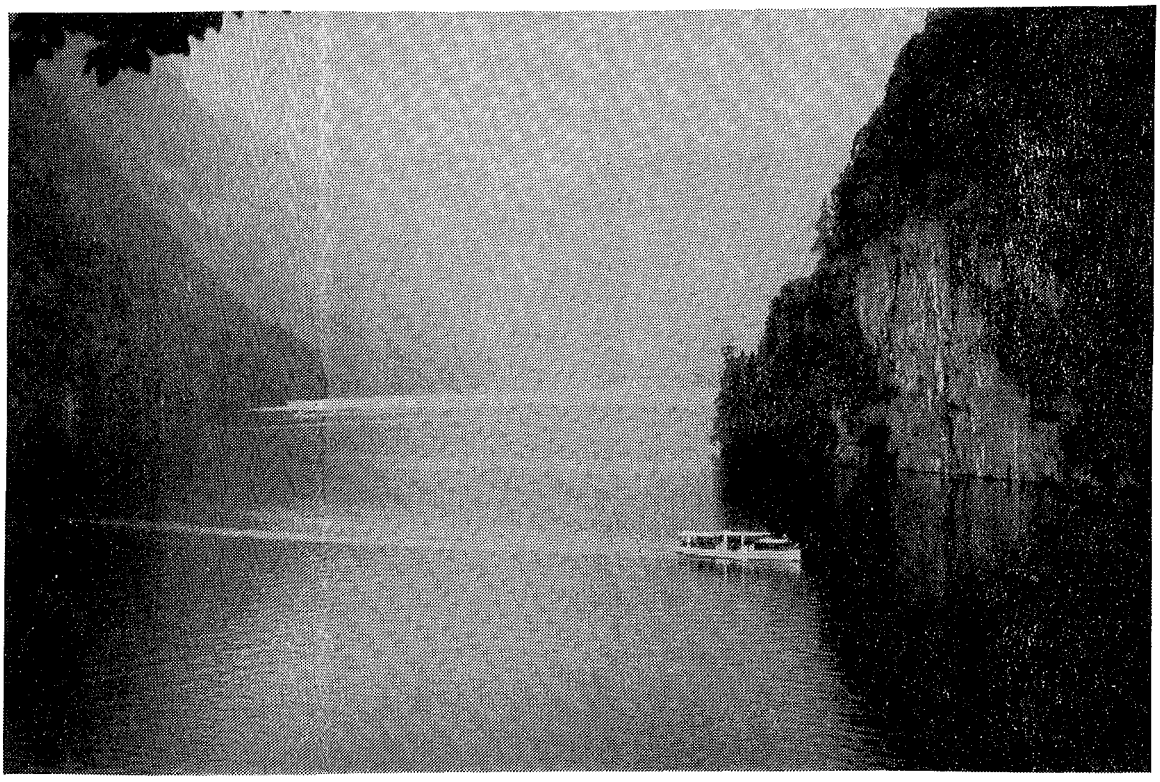

Fig. 8. "Konigssee National Park, Bavaria. A view over the lake from the 'Malerwinkel' or artists corner, showing one of the electrically powered ferry boats - the only type permitted to operate on the lake.

one can assess their accuracy. He felt that if he had to begin the mapping project over again he would begin with a smaller number of species ± 300 and concentrate on the ones that amateurs are familiar with, i.e. ones that they know or that are easy to determine using their floras. Once one has raised the knowledge of these people then one can progress to the next 300 species. He would insist on voucher material for especially difficult species. He would limit the number of amateurs involved as from his experience the majority of the people are not active. Also people need to be familiar with the landscape with which they are working. He said that the Swiss have an excellent system of using six full-time botanist to map their flora. He commented that in Australia only one gridding system should be used because in Europe they have numerous systems which are difficult to interrelate. There is no effort made to teach integrated natural history in schools. Visiting the Munich Herbarium was Dr A. El Gazzar from Cairo University. He told me that in Egypt there are no amateur groups involved in natural history studies.

Alfred Meebold Collection

The Munich Herbarium holds a vast quantity of material collected from Western Australia by Dr Meebold. I checked with Dr Schreiber and found that Meebold's second set of specimens was lodged at Munich (the first set at Hedenheim). Dr Schreiber said she would attempt to locate more information on Meebold for me. Subsequently Dr Schreiber has forwarded to the Western Australian Herbarium duplicate specimens of Meebold material as well as handwriting specimens and photographs of Meebold.

Field trip River Isar

I accompanied Dr G. Benl on a field trip to the River Isar where there occur patches of alpine species washed down from the mountains by the rains. We also visited an area where the horsetail Equisetum telmatia occurs.

THE NEW YORK BOTANICAL GARDEN, UNITED STATES OF AMERICA (Figs. 9-12)

The New York Botanical Garden (NYBG) was founded in 1891 and occupies 250 acres in the midst of the largest metropolitan area in the United States.

The Garden also houses an herbarium with a collection of more than 4,000,000 plant specimens, and a library of more than 400,000 books.

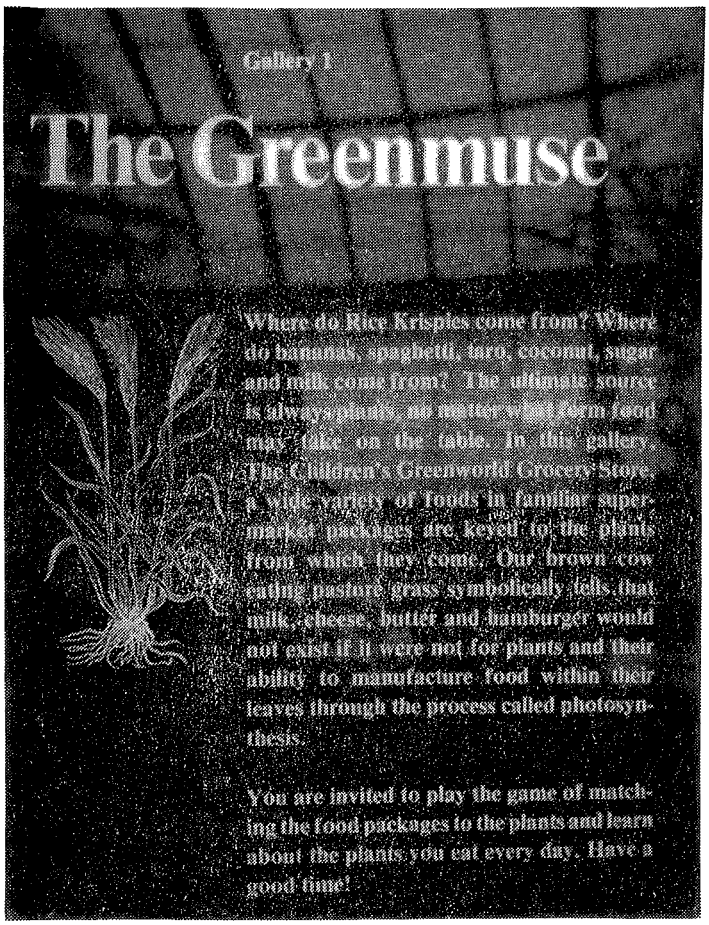

Fig. 9. New York Botanical Garden, U.S.A. The Greenmuse is located within the botanical garden and is designed to provide a variety of educational programmes for children.

Fig. 10. Greenworld Grocery Store, N.Y.B.G. Displaying over 40 major food crops of the world, the exhibit is designed to provide information about the sources of food that is eaten.

The Garden also is a major educational facility that serves students from early school years to post-graduate and post-doctoral training.

Greenworld for Children.

The Greenworld for Children provides a variety of educational programmes for school classes that visit the NYBG.

TOURS.

The Conservatory.

Students explore a variety of botanical habitats: the tropics, the desert, a palm grove and a medieval garden. Time: one hour; suitable for grades 1-12.

The "Greenworld Grocery Store" Exhibit.

Displaying over 40 major food crops of the world, the Conservatory exhibit is designed to dispel misinformation about the sources of food we eat. Time: one-half hour; suitable for grades 1-12.

MINICOURSES.

These programmes consist of two sessions, each 2.5 hours.

Introduction to the Plant World.

Students learn basic concepts of botany, horticulture and ecology by means of workshops and explorations within the Conservatory and the deciduous forest. Suitable for grades 3-7.

Foods, Herbs and Spices.

Workshops focus on botany and the growth of common food plants, herbs and species, as well as the scientific aspects of bread making. Students investigate the food plants exhibit, visit the Conservatory's medieval herb garden and the outdoor herb garden. Suitable for grades 5-8.

Fig. 11. Greenworld Grocery, N.Y.B.G. Students are guided by code numbers on packets to identical codes on living plant displays.

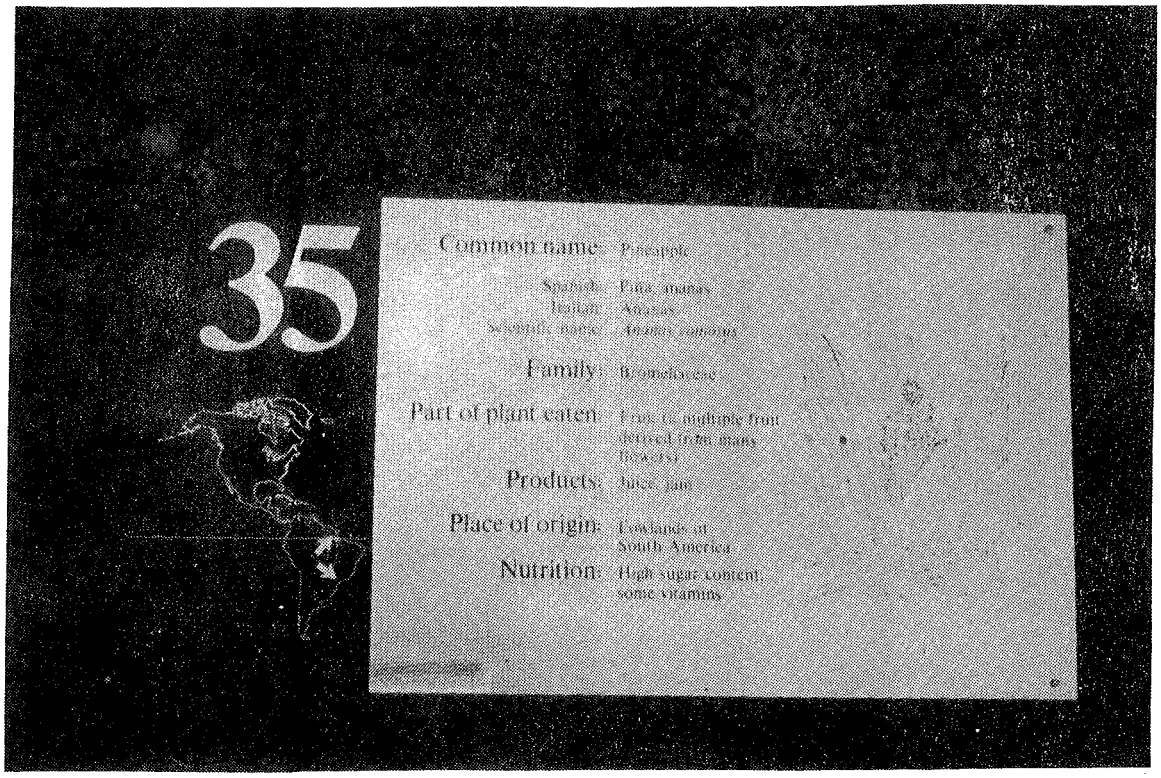

Fig. 12. Greenworld Grocery, N.Y.B.G. A detailed sign displays information on each of the plants grown in the garden.

The Jungle, the Desert and the Northeast Woods.

Students compare plants that grow in three different environments. In each the habitat (including climate) is investigated in conjunction with the characteristics of its flora. Students study the Conservatory collections and explore the Garden's deciduous forest using data sheets. Suitable for grades 5-8.

The Forest in the City.

Students explore the botany and ecology of the Garden's 200 year old Hemlock Forest. The structure of the forest, as well as specific tree characteristics are studied. Suitable for grades 5-8.

Making Sense of your Environment.

Through sensory exploration children are encouraged to discover how plants adapt to the different environments within the conservatory and in the NYBG's forest. Activities include investigating plants under a microscope, creating an environmental collage, writing riddles and poems, making maps and preparing a fruit salad. Suitable for grades 2-5.

GRAND CANYON NATIONAL PARK, ARIZONA, UNITED STATES OF AMERICA

(Figs. 15 & 16, Appendix 7)

The Grand Canyon of Arizona was discovered by Don Lopez de Cardenas, a captain in Coronado's expedition, in 1540.

It was made a National Monument in 1908 and became a National Park in 1919. It has an area of over 1,900 square miles, is about 190 miles long, and contains 280 miles of the Colorado River.

The Grand Canyon is probably the world's most spectacular example of the power of erosion - a chasm 277 miles long (measured by river course) and up to 18 miles wide. The Canyon bottom below Yavapai Point is 2,400 feet above sea level, about 4,500 feet below the South Rim and 5,400 feet below the North Rim - making an average depth of about one mile.

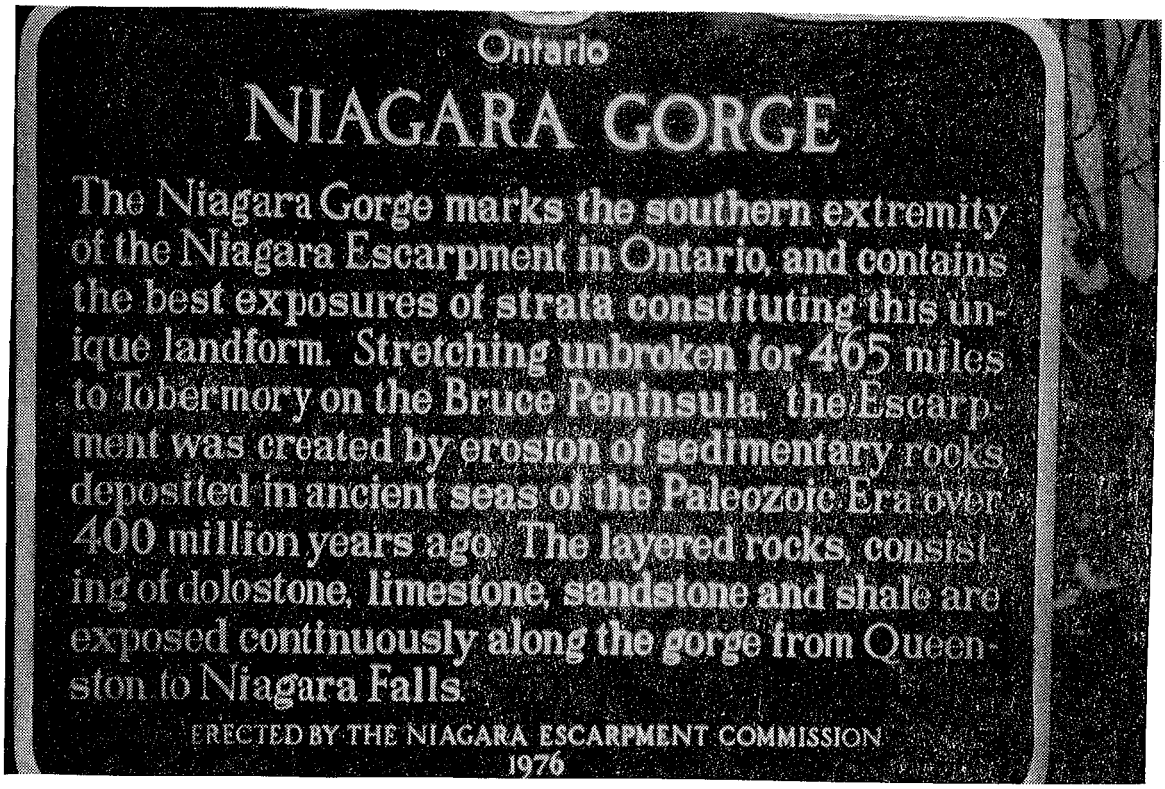

Fig. 13. Niagara Gorge, Ontario, Canada. Signs such as this are extremely important to visitors wishing to learn about the natural history of an area.

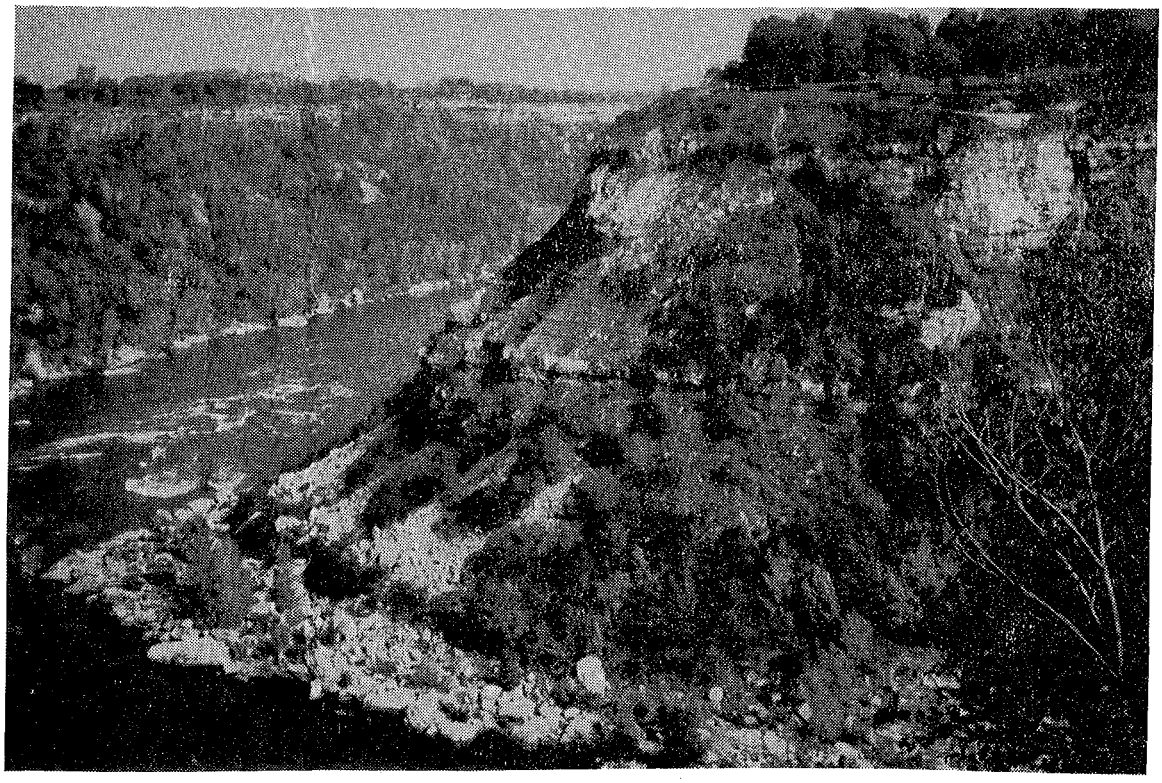

Fig. 14. Niagara Gorge, Ontario, Canada. A view of the Gorge located opposite the above signpost.

The Canyon is cut into a low, rounded mountain, the Kaibab Plateau. As the rock walls break down, the Chasm gradually widens. Scientists estimate that it has taken from three to six million years to cut the Grand Canyon. The work is by no means finished. The powerful forces of the rushing river, of rain, snow, heat, frost and wind are still sculpturing the fantastic shapes of these precipitous bluffs and towering crags.

The Colorado River is one of the great river systems in the United States of America (over 1,400 miles long), and the area it drains totals nearly 12 per cent of the United States of America. At the river gauging station near the Kaibab Suspension Bridge in Grand Canyon, the river averages about 300 feet in width, is up to about 100 feet deep, and flows at an average speed of four miles an hour. Prior to the completion of Glen Canyon Dam, the river carried through the Grand Canyon an average of nearly one-half million tons of suspended sand and silt every 24 hours. The Colorado River flows west through the Grand Canyon, later bends to the south and finally empties into the Gulf of California in Mexico.

Six of the seven climatic belts recognised throughout the world are represented in the Grand Canyon region. They vary from that of Mexican desert at the Canyon bottom to the Arctic-Alpine type of the San Francisco peaks.

Animal life in the Grand Canyon region includes about 70 species of mammals, 250 species of birds, 25 reptiles and five amphibians. During the growing season, both rims and canyon slopes are covered with a great variety of wildflowers.

The finest and most spectacular views of the Grand Canyon are obtained from the inner-canyon trails which the National Park Service has literally carved out of the sides of the cliffs.

Many hundred small ruins of ancient Indian pueblos have been discovered in the Canyon and on the rims. Five Indian tribes live in the region today: the Hopi, Navajo, Havasupai, Paiute, and Hualpai.

The Grand Canyon has its own Natural History Association which is a non-profit corporation working in conjunction with the National Park Service in programmes of interpretation, education and research in the Grand Canyon National Park. The Grand Canyon Natural History Association in cooperation

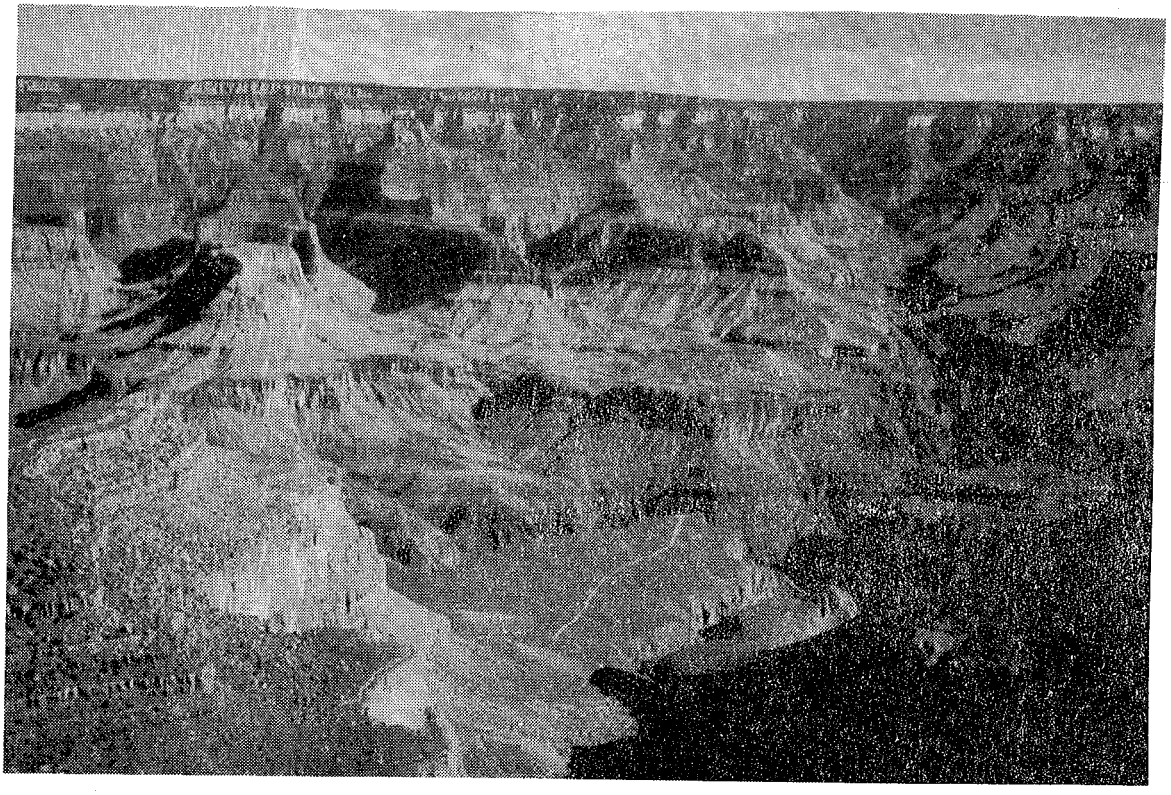

Fig. 15. Grand Canyon National Park, Arizona, U.S.A. A view over the Canyon - probably the world's most spectacular example of the power of erosion. Species lists covering aspects of the natural history are available from the park rangers.

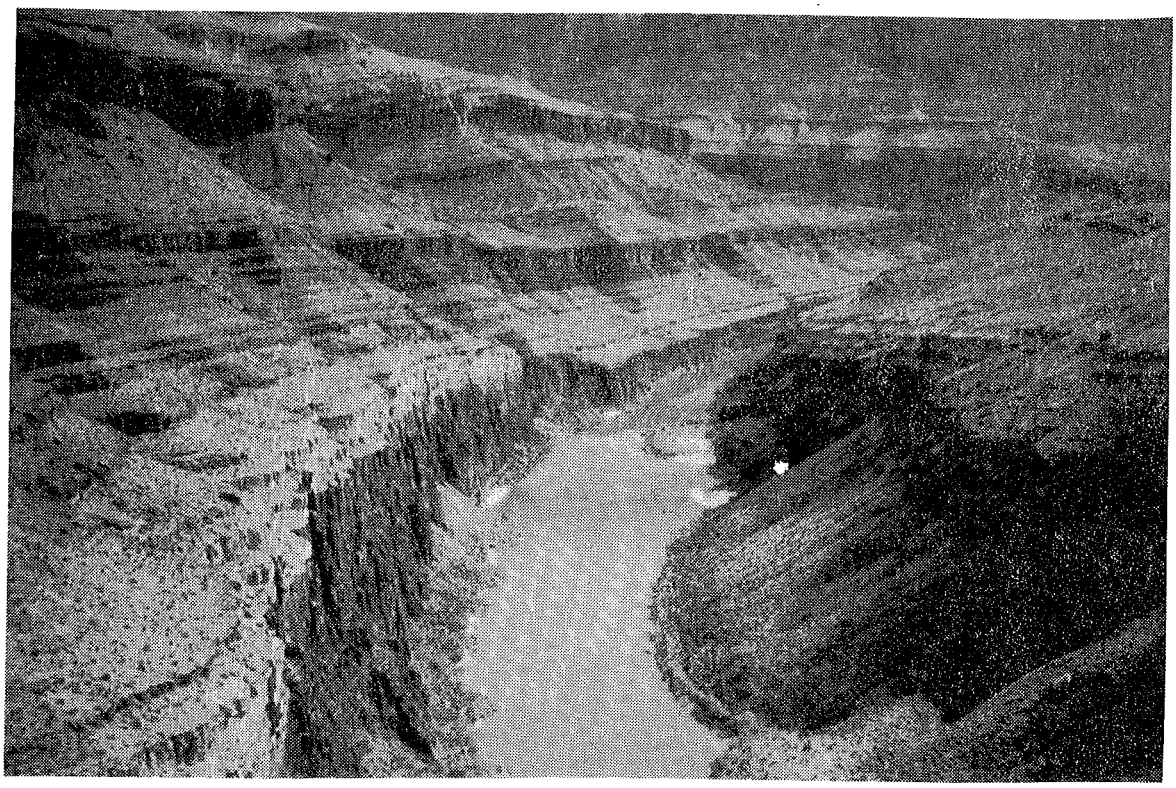

Fig. 16. A result of controlling the floodwaters of the Colorado River has been the development of new shoreline plant communities.

with the National Park Service (and with assistance from the Grand Canyon National Park Lodges) publishes an informative newsheet "The Grand Canyon Guide". The Association also publishes many useful field check lists and brochures covering many aspects of the Grand Canyon's Natural History (see Appendix 7).

MUIR WOODS NATIONAL MONUMENT, CALIFORNIA, UNITED STATES OF AMERICA

One hundred and fifty million years ago a tree ancestral to the present-day redwood and giant sequoia grew throughout the Northern Hemisphere. Since then, the natural habitat of these trees has progressively diminished.

Today the giant sequoia grows in a 400 kilometre long (250 mile long) area of the western slopes of the Sierra Nevada, in Sequoia and Yosemite National parks. The redwood, Sequoia sempervirens, grows only in a belt 869 kilometres (540 miles) long and 48 kilometres (30 miles) wide along the Pacific coast from just south of Monterey to the south-western corner of Oregon. Here the ocean produces abundant fog in selected areas; one of them is the V-shaped valley of Muir Woods, in which the damp climate needed for this species prevails. Some specimens exceed 73 metres (240 feet) in height. In Humbolt County, farther north, a few trees soar to more than 110 metres (360 feet) - the tallest living things.

The redwoods' great size and long life are attributed to their high resistance to fires, insects, and fungi. They resist fire by having a large amount of water in their wood, almost no inflammable pitch, and a thick, asbestos-like bark. The last significant fire in Muir Woods occurred about 1845. Natural chemicals in the wood provide very effective protection from insects and fungi.

The oldest known coast redwood was 2,200 years old. The usual life span range from 400 to 800 years.

The roots of neither the Redwood nor the Giant Sequoia penetrate much deeper than two metres (six feet), but their lateral root systems radiate as far as 46 metres (150 feet) from the trees. Giant Sequoias reproduce only from seeds; Redwoods reproduce mainly by sprouting from root buds.

Muir Woods is named for conservationist John Muir, who loved the redwood forests and who for many years campaigned for their protection. One of the people Muir inspired to contribute to the conservation movement was United States of America Representative William Kent of Marin County. With his wife, Elizabeth Thatcher Kent, the Congressman purchased 200 hectares (500 acres) of redwoods that were threatened by lumbering operations and water impoundment.

The Kents then presented the land to the American people with the stipulation that the area be named Muir Woods, and in 1908 President Theodore Roosevelt established the national monument by proclamation.

FIELD STUDIES CENTRES

In Australia, the importance of establishing Field Studies Centres has been dealt with by Piesse and Strom (1970) who pointed out that:

"Despite different situations, Australia's conservation education and environmental science education problems would seem to be similar to those in Britain: lack of finance, lack of resources in trained staff, insufficient public realisation of the importance of conservation; and a lack of co-ordination between like-minded bodies. (One might add to this list in Australia's case - an educational history rather lacking, at least until very recent years, in a sense of experiment and innovation)".

A Field Studies Centre is a place where you can stay when you wish to learn about some aspect of the countryside, of wildlife or of the man-made environment which interests you; a place where permanent staff and visiting experts store their knowledge and enthusiasm with beginners of any age and background; a place to attend short courses in a great variety of subjects. They may be residential or non-residential centres where at least basic laboratory and library facilities are available as well as regular access to the areas being studied.

The location of a Centre is chosen for the diversity and richness of its surroundings; visitors experience the simple comforts of a converted countryhouse or similar building set in superb scenery. Whatever their subject, they can take full advantage of well-stocked libraries, laboratories and workrooms.

Each Centre should be headed by a Warden and Director of Studies qualified in an appropriate academic subject and having a wide experience of field investigation and teaching. His local knowledge, and the stored data and field experiments for which he and his staff are responsible, form a valuable part of the service.

In Britain the Field Studies Centres offer a wider variety of courses which include:

(I) Courses for Adult Amateurs.

Short introductory courses are run in subjects ranging from 'Birds in the Landscape' to 'Photography and Processing', 'Small Mammals', 'Outdoor Painting' to 'Garden Plants'. Most of them are designed for people over 16 but some are for family groups. These courses are taught by Centre staff or visiting experts.

(II) Courses for School Parties.

More than half the visitors to FS Centres are senior pupils from secondary schools studying biology, geography or related environmental subjects; special attention is paid to new A-level syllabus requirements. Younger school parties are also catered for at some Centres. Most school courses are run by, or in collaboration with, Centre staff.

(III) Provision for those in Higher Education.

Groups from universities and colleges, including student teachers, can make full use of Centre facilities whether they attend Centre-run courses or not. Such groups are offered tutorial consultation with Centre staff, who can also arrange for access to working ground.

(IV) Conferences and Professional Training.

Special arrangements can be made at some Centres (and at certain times of the year) for professional groups to have the use of Centre facilities, including appropriate instruction if required. Professions with an environmental interest -- planners, engineers, industrialists, agriculturalists, foresters, conservation managers, youth leaders, etc., as well as teachers and educational administrators -- are particularly welcome.

(V) Research Facilities.

Working ground and bench space are available for individual research projects. The FSC also offers technical advice and contract services.

KINDROGAN FIELD CENTRE (Figs. 3-4)

My visit to Kindrogan was planned to coincide with a fungal identification course being conducted by Dr Roy Watling of the Royal Botanic Gardens, Edinburgh, combined with a nature photography course given by Heather Angel, a professional wildlife photographer. I was able to see how a field Study Centre functioned and hold discussions with the warden Mr Brian Brookes, on the overall management of the Centre.

The Scottish Field Studies Association maintains the residential Field Centre at Kindrogan in Perthshire, a large country house in an attractive highland setting. Kindrogan provides accommodation, laboratories and a library for up to 60 students, and affords excellent opportunities for all aspects of field studies.

Kindrogan Field Centre is located in the Southern Grampian Highlands, within easy reach of the Central Lowlands, and close to the main lines of communication.

Many types of habitat are found close to Kindrogan. These include several mountains of up to 900 m (3,000 feet), coniferous and broad-leaved woodland, the River Ardle and numerous lochs, dry and wet moorland, pasture and arable farmland. The area is rich in historical remains, and there are many traces of abandoned settlements. The southern margin of the Highlands lies a few miles to the south of Kindrogan, offering vivid contrasts between the upland and lowland landscapes of eastern Scotland. The area has a corresponding contrast in landforms and underlying geology.

The objectives of the Scottish Field Studies Association are to promote the development of Field Studies in Scotland, and to create among both adult and younger members of the general public a greater awareness and understanding of the Scottish countryside. Field Studies embraces a variety of specialist and general subjects, ranging from Archaeology and Botany, through Ecology, Geography and Geology, to Painting and Photography.

The Association aims to provide facilities of all kinds for Field Studies, to offer courses in a wide range of subjects, and to maintain a staff of expert field instructors. Policy decisions are made by an Executive Committee, served by a number of specialised sub-committees.

In liaison with statutory bodies, such as the Nature Conservancy Council and the Countryside Commission for Scotland, and with voluntary organisations such as the Scottish Wildlife Trust, the Association seeks to promote the objects of conservation, by consultation and co-operation in matters relating to the countryside. Conservation Education is a vital element in most of the Association's activities.

The major part of the Association's income is derived from the fees of students attending courses at Kindrogan and elsewhere. This is supplemented by grants from the Scottish Education Department, local authorities, and from other private corporate benefactors.

The Field Centre at Kindrogan was equipped with the aid of substantial grants from a number of sources, including the Carnegie United Kingdom Trust, the Countryside Commission for Scotland, and Mr and Mrs K.F. Balfour, former owners of Kindrogan. The sale of publications also provides a small supplementary income.

CONCLUSIONS

My overseas study visit has convinced me of the urgent need to co-ordinate and improve the collection and collation of information about the distribution of plants and animals in Australia. This type of programme was outlined by Perring (1975) who pointed out that it had a number of advantages. Firstly for biogeographers and taxonomists for whom accurate distribution maps are of fundamental importance in understanding the origins and relationships of the taxa with which they are concerned. Secondly, for ecologists for whom a map may be a first stage in understanding the environmental factors limiting the distribution of plants and animals. Thirdly, and of rapidly growing importance, for conservation so that those who are called upon to carry out a rational policy to ensure the survival of the country's wildlife, have an up-to-date knowledge of the location and relative frequency of the species involved. Furthermore, with the growth in concern for the environment there is an increasing demand for biological information for Environmental Impact Statements (EIS's) and Environmental Review and Management Programmes (ERMP's) in relation to new primary and industrial developments. All of these require that all relevant biological data be available so that informed environmental decisions may be made.

I was particularly interested to examine and evaluate the European (particularly the British) "Network System" for utilising amateurs in data collecting. This system showed that by pooling their efforts, groups of individuals could initiate new kinds of research which make possible lines of enquiry that they could not hope to undertake on their own. However, I have serious doubts that such an ambitious system could at present be established in Australia. The enormous size of Australia and its relatively small (and localised) population, compared with the United Kingdom, means that survey of its biological resources cannot approach anything like the detail possible in many parts of Europe. The European network system is effective because of the regionalisation (and size) of these countries with their ability to involve institutions (and their staff) in such projects. The end result is an intricate pattern of close-knit groups being co-ordinated from a central point (in Britain, often the Biological Records Centre at Monks Wood). The European experience has established that voluntary studies are unlikely to be scientifically very productive without careful forthought and discipline. Also, the system depends on delegating certain areas of the country to the most reliable workers.

The major problem in Australia is that in almost every State the institutions are confined to the capital cities (fringing the coast) and any project being conducted by amateurs in remote parts of the country by necessity have to be co-ordinated from a great distance. Most of the countries conducting network research stress the importance of maintaining personal contact by making visits to the areas so that amateurs can understand and identify with the tasks they have undertaken. Another consideration is that European project co-ordinators are almost always able to supply base-line information to their worker (e.g. species lists, floras, etc.) but in many States and areas of Australia this is not possible. It must also be remembered that the European system relies heavily on "sight" records where no voucher specimen is collected. In Australia with the present state of biological knowledge limited, sight record studies should only be used for groups which are well known and for which handbooks exist.

It is because of the lack of knowledge of the natural history of Australia that all the available manpower should be used effectively in relation to a plan which will ensure the country is covered as evenly as personnel and access allow. It should be acknowledged at this point that the Royal Australasian Ornithologists Unions "Atlas of Australian Birds" project is one example of a network system that is successfully operating in Australia. Its success I feel is due to the small number of species involved, the availability of good field guides for identification and the general widespread interest in birds.

It has been pointed out in a recent publication "People and Plants in Australia" (Carr & Carr 1981) that since the end of the 2nd World War there has been a sharp decline in Australia in the contribution made by amateurs to natural history studies, relative to that made by professionals. This has been despite the urgent need for observations in phenology, pollination biology, vegetation mapping and floristic studies, the areas in which amateurs in other countries have made notable contributions. The Carrs suggest the possibility that amateurs are less able nowadays to meet the stringent standards demanded for publication in botanical and other scientific journals. Such a comment highlights the important role that the journals of Australian natural history societies play in providing a venue in which amateurs can publish.

The role of the Australian education system in contributing to the decline of natural history studies is also discussed by the Carrs who state "The teaching profession may be suffering a dearth of individuals who, keen amateur naturalists themselves, are able and willing to enthuse thier pupils in field studies. The teaching of biology from stereotype texts with little incitement to personal discovery and conveying no sense of the openendedness of the subject may also be partly at fault. There are of course, notable exceptions".

Perring (1976) has also suggested that it would help if biology teachers appreciated that, as the majority of their pupils will never become professional biologists, a good percentage of teaching time might with profit be devoted to helping them to enjoy the subject as a recreation. And that means field work, observation of whole plants and animals, rather than the microbiology of the cell. Being able to name and classify species of plants and animals is an essential cornerstone of biological science and education. Once these basic elements can be identified, and their interactions understood, one may begin to appeciate the fragility of ecosystems. Field Studies Centres could also play a major role in this educational programme.

It seems to me to reflect very badly on the attitudes of Australians when the national heritage of unique wildlife which we have inherited should be so blatantly ignored in the education curriculum. What I propose is that Australian natural history be taught in schools as an integral part of the school curriculum not as an "optional extra" which allows it to be, in many cases, totally ignored. If this were the case teachers would be required to work it into the school programme along with other core subjects. Every year hundreds of city-bred teachers embark on a career which may mean a two or three-year stint in an outback school which may for some be purgatory or for others a romantic adventure. Horin (1980) has suggested that "A strong interest in a craft or hobby, or in the <u>environment</u> ...." may help some teachers through their outback experience.

In some of the physical sciences lack of equipment may limit much back room research but in natural history studies there is no restriction. All that is required is a pair of eyes aided by a handlens, a notebook and pencil, the will to explore, a little encouragement and a desire to accurately record

one's observations. There are many amateurs capable of carrying out a multitude of tasks provided they receive the necessary direction and encouragement.

The necessary direction for recording programmes should be developed according to the talents available in each of the States but in such a way that they will eventually contribute to a national information net. As schools in Australia form probably the best network of institutions across the country more use should be made of them as co-ordinating centres for natural history studies.

It has been shown by Perring (1976) that many volunteers are only amateur in the sense that they are unpaid: they are often professional people who want to bring the same level of expertise to their hobby as they bring to their work. Participating in network research gives a sense of purpose to their field observing and brings them into direct contact with the best professional taxonomists in the country, from whom they may learn the key characters of sight, sound or behaviour which make identification easier.

Professional organisers have to appreciate this and ensure these rewards are provided by organising field meetings, producing identification keys and interim results to maintain interest. The English experience suggests that the more effort and thought professionals put into the organisation of a scheme, the richer will be the rewards.

RECOMMENDATIONS

1. That a uniform co-ordinated system be established by State and Federal Governments which will ensure that data collected by taxonomists and other scientists becomes immediately accessible to the wider public. The establishment of a small group of professional scientists devoted to co-ordinating amateur activity could produce information which would be economically impossible to produce by any other means.

2. That natural history studies be put back into school curricula and a greater responsibility taken by Teacher Training Colleges and Universities in training people in this field.

3. As schools in Australia form probably the best network of institutions across the country more use be made of them as co-ordinating centres for natural history surveys.

4. When initially selecting subject or groups (of plants) for study something large and unmistakable be chosen (e.g. Banksias, Wattles (Acacia spp.), Orchids, etc.) and preferably groups for which popular field guides have been published.

5. That government financial assistance be forthcoming to promote the publication of handbooks, field guides and scientific periodicals produced by non-profit natural history organisations.

6. In designing projects which amateurs are to be involved in it is important to:

   (i) carefully elaborate to the group the objectives of the proposed exercise;

   (ii) this should then be further simplified and broken down into a series of graded steps so that parts of the project may be brought to completion and published (or circulated amongst group members) to create a sense of involvement and achievement. If possible all participants' names should be included in reports;

(iii) the presentation of the results needs to be simplified so that survey members can see what they have accomplished;

(iv) selection of group leaders is extremely important. This necessitates the project co-ordinator knowing the capabilities of the amateur workers before such a person is selected.

7. Repeated visits to study sites often leads to a loss of interest (the "been there before" syndrome) which can be a major problem with projects which require follow-up visits. Maintaining interest can be achieved by swapping groups onto different projects or rostering the groups so that the visits are not made so frequently by the same people.

ACKNOWLEDGEMENTS

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To all those people who assisted me in many ways, and with many kindnesses during my overseas visit, I also convey my sincere thanks.

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APPENDIX 1

INSTITUTIONS VISITED & PERSONNEL CONSULTED

APPENDIX 1

INSTITUTIONS VISITED & PERSONNEL CONSULTED

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