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Rare plant recording and conservation in Great Britain

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Between 1954 and 1960 in the course of the preparation of the "Atlas of the British flora" (PERRING & WALTERS 1962) the 400 rarest species in the flora which occurred in twenty or fewer "vice-counties" were selected for special treatment. These are the species labelled A in the Atlas. For each of these species the main literature and herbarium sources were abstracted by the secretariat and transformed into punched cards, one for each locality. From these cards tabulations were prepared which showed the most recent data at which the species had been found at each locality. The tabulations were sent to experts who were asked to comment on the records and, where possible, supply more recent dates and additional records. After digesting their comments the maps were prepared.

More than a decade has passed since most of these maps were prepared: a decade in which changes in our environment have been more rapid than ever before. In order that we should understand the effect of these changes on our rare plant species I believe we should survey their populations at least every ten years. For this reason we began a rare species survey at the Biological Records Centre in 1968.

We were able to use the "Atlas" as an objective basis for the definition of rarity. We chose initially to look at the 278 species which occur in 15 or fewer 10 km squares in Great Britain. We sent out tabulations of species by Counties to the recorders of the Botanical Society of the British Isles, who sent us back the latest information about the species. From these returns we were able to assess the number of squares and localities for which the species were known in historical times, in the period between 1930 and 1950, and from 1960 onwards. The results are given in table 1.

	Squares	%	*Localities*	%
Historical times	3390	100	4595	100
1930-1950	1673	49	1902	41
1960+	1176	35	1425	31

Table 1. — Number of squares and localities for 278 rare British plant species.

This disturbing decline in numbers of locations of rare species is emphasised by the fact that since recording began 20 native species have become extinct in Great Britain, though several still persist in Ireland (PERRING 1970). Only seven of these 20 became extinct before 1900 but 13 have disappeared in the last 70 years: one every five years. If the rate of extinction is increasing then so also is the number of species which are now restricted to only one or two localities. If we consider the rare species (excluding the extinctions) and the number of them which occurred in one or two squares at different periods we find the following:

— Before 1900, 44 species occured in only one or two 10 km squares.

— By 1930, 59 species occured in only one or two 10 km squares.

— By 1960, 97 species occured in only one or two 10 km squares.

Thus about 7% of our native flora of about 1500 species may now be in danger of extinction. In addition there is another group of species which are declining so rapidly that they too may shortly be entering this danger zone. This is particularly true of species of marshes and wet meadows which are subject to draining. The fritillary, *Fritillaria meleagris*, once known from over 100 localities is now known from only 11.

The fen orchild, *Liparis loeselii*, once widespread in the fens of East Anglia is now reduced to a very small number of localities in that region and is mainly to be found in dune-slacks in South Wales.

One of our most attractive weeds of farmland is the cow-wheat, *Melampyrum arvense*, but it is now on the verge of extinction, hanging on in a few hedgerows where it is always under threat from burning or clearance. Once reported from nearly 50 localities, it is now known from only 5.

If losses like these are to be halted a comprehensive plan of action has to be prepared and put into action. Some progress has already been made and more is proposed. This paper reviews the present situation.

Action by the Biological Records Centre

The first action which is being taken is to find out as much as possible about each site of each rare species. The Biological Records Centre of the Nature Conservancy is asking amateur and professional botanists who visit any of the sites to complete a simple form on which they record the exact locality, making a sketch map indicating the limits of the population, and where possible, counting the numbers of plants. They are asked also for brief ecological notes and, most important, what protection, if any, is already being given to the site. At the Biological Records Centre the data will be used to acquire a national picture of the state of each species and to decide for each rare species a "threat number" which is based on five criterea:

— The absolute size of the population(s) in Great Britain

— The rate of decline.

— The attractiveness of the species.

— The accessibility.

— The present conservation status of its site(s).

The threat number will enable us to decide which species are most in need of protection, in consultation with the Botanical Society's own Conservation Committee. The decisions can be translated into action at B.R.C. where lists of species and localities by counties can be compiled using data processing machinery. These will be sent to the appropriate County Conservation Trust and members of the regional staff of the Nature Conservancy with a request that they do all in their power to ensure the safeguarding of each of the localities in the list.

Local action

If a locality is already a nature reserve then any management plan for that reserve should take account of the presence of the rare species and, where necessary, research should be carried out to determine what action if any is needed to maintain or increase the population. In the absence of research it is usually best to ensure that past management is continued, as it has been under these conditions that the species has survived for so long.

If a locality is not a nature reserve then it is to be hoped that local conservation organisations will try to acquire the site or, failing that, ensure that the owner understands its importance and allows management to be carried out where necessary. Local action is most likely to be successful in this respect: personal contact with an owner or tenant can succeed where official letters fail. It is intended to provide a tool for local initiative by the production during the next twelve months of a book listing all the rare plants of Britain and, for each species, indicating past and present distribution (not including exact localities of course), and the rate and probable causes of decline, following the excellent Belgium example (DELVOSALLE & AL. 1969). The book will be published with the approval of the Conservation Liaison Committee of the Society for the Promotion of Nature Reserves on which the voluntary and professional conservation organisations and the national biological societies are all represented. A statement like "now only known from two localities in Cornwall" may be valuable ammunition when talking to the farmer who owns one of them.

Even when the conservation organisations are successful and control over a site has been acquired, access may have to be limited either because constant visits may disclose the site of an attractive species to the unscrupulous, or because it occurs in a fragile habitat which could be destroyed by too much trampling by the very well-wishers most keen to protect it.

It is surely better, particularly in rapidly developing regions, that the local conservation organisations should know the exact localities of the rare species in their area so that they can keep their planning authorities fully informed: the dangers from

house building, road widening, pipe-laying, drainage schemes, etc. are much greater than attacks by a few unscrupulous naturalists. Nevertheless action would certainly not be complete unless attention were paid to this aspect of rare species conservation.

National action

Legislation.

There is no general law against picking or uprooting wild flowers in Great Britain though in most counties bye-laws exist which make it an offence to dig up plants in places to which the public has access. These by-laws are largely forgotten, are totally ineffective and in any case are too blunt a weapon to deal with the problem of particular species in particular places. For some years the Wild Plant Protection Working Party drawing its members from the Society for the Promotion of Nature Reserves, the Botanical Society of the British Isles and the Council for Nature has been working on a bill which would make the picking or uprooting of certain rare species illegal. The "threat number" will help to determine which species should be included, though it would be hoped that should the bill become law that it would give the Minister concerned powers to alter the list on advice from a panel, whose judgment would be based on frequent resurveys carried out by the B.S.B.I.

Persuasion.

An Act is needed to give teeth to the other actions which must be taken to bring about a change in attitude to collecting — a change which has been brought about in the bird world in Britain, in the last twenty or thirty years, by a combination of legal action and publicity. The Botanical Society has made a start by producing a "Code of conduct" for its members — a guide to collecting and visiting rare or local species. The most important clauses of the Code are as follows:

— Members will not pick or collect any material of nationally rare species as defined in a list published by the Society (longer than the list in the proposed Act).

— Members will not collect specimens from any nature reserve or nature trail without obtaining permission.

— Members will not collect specimens of any species in a locality in which it is scarce.

— When living material of rare or local species is required for experimental work members should raise it from seed or cuttings wherever possible.

The Code also includes warnings about the dangers of large numbers of botanists visiting or photographing the site of a rare species. The British Lichen Society has already produced a similar code for its members and it is hoped that other national biological societies will follow suit. Using particular codes as a basis the Conservation

Liaison Committee hopes to prepare a common code as a guide to all biologists, amateur and professional, who may not be members of national societies but need just as much guidance: members of natural history societies, school teachers, students, and non-taxonomists in biology departments of our universities.

Guidance is required not only at the national level, but at the local level also. It is still a frequent practice in many parts of the country for competitions to be held for the largest collection of wild flowers which can be made by school children. This can obviously endanger locally rare species and yet it would be a loss educationally if all collecting ceased. The compromise has been for a number of local education authorities with the backing of their local conservation organisations to produce guides to the collecting of wild flowers in their counties. Brecon, Cambridgeshire and the Isle of Ely, Hertfordshire, Huntingdonshire and Northamptonshire Education Authorities have published lists. These guides usually contain two lists: one of about 250 plants which could be collected with safety, and a second list of decorative and beautiful flowers often rare or local which should on no account be picked.

Propagation.

It is generally agreed by botanists that adequate material of rare species for classical taxonomic studies already exists in our national herbaria: it is the cyto-geneticists, plant biochemists, population analysts and so on who make the biggest demands for living material from the wild. One of the clauses of the Botanical Society's "Code of conduct," referred to above, suggested that members should raise rare species from seed or propagate them from cuttings wherever possible. If this suggestion is to become effective centres of seeds and cuttings must be established and the scientific public must be able to find out easily what they contain.

The natural guardians of living plant material are the botanic gardens, and the Botanical Society has already begun discussions with several of the larger ones to decide how the problem is to be tackled. In every case the suggestion of co-operation has been warmly welcomed by the gardens.

It is hoped that particular gardens will be responsible for maintaining living plants of known provenance of particular species and that a register of these will be maintained by the B.S.B.I. All those wishing to work on any species in the list of those not to be collected would be asked to obtain material for study from the appropriate botanic garden and not from the field.

The Royal Botanic Gardens at Kew has, over the last two years, developed a seed bank with extensive low temperature storage conditions. Agreement has been reached that the gardens will maintain stocks of seed or rare British species. It is hoped to use the members of the B.S.B.I. to collect the necessary material, under guidance, over the next few years. This excellent scheme is fully described by THOMPSON (1970). If material from the remaining sites of our diminishing rare species are safely in cultivation or stored as viable seed we shall at least be certain that the potential genetical and physiological interest of these usually isolated populations has not been lost to science for ever.

Introductions and reintroductions

If material from all localities can be propagated successfully, the interests of conservation can be served in another way. If the native site of a rare species is temporarily destroyed the species may be subsequently re-introduced after the danger has passed, from stock known originally to have come from that site. Whilst most ecologists would be unwilling to accept this as a solution except in extreme cases, because of the importance of maintaining the original balance between species making up the community, nevertheless, if a species is destroyed by accident, there could in future at least be the possibility of returning it to its original site.

There are many naturalists, sympathetic to the aims of conservation, who wish to carry the ideas of introduction further and spread rare species at will through the countryside. There are, however, strong arguments against introducing populations to new areas without very careful consideration of all the biological consequences. For example, there must be complete certainty that the species concerned is absent from the area to which it is intended that the introduction should be made, otherwise the mixing of a native and introduced population can seriously affect any genetical experiments in the future. Introductions also seriously affect work on the distribution patterns of species. The Biological Records Centre of the Nature Conservancy is trying to establish the native distribution of all the plants and animals which occur in the British Isles. In order to reduce the possibility of misleading results appearing as a product of introductions it is essential that these are fully and accurately documented and the details sent to the Biological Records Centre.

Growing concern about uncontrolled introductions into the environment and particularly into nature reserves stimulated the Conservation Liaison Committee of the Society for the Promotion of Nature Reserves to publish a booklet (S.P.N.R. 1970) outlining criteria for introductions: three of the seven criteria referred to rare species. It is suggested that introduction is reasonable where a rare species has become extinct within a reserve area within the recent past and the habitat is still suitable or could be modified to become so. Introductions may also be made where a species occurs in a habitat contiguous to or in the immediate vicinity of a reserve but happens, by chance, to be absent from the reserve itself. Species might also be moved to the safety of a nearby suitable reserve if its site is threatened in an unprotected area. In addition it is recognised that it may be desirable occasionally to introduce rare species into areas outside their known geographical range for serious scientific experiment — but on the understanding that the material can be removed if necessary at the termination of the experiment.

Conclusion

Rare plant species are often relicts surviving in restricted ecological niches. The opportunities for these species to spread to other, suitable habitats are minimal. Thus a site lost now is usually a site lost for ever. The challenge to the conservation

movement is enormous: in addition to the flowering plants and ferns other groups of plants like the bryophytes and lichens are equally threatened and their rare species are equally in need of protection. The challenge is also immediate and extremely urgent: losses are occurring every year. Rare species conservation is a complex subject involving recording, research, management of reserves, legislation, education and cultivation.

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DISCUSSION

BÖCHER stresses that the British conservationists are doing pioneer work, and that hardly any other country has reached a comparable stage in conservation matters. In Denmark, it was proposed to forbid collecting roots with specimens for school and university herbaria as a contribution to the conservation of rare species.

MELDERIS states that amateur botanists have caused severe damage, in the past, to the British flora. The large number of formerly private herbaria now kept at the British Museum are all rich in rare species, mostly collected in the same few classical localities, while common species were generally neglected. As an instance, *Centaurium latifolium*, a species endemic to a single locality in Lancashire and now extinct, is represented by more than 50 specimens at BM. Most of them were collected when the plant was just flowering, which is particularly harmful with a biennial species depending on seed for reproduction.

PERRING agrees that collecting is a factor responsible for the decline of some of the species, but not a very important one overall. In his figures, it is responsible for about 10% of the cases, while the destruction of the habitat by drainage, building etc. is responsible for 55-60% of the cases.

BÖCHER mentions pollution as an other cause, responsible for the almost total disappearance of *Elisma natans* from Denmark.

PERRING fears that pollution will become indeed an increasingly important factor in the near future. Up to the present, there has not been a great loss of aquatic species, but rather of species of marshland and other damp habitats. A number of *Potamogeton* species is indeed likely, owing to the increasing pollution, to become rare over the next few years.

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