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Criteria for Evaluating the Importance of Herbarium Collections

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Introduction

When allocating limited resources to maintaining herbarium collections, it is becoming increasingly important to prioritise. Whilst it is obvious that the most important collections are the highest priority, it is often difficult to decide which the most important collections are, either at the level of the whole herbarium or of its component parts. At a national level, decisions rarely have to be made about the relative value of individual herbaria such as that of the Natural History Museum compared with Bristol City Museum (BRISTM), though placing them in a national context may help secure funding, resources within universities or county councils, etc.. More regularly, decisions have to be made within herbaria about allocation of resources to different individual collections.

The aim of this discussion paper is to propose some criteria for evaluating the importance of collections to assist with allocation of resources. The criteria have been drawn up for Vascular Plant collections, but could easily be adapted to cover Cryptogamic herbaria or herbaria of cultivated plants, or even zoological collections. A specimen is defined here as a herbarium sheet (or sheets if there is more than one part to a collection) rather than as an individual plant mounted with others on a single herbarium sheet. A region is essentially a county or small group of counties (e.g. Cambridgeshire, N. Wales). The collections has been ranked into three categories of importance:

- Internationally important: Important within an international context. Essential for any floristic or taxonomic work at a national or international level.
- Nationally important: Important within a national context, irrespective of the size of the country. Should be consulted for any floristic or taxonomic work at a regional or national level.
- Regionally important: Important within the context of a county/region, or small group of counties/regions. Useful additional data for a regional floristic or taxonomic work.

Collections falling below the thresholds for the categories proposed below could be classed as of local or low importance, but are not dealt with further.

Criteria for assessing value of herbaria

1. Size of collection

The total number of specimens in a herbarium is clearly of major importance in deciding its value.

The number of specimens for each category are proposed as follows:

- Internationally important: 2 50,000+ specimens

- Nationally important: 50,000+ specimens
- Regionally important: 5,000+ specimens

2. Coverage of country

Herbaria with the main collections (in terms of numbers of specimens and coverage of taxa) for a particular country are clearly very important as key sets of reference material. The criteria for assessing the value as floristic collections are proposed as follows:

- Internationally important: One of the top five collections for that country in the world
- Nationally important: One of the top 20 collections for that country in the world
- Regionally important: One of the top 100 collections for that country in the world

3. Types

Type specimens are priceless assets for solving taxonomic and nomenclatural problems and provide definitive sources of reference. Whilst each individual type specimen could be regarded as top priority in its own right, herbaria with more types are likely to be of greater importance than those with few types. The numbers of types for each category are proposed as follows:

- Internationally important: 200+ holotypes or 500+ isotypes, syntypes, lectotypes or paratypes
- Nationally important: 50+ holotypes or 200+ isotypes, syntypes, lectotypes or paratypes
- Regionally important: 5+ holotypes/20+ isotypes, syntypes, lectotypes or paratypes

4. Collections by taxon

Large collections of a particular taxon (e.g. *Taraxacum* at OXF, often as a result of the interest of one botanist or a research project from one institution, are of particular value for monographs. The criteria are proposed as follows:

- Internationally important: Ten or more different collections held which qualify as one of top five taxon-based collections in the country
- Nationally important: Five to nine different collections held which qualify as one of top five taxon-based collections in the country
- Regionally important: One to four different collections held which qualify as one of top five taxon-based collections in the country

5. Collections of individual botanists

Most herbaria are composed of a series of collections by different botanists and these individual collections vary in importance due to numbers of specimens, location, taxonomic coverage, uniqueness and historical importance. In some cases collections have been split between a number of herbaria. The combined individual components will determine the status of the herbarium as a whole, but a collection within a herbarium may be of international importance in its own right, even if the herbarium itself is not. For instance, the collections of Linnaeus is clearly of

international importance, but what of those of Donald Grose author of *Flora of Wiltshire* (DVS), or Phyllis Stockdale a local Sussex botanist (BEX; Rich, Nicholson & Woods 1996)? Each has to be judged on its own merits. The criteria proposed are as follows:

Internationally important:

- Any one collection of major national or international botanists (e.g. Linnaeus, Bentham)
- Five or more collections of major national or international experts on particular floras/families/genera/groups (e.g. Glück aquatic herbarium in B, Druce herbarium in OXF)
- Any one collection of major historical significance (e.g. Darwin Voyage of the Beagle collections)
Any one collection forming the basis of a national monograph or flora (e.g. E. S. Eedes *Rubus* herbarium in NMW)

Nationally important:

- Five or more large or unique collections of main botanists in country or region (e.g. C. T. & E. Vachell herbarium in NMW; herb. L. A. Livermore in LIV; herb. J. W. White in BRISTM)

Regionally important:

- Five or more good collections of local botanists (e.g. herb. R. F. May in NMW)

6. Usage

It is a circular argument that herbaria which are widely used are more important, because botanists tend to go to the top herbaria anyway. However, herbaria which are widely used do tend to be of greater value as the taxonomic arrangement is often more up to date, and the specimens are critically determined and more widely consulted or cited. There are various measures of usage which can be used, and the criteria proposed to cover these are given below. Other forms of enquiry, such as internet database searches, could also be included.

Loans

- Internationally important: 200+/year
- Nationally important: 50+/year
- Regionally important: 5+/year

Visitors

- Internationally important 50+/year
- Nationally important: 20+/year
- Regionally important: 5+/year

Cited or referenced specimens

Specimens cited by particular authors or botanists as representative or as types clearly have added value.

- Internationally important: Extensive use or citation of collections in national / international monographs, or use in preparation of national flora.

- Nationally important: Use or citation of at least some collections in national / international monographs, or collections representing county floras.
- Regionally important: Contains good local collections.

Example - herb. National Museum of Wales (NMW)

The herbarium of the National Museum of Wales (NMW) can be placed in its British context by scoring against the criteria as follows:

- | | |
|-------------------------|---|
| 1. Size | Internationally important: c. 250,000 specimens |
| 2. Coverage | Internationally important: The best collection of Welsh plants in the world |
| 3. Types | Nationally important: Only 24 holotypes but c. 300 iso-/syn-/lecto/paratypes (Carey et al. 1997) |
| 4. Taxa | Probably of national importance: major collections of <i>Rubus</i> , <i>Rosa</i> , <i>Cotoneaster</i> , <i>Pteridophytes</i> (and especially <i>Dryopteris</i>), <i>Mentha</i> , <i>Salix</i> , <i>Populus</i> , <i>Melampyrum</i> , and possibly <i>Myosotis</i> and <i>Euphrasia</i> . |
| 5. Individual botanists | Nationally important (e.g. herbs. J. A. Wheldon, W. A. Shoolbred, P. A. Deseglise, F. Rose etc.; see Harrison 1985): Collections relating to Welsh ferns, Welsh timber trees, Welsh flowering plants and Brambles of the British Isles |
| 6. Usage | Nationally important: 36 loans in 1997, c. 150 visitors and many specimens regularly cited or referenced. |

Overall the herbarium is of international importance.

Criteria for assessing value of individual collections

1. Size of collection

The total number of specimens in a single collection is clearly of major importance in deciding its value, and the criteria proposed are as follows:

- Internationally important: 25,000+ specimens
- Nationally important: 5,000+ specimens
- Regionally important: 2,000+ specimens

2. Coverage of region/county

The main collections for a particular region or county are clearly important, but due to the size of the collections for each country in major herbaria it is unlikely that individual collection would be included in the top collections for a country (though there may be some examples). The criteria proposed are as follows:

- Internationally important: The top collection for that region/county in the country
- Nationally important: One of the top 20 collections for that region/county in the country
- Regionally important: One of the top 100 collections for that region/county in the country

3. Types

Individual collections with more types are likely to be of greater importance than those with few types.

The numbers of types for each category are therefore proposed as follows:

- Internationally important: 50+ holotypes or 200+ isotypes, syntypes, lectotypes or paratypes
- Nationally important: 5+ holotypes or 20+ isotypes, syntypes, lectotypes or paratypes
- Regionally important: 1+ holotypes/2+ isotypes, syntypes, lectotypes or paratypes

4. Collections by taxon

Large collections of a particular taxon often result of the interest of one botanist, and are very important in illustrating their concepts of species. The proposed criteria for each category are as follows:

- Internationally important: One of top 3 collections for that taxon in the country
- Nationally important: One of top 10 collections for that taxon in the country
- Regionally important: One of top 20 collections for that taxon in the country

5. Collections of individual botanists

The criteria proposed for assessing importance of individual collections are as follows:

Internationally important:

- Collections of major national or international botanists
- Collections of major national or international experts on particular floras / families / genera / groups
- Collections of major historical significance
- Collections linked to national flora or monograph

Nationally important:

- Large or unique collections of main botanists in country or region
- Collections linked to county flora or monograph

Regionally important:

- Good collections by local botanists
- Duplicate collections of main botanists for country

Example - herb. E. S. Edees

E. S. Edees was one of the leading experts in *Rubus* in Britain, and his monograph with A. Newton forms the basis of our current understanding of brambles in Britain (Edees & Newton 1988). His herbarium of about 7,500 specimens (including many types) allows us to link the book to the specimens he worked on, and is now the key reference collection for anyone working on brambles in Britain.

1. Size of collection Nationally important: 7,500+ specimens
2. Coverage of region/country Not applicable (a taxon-based collection)

3. Types Nationally important: 22 holotypes and c. 300 iso-/syn-/lecto-/paratypes

4. Taxon Internationally important: One of top 2 *Rubus* collections in Britain

5. Individual botanists Internationally important: Collection of major national expert linked to monograph on *Rubus*

Overall the Edees collection is of international importance.

Discussion

The criteria provide a quantitative basis for comparison of collections, but some criteria still depend on definitions, such as what constitutes a "good" collection by a botanist? This can only be determined once the context is known and some may depend on expert opinions of taxonomists or specialist botanists. For instance a comprehensive herbarium of the Shetland Islands would still contain many fewer specimens than an incomplete one from Surrey, but might be considered more important. Some criteria may also be difficult to use as the information is simply not available - for instance what are the top 20, or even top 10, *Sorbus* collections in Britain? I would welcome comments on the criteria or the quantitative limits, and on additional criteria.

Many herbaria of course already have a good idea of which their important collections are, but an assessment exercise helps to establish those which are currently under- or over-valued. The failure of a collection or herbarium to meet the regional, national or international categories does not mean that the collections are of no value, they are just of relatively low priority.

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