

# Management of a Lichen Herbarium

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## Introduction

Lichen herbaria store preserved specimens of lichenized (and often lichenicolous) fungi. The main tasks of lichen (and all other) herbaria are as follows:

Taxonomic studies must be at least in part based upon herbarium specimens, of which the so called type-specimens are the most important. It is on these that descriptions of new taxa are based, and they serve in perpetuity as the reference for these names. For a new species to be validly published, the herbarium in which the type specimens are lodged must be specified. Locations, contents, acronyms etc. of the world's public herbaria can be found in "Index Herbariorum", compiled by Holmgren et al. 1990. A searchable internet-version is available at: <http://www.nybg.org/bsci/ih/>.

**Taxonomic,  
chemical and  
molecular studies**

Most secondary lichen substances remain stable in storage, and hence herbarium specimens are reliable subjects for chemical investigations. The ability of lichen thalli to accumulate pollutants means that older specimens may provide evidence of former environmental conditions.

Improved methods in molecular studies have also led to an increasing use of herbarium specimens (preferably not older than 10 years) as important subjects for taxonomic works. When old herbarium collections (e.g. from the last century) are examined, lichen phylogeny and the long term population dynamics of lichens will become promising fields of study.

- Floristic data** Herbarium specimens are an essential basis for the preparation of check-lists or floras of particular geographical regions. They can also provide an indication of changes over time in the distributions of species.
- Identification** Due to the rather complicated morphology of lichens, descriptions (and keys to taxa) are difficult to make or, if done, often are insufficient for a certain recognition of taxa. Illustrations can overcome this problem to some extent, but are unavailable in many cases. Thus, properly identified herbarium specimens are an indispensable tool for a correct identification of unnamed taxa.

## Experimental Details

### Preparation of lichens

Carefully prepared herbarium specimens are of vital importance for the quality of the whole herbarium. Although the 'Herbarium Handbook' of Forman and Bridson 1998 gives helpful advice on preparing phanerogams, collecting and preserving of lichens is dealt with only cursorily. [Note: While finishing the manuscript a book on 'managing the modern herbarium' (Metsger and Byers 1999) has been published]. General hints regarding the preparation of lichens can be found in, for example, Wirth 1995, Moberg and Holmsen 1992 and Hawksworth 1974. A brief summary of methods for preparing lichens for deposition in a herbarium is given below.

### Collecting lichens and preliminary field-preparations

Before collecting lichenized fungi (or indeed any biological specimens), the potential rarity of the species should be considered. Many countries require formal collecting permits, and these frequently come with a range of restrictions. In countries where some species are legally protected, collecting of rare, vulnerable or threatened species may be highly restricted or prohibited. Regardless, no collecting should deplete an entire stand.

For epiphytic lichens, the substratum must also be considered, and trees should not be damaged or killed. Depending on the growth habit of lichens and the type of substratum, different collecting-methods are appropriate. Easily removable (large foliose, umbilicate or fruticose) lichens must be collected with their attachment organs (but usually without substratum). Small foliose and all crustose lichens have to be removed with part of the substratum. Stout knives or caulking irons are used for bark, wood or soil; chisel and hammer help to remove lichens from

hard substrate (e.g. rocks). Fragile lichen species (e.g. Caliciales, or many fruticose taxa if totally dried) should be carefully wrapped in soft paper (e.g. uncoloured toilet paper). Rocks with crustose lichens (especially when wet) must be processed in the same way to avoid mutual abrasion.

In order to minimise space-requirements, freshly collected (often slightly to totally wet) specimens of foliose or fruticose lichens should be very slightly pressed and dried between uncoloured paper. With great care, rock substrates may have to be made thinner with a chisel or other specialised cutting equipment (see Figure 1), because too thick specimens unnecessarily can cause additional space problems. Specimens on bark, rock and especially soil are usually fixed to stiff card with wood glue. Additional protection against pressure (especially necessary in case of brittle lichens and/or substrate, e.g. delicate Caliciales, unpressed fruticose lichens or specimens on friable or earthy substrate) can be achieved by gluing small wooden rods (or rings of very strong cardboard) around the substrate or by putting it into small shatter-proof boxes. Never close the boxes before the lichen or the substrate or the glue is totally dry; mould fungi may destroy the whole specimen!

Foliose or fruticose lichen thalli and any substratum with lichens on each side must never be stuck directly onto cards. If a sample consists of many small pieces, these can be placed on cardboard between two layers of soft paper, which may prevent displacement. Sometimes it is necessary to group them within a small packet, which can be glued onto the card (see Figure 2a). Arranging packets inside each other should be reduced to a minimum as it slows down the access to the material.

After mounting on card, most lichens are usually placed into folded envelopes (see Figure 2b). Both cards and envelopes need to be of a long-lasting (acid-free) archival quality. It is advisable to print the herbarium name (or acronym) on the outside of every packet and on the cardboard. This prevents confusion when handling specimens from many different herbaria. At least for lichens on rocks and for any fragile material, specimens should be covered with a layer of soft paper (to protect the envelope, the label and the lichen). Duplicates of labels, placed inside the packets, are sometimes used for the same purpose.

For how to handle specimens for determination/examination see "Herbarium Problems".

## Preparation in the laboratory

























