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Botanical related adhesives

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Introduction

The bulk of the botanical collections in the Natural History Museum (NHM) are herbarium specimens comprising a dried plant specimens mounted on a sheet of paper. The material and methods used in preparing herbarium specimens varies from Institution to Institution. The principal methods used are:

- **loose** (perhaps the best practise from a purely conservation point of view and specimens easy to use, however, if the material is used, consulted, despatched for loans, etc. the likelihood of mechanical damage or separation from labels is high)
- **pinned** (there are health & safety risks and the likelihood of mechanical damage is high)
- **stitched** (not very practical, very time consuming; high risk of damage of material during preparation)
- **strapped** (it secures the specimens on the sheet but some material would require many straps, which could cover important features, there are also issues of the glue on the straps)
- **gluing** – two main methods:
 - **spot gluing**: glued applied in certain points (it secures the specimens in the sheet but the likelihood of mechanical damage is high)
 - **whole specimen glued**: glued applied to the whole of the specimen (very secure method, the likelihood of mechanical damage very low; important features can be hidden)

Adhesives

Many adhesives have been used to mount herbarium material. Before 1950, they were often derived from animal skin and bone products, such as gelatin. Later, wheat starch paste, Methyl Cellulose and latex were also used.

As the result of a long history and being used widely for an extensive variety of conservation purposes, the adhesives most commonly used in conservation include Polyvinyl acetate (PVA), Polyvinyl alcohol (PVAI), Elmer's Glue All (still PVA emulsion) and Cellulose nitrate.

Selecting the right adhesive

A variety of factors have to be considered when selecting adhesives. They must have certain properties including pH neutrality, flexibility, reversibility and longevity, as well as being easy to work with and not posing any health risks. Therefore, an adhesive should be:

- Soluble in water (giving a degree of reversibility)
- Flexibility (to support the specimen if the sheet is accidentally flexed)
- Drying condition: reasonable drying time (not too fast/slow, to allow a proper 'finish' and not shrink and become brittle)
- Easy to apply: spread easily with even coverage (thin enough not to go into globules or to stick/load into brushes)
- Easy to remove: 'balling up' (when cleaning off excess adhesive, and does not leave trace and the surface where the adhesive was applied is clean and smooth)
- Strong attachment: bonding with good stability (of both the specimen and the labels on the paper)

- Neutral pH (and archival quality)
- Not affected by temperature (high or low)
- Non-toxic (will not harm the object or the worker)
- Good adhesion to many porous surfaces, therefore suitable for paper (labels/capsules) and specimens (one-cell thick to woody).
- Good stability in light (doesn't yellow)
- Expected long term durability (stability with ageing, so that the specimens won't need to go through the process again)
- Non invasive (should not react with any chemicals/substances in the specimens, especially over long periods)

Botanical adhesives at the NHM

It is unfortunately not known what was used to mount the specimens at the Botany Department of the NHM before 1970. Latex was used for over twenty years (from ca. 1970). This was substituted by PVA (Polyvinyl acetate) in 1993 when Latex became unavailable.

In 1999, the department trialled 'Evacon-R' adhesive, which was recommended by Stuart Welch, Conservation by Design. However, although it was satisfactory for labels and capsules, this adhesive proved unsuitable for our needs:

- It was very difficult to apply; it didn't spread evenly and was difficult to 'load' into brushes.
- It dried too quickly (diluting with water did not help); brushes became stiff and clogged after 30-45 min of work.
- It was affected by the temperature but neither warmer or lower temperatures improved its application
- This adhesive did not rub off from hands or brushes easily.

Recommendations

Taking into consideration most of the properties and requirements, PVA seems for the moment, the most suitable adhesive for our purposes at the NHM. It is so far performing its herbarium related requirements, with some conservation aspects being covered.

It has been known that PVA is non-acidic (unlike many other polymers), but recently some controversies have been aroused, which certainly needs further investigation. Moreover, conservators from Natural History Museum have suggested a search for a more conservationally sound option.

If looked at only from the conservation point of view, perhaps the best practice would be to simply leave the specimens loose (as mentioned above). However, as the herbarium collections are an important source of information, they are always consulted and requested on loan, which means that there is a great risk of damage. We are not 'sticking' to PVA as the magic potion for mounting plant specimens. We are aware that we should continue to search and investigate other options. Please do not hesitate to contact us if you have any ideas! We will be happy to try it!

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