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Notes On Conservation Tests Of Failing Collembola (Insecta) Micro-Slide Mounts

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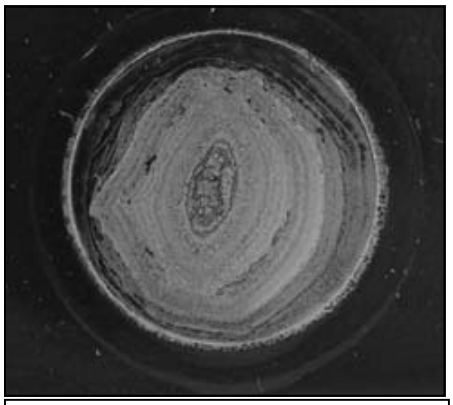
Entomology Microscope Slide Conservation Project, 18th February – 5th March 2004

Insect cuticle and Canada balsam have very similar refractive indexes. Its use as a mounting medium was discouraged in the past because the fine structures of insect specimens tend to be invisible using normal light microscopy. Before it was established that phase contrast microscopy could overcome the refractive index problem, many new mounting media with contrasting refractive indexes were used to improve the visibility of the specimens. However, most of these have been proved to be unstable compared with Canada balsam. This project was designed to determine a conservation method to rescue deteriorating Collembola microscope slide mounts at the Natural History Museum, and to establish whether such material could be successfully remounted in archivally proven Canada balsam. In many cases, the mounting media used in these slide mounts was not known for certain.

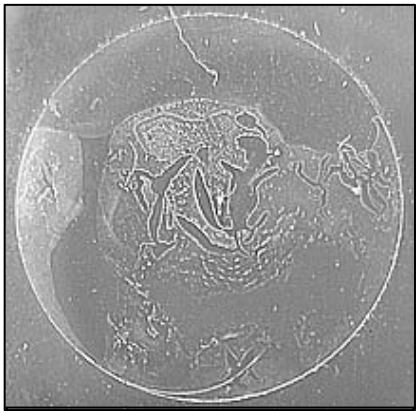
PAB selected 40 deteriorating Collembola microscope slides from the NHM main Collembola collection. The slides selected were relatively unimportant material and considered expendable for this experimental work. Using the Brown & De Boise (2004) slide conservation technique as a guide, the slides were processed by Melissa Gunter as part of her MA studies on the Royal College of Art/Victoria & Albert Museum Conservation Programme, in collaboration with the Natural History Museum, 18TH February – 5TH March, 2004. The slides were soaked in 30% ethyl alcohol for 5-6 days and their respective labels were removed and remounted onto new slides. The cover-slips and specimens were easily separated from the slides after soaking. After dehydrating each of the specimens in glacial acetic acid for 3-5 minutes, the Collembola were soaked in oil of cloves and remounted into archival quality Canada balsam. The slides were then placed into an oven at 30°C for three to four weeks to harden.

Berlese Collembola slide mounts

There were two types of Collembola slides identified as deteriorating and in need of conservation. Three slides were made with classic Berlese gum chloral mountant, which had become completely crystallised (Figure 1). The sealant ring had failed and allowed the Berlese to dehydrate, thus causing the formation of Chloral-hydrate crystals throughout the mount. On soaking these slides in 30% ethyl alcohol, the specimens were found to have broken up into many small pieces, making them unsuitable for further conservation. Any important, completely crystallised Collembola slides will, in the future, be de-ringed and placed into a warm and wet environment to attempt to re-hydrate the crystals. If the crystals disappear, these slides will be re-ringed after treatment with Canada balsam or Euparal, to stop any future dehydration.



Crystallising Berlese mount



Shrinking (possibly) Gisin's mount

Peter Lawrence Collembola slide mounts

As stated in Brown (1997), many slide preparators and researchers have not stated what mountant they used. The majority of slides studied were made by Peter Lawrence who did not state which mountant he used, either on the slide or in any of his taxonomic papers. The majority of slides showed varying signs of the mountant retreating away from the specimens and from the centre of the slide (Figure 2). This is further aggravated by the mountant shrinking vertically, resulting in the cover-slip separating from the mountant and damaging the specimen.

As this form of shrinkage is not known in any of the Berlese slide mounts in the NHM aphid collection, we can assume that the mountant is not Berlese. Also these slides are not ringed and show no signs of crystallisation caused by dehydration. These slides were easily soaked out from the mountant using 30% ethyl alcohol, whereas Berlese slide mounts usually require a further soak in 10% potassium hydroxide to release the specimens.

Peter Lawrence possibly used 'Gisin's recipe. According to Fjellberg (1980), this consists of 179 ml. of lactic acid, 36 ml of glycerol, 28 ml. of glycerol + saturated picric acid and 7 ml of 40% formaldehyde. A future study will reveal whether any formaldehyde present in Gisin's fluid, or in the preserving solution used prior to slide preparation, might preclude the successful dissolving of the body contents to effect the necessary improvement of visibility for the study of cuticular structures.

Collembolan remounted in Canada balsam

Conclusions

Most of the Collembola specimens coped well with being soaked out of the old mountant, dehydrated with glacial acetic acid and remounted into Canada balsam (Figure 3). Body contents should always be removed so that the cuticular characters used in taxonomy can be clearly seen using transmitted light or phase contrast microscopy. Some of the specimens should have been soaked in 10% potassium hydroxide to attempt to remove body contents still present, but this could not be done due to the time constraint on the project. Non-removal of such body contents resulted in a degree of (osmotic?) collapse of the cuticle of some specimens on remounting into Canada balsam. When attempting to discover techniques to rescue deteriorating slide mounts, one should experiment on less important material mounted by the same collector/preparator so as not to risk destruction of more valuable specimens. This technique will be used and improved with practice, to rescue the type and other important deteriorating material in the NHM Collembola collection. Steve Hopkin of Reading University is currently engaged in a condition survey of the NHM Collembola collection to indicate which important slide material requires rescue.

References

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