Biology Curators Group Newsletter

Title: Techniques: How (not) to treat your type specimens

Author(s): Thatcher, V. E.

Source: Thatcher, V. E. (1987). Techniques: How (not) to treat your type specimens. *Biology Curators Group Newsletter*, *Vol 4 No 9*, 161 - 163.

URL: http://www.natsca.org/article/1162

displays, records, reference and study collections, loans, museums on holiday; these are some of the topics covered. The reverse side of the leaflet carries a list of museums which provide some level of biological (natural history) service.

Those carrying a star (*) provide most or all of the services listed in the leaflet and employ a curator specialising in biology (natural history). Other listed museums provide some of these services but, crucially, do not employ a biologist in a curatorial post.

The leaflet is deliberately similar in design to the Geological Curators' Group 'Thumbs Up' leaflet, and the two should complement each other.

2. The Events

"Beetle down ...." Week 22 to 31 July 1988

National and local press releases will be available but most museums will prefer to write their own. We are hoping that each museum will organise special activities some time during this week, to carry the "Beetle-down ...." flag. Most children will be on holiday from school during this week, and the idea is to get them down to their local museum, either in their home town or on holiday in the UK (this aspect is covered in the leaflet).

Activities may involve simply drawing media attention to some aspect of your work; or actually involving your Education staff in a special activity; or may be publicising a particular object or collection. At the very least, please try to publicise the spirit of "Beetle-down ....".

The main thing is .... please try to get involved! And don't forget to let us know how things go, and send a copy of press cuttings.

3. The Products

"Beetle-down ...." Package

A window sticker - for those museums qualified to display one.
A general press release.
A batch of "Beetle-down ...." leaflets.
Car stickers may be available.

The package will be available in late Spring at a nominal cost, from BCG. The price will depend on how much we can raise from sponsors. Further details at the Bolton meeting and in the next Newsletter.

"Beetle-down ...." does not end on 31 July 1988. The campaign will continue throughout the summer holidays, and into 1989. If things go well a range of products and leaflets may become available, in the future.

Derek Whiteley
BCG Secretary
City Museum
Sheffield S10 2TP

STOP PRESS!!

We have just heard that WATCH, the youth wing of RSNC, have offered to co-produce the leaflet. We should be able to provide the package at a very nominal charge with their help.

Techniques

How not to treat your type specimens.

The following is quoted from MONOCULUS (Copepod Newsletter) no.14 (April 1987); it is transcribed from 'Type Specimens of Ergasilus funduli Kroyer, 1863 (Crustacea: Copepoda) re-examined', Steenstrupia 12 (9): 154-156, by Z. Kabata.

"This paper would not be complete without an account of the fate of the examined specimens. The best-preserved of them (Fig.1) was selected as the lectotype, there being no type designated in Kroyer's material. Afraid that further manipulation might be damaging to the fragile specimens, I labelled the slide on which it had been mounted in Berlese's fluid and returned it to Dr Wolff in Copenhagen. To my surprise, Dr Wolff, having looked at the slide, was unable to find anything under the coverslip. The specimen had inexplicably vanished. I asked Dr Wolff to send the slide to me again, so that I could verify this strange fact. I need not have troubled. The much-travelled slide was indeed innocent of any specimens."

It continues, explaining the disappearing copepods.

"Both Dr Wolff and I wanted to have a lectotype selected. Having picked out of the remaining material the only specimen that, in my opinion, sufficiently displayed the diagnostic features of the species, I put it on a slide in Berlese's fluid and labelled it immediately. Several days later I inspected the slide thoroughly. To my utter disbelief, the specimen was not there. A small clump of debris that might have represented copepod remains was all that could be found.

It seems fairly obvious that Berlese's fluid must have acted as a solvent and caused a complete, or almost complete, disintegration of the copepods. This could have happened only because of the old age of the specimens, combined with whatever treatment they had received in the past ...

This strange incident is reported upon as a warning to copepodologists who have to examine century-old specimens. I am also glad to report that Dr Wolff's helpful friendship for me appears to have survived this debacle."

Further comment arising from the above appeared in MONOCULUS 15 (November 1987) from Vernon E. Thatcher in Brazil. It is quoted fully here.

The sad but amusing story by Dr Kabata about the disappearing copepods in MONOCULUS, 14, suggests to me that it is time someone offered a few words about methods. Making permanent whole-mounts is more a craft or an art than a scientific procedure, and permanence is relative. For example, a ringed glycerine jelly mount stored in an unheated room in Hamburg might last for years, whereas the same slide kept in my sometimes airconditioned lab in Manaus might deteriorate in a few months. Mythology and alchemy are still to be found in micro-technique and some people assume that the same "classic methods" are being used by all and date from van Leewenhoek (1674). Both of these assumptions are false. In truth, procedures vary from lab to lab and most have evolved during the last 30 to 50 years.

Although the "classic methods" have evolved over the years and new reagents have been introduced from time to time, the basic problems remain the same. We must kill and fix an animal in a solution that will preserve its cells and produce minimal distortion. After that we need to remove all water from the animal (dehydration) and replace it with liquid that will harden without undue alteration in form. At some point, stains should be introduced to enhance visibility and the animal should be cleared enough to permit the passage of light, but not so much as to render it totally transparent.

If we define "permanent slide" as one that will last for one hundred years, we have expressed our goal. That is, we seek hundred year permanence (or HYP). The mounting medium that has HYP is Canada balsam. Most others are too recent for us to know if they have HYP or not. Similarly, many stains do not have HYP but Eosin may, since it has been in use for a long time.

In a long and arduous search for HYP, I have tried and abandoned many reagents and procedure either because they were inadequate or unnecessary. Among these are: Bouin's, Schaudinn's and Zenker's fixatives; carmine, cochineal and fuchsin stains; graded alcohols, dioxane and absolute alcohol; lactic acid, lacto-phenol, xylene, cedarwood oil and creosote; Berlese's, Gray & Wess' and any mounting medium containing either PVA or glycerine.

I have recently evolved, and will now explain, a method that is rapid, simple, has HYP, has CLASS, gives excellent short-term results and is almost foolproof. First, fix everything in AFA (85 pts 85% alcohol: 10 pts formalin: 5 pts glacial acetic acid) for at least 10 minutes. Next, pass the specimens directly from AFA to the stain solution (95% alcohol coloured to the intensity of weak tea with equal parts of Eosin and Orange-G stains). Stain in this solution for 3-10 minutes and then move the specimens to pure phenol (liquify phenol crystals with a bit of 95% alcohol to make this solution). The phenol simultaneously dehydrates, clears and destains the material. When the specimen is clear in phenol a few seconds later it is already dehydrated, but if more destaining is desired it may be left in this solution for a few minutes. After the proper degree of destaining is achieved, pass the copepod to methyl salicylate which stops the destaining process. After 3 minutes in the latter, the specimen can be mounted in balsam. The entire process requires 8-10 minutes. Material fixed by other means and stored in 70% alcohol can be processed in the same way, but specimens in aqueous solutions (10% formalin) must be placed in 70% alcohol for a few minutes before staining.

If a specimen collapses in methyl salicylate (copepods seldom do), it may mean that it was not properly fixed or was dead too long before fixation. Not all is lost, however, for when such a specimen is returned to phenol, it returns to normal shape in a few minutes. To resolve the problem of collapse, it may be necessary to perforate the animal with a fine needle to permit a more rapid exchange of liquids. It is sometimes helpful to pass such specimens through a solution of half and half (phenol and methyl salicylate) before exposure to pure methyl salicylate.

It often happens that a copepod is fixed in an undesirable position with the antennae wrapped around the body or the abdomen curled under. Regardless of the fixative used, these conditions can be corrected because a specimen in phenol becomes soft and pliable. It can be taken from that liquid, placed on a dry slide and manipulated into a good position with dissecting needles. Arranging the legs at this time may obviate the necessity for dissection. When the animal is in the desired position, place a coverglass on top to hold it and add some methyl salicylate. The latter hardens the specimen in a few seconds and it will retain the same form when mounted in balsam.

The described method will produce good whole-mounts of any zoological material that it is possible to place between a coverglass and a slide, as long as it clears in phenol. It is especially useful for Copepoda, but we have also had good results with Ciliophora, Rotifera, Temnocephala, Monogenea, Digenea, Cestoda, Nematoda, Acanthocephala, Oligochaeta, Hirudinea, Cladocera, Branchiura, small isopods, decapod larvae, mites, insects and larval fish. Small pieces of vertebrate intestine and snail hepato-pancreas have been flattened and mounted in this way as well. With nematodes, it is relatively easy to make permanent "en face" mounts by removing a worm from methyl salicylate, placing it on a dry slide near a drop of balsam, cutting off the head and pushing it into the balsam.

In case some skeptic should ask how I know this method achieves HYP, I would have to ask him to come back in one hundred years and we will then take a look at these slides. If they are not as good as we would like them to be, we will simply remount them using the same technique. Any slide made with balsam can be demounted by soaking in methyl salicylate or xylene for a few hours. Slides

made with PVA or glycerine jelly, on the other hand, cannot be successfully demounted. Personally, I plan to check my collections every 50 years or so to see if any specimens require remounting.

Vernon E. Thatcher
INPA, Manaus, AM, Brazil

Many thanks to Prof. Dr. H. Kurt Schminke of Oldenburg University in West Germany, editor of MONOCULUS, for permission to reproduce these articles, and to Peter Davis for suggesting we reprint them.

Pest control

[Martin Linnie (Dept of Zoology, Trinity College, Dublin) has sent us a copy of his paper Pest Control, A Survey of Natural History Museums in Great Britain and Ireland (INT J OF MUSEUM MANAGEMENT AND CURATORSHIP (1987), 6, 277-290)

One hundred and eight natural history museums took part in the survey, and this paper looks carefully at the results. Types of pests, damage, source of infestation, pest control strategies, effects of pesticides on specimens and health and safety aspects are discussed. A summary of Martyn's major findings are listed below:

1 The majority of museums surveyed have uncontrolled temperature and relative humidity levels, particularly in storage and display areas.
2 Virtually all museums (96 per cent) have experienced some form of pest infestation.
3 Members of the Coleoptera and Lepidoptera were the most frequently recorded pests, while the Dermestidae (hide, bacon and carpet beetles) caused the most damage and posed the greatest threat to collections.
4 Integration of material into established collections was the most frequent source of pest entry recorded, and accounted for 38 per cent of reported infestations; yet only 17 per cent of respondents routinely fumigate or treat incoming material before integration.
5 Pesticides are used to control or deter pests in 96 per cent of the museums surveyed, and naphthalene, PDB and 'vapona' are the most widely used substances.
6 Some form of adverse effect on specimens or museum materials related to pesticide usage was noted by 29 per cent of respondents.
7 A range of medical ailments occurring at work were linked with the use of chemical substances used for pest control by 32 per cent of those surveyed, and were most frequently associated with exposure to naphthalene, p-dichlorobenzene and 'vapona'-type products.
8 Comparisons with the survey of American museums and related institutions (Bell and Stanley, 1980) show similar trends despite obvious differences in geographical and climatic conditions.

Both surveys show the Dermestidae to be the most serious pest in natural history museums, and the integration of material as the main cause of infestations. However, while the top three substances used to protect collections are the same in each survey, naphthalene, the most widely used substance in the British Isles (62 per cent), is used by only 27 per cent of respondents to the United States survey. Just over half of the American institutions routinely fumigate or treat incoming material, compared to only 17 per cent in the British Isles, while adverse effects noticed on materials and specimens were similar in both surveys.

If anyone has difficulty obtaining a copy, please send 50p in stamps to:

BCG Secretary
Derek Whiteley
City Museum
Sheffield S10 2TP

Exhibitions

First Impressions - whose impressions?

First Impressions: The British Discovery of Australia is hailed as a centrepiece of the bicentennial celebrations. The exhibition contains many fine drawings and paintings from the explorers and naturalists who visited Australia 200 years ago. It also recounts the history of the times using a variety of maps, portraits and videos.

Although excellently and interestingly produced this exhibition is disappointing in one major respect: it is too pretty. The chosen title means there is no need to discuss the Aborigine question. As the defaced posters on the Underground remind us, this year is no celebration for them. Perhaps more sadly, given the exhibition title, is the lack of information on the convicts. Museums have often been criticised for presenting a non-controversial and rose-coloured view of the past, a situation which is thankfully changing. However this exhibition includes only the work of the 'great men' and artists and ignores the experiences of the ordinary people. If naturalists want to encourage inter-disciplinary work, like First Impressions, we must strive to present an honest picture. If not, historians are surely justified in assuming such exhibitions are best left to them.

First Impressions: The British Discovery of Australia is a temporary exhibition at the British Museum (Natural History) until 20th March. It then travels to Australia to tour for 16 months.

Jane Pickering (student)
Department of Museum Studies
University of Leicester