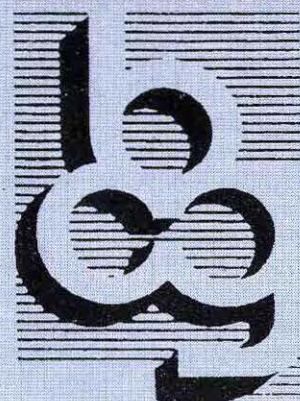


THE BIOLOGY CURATOR

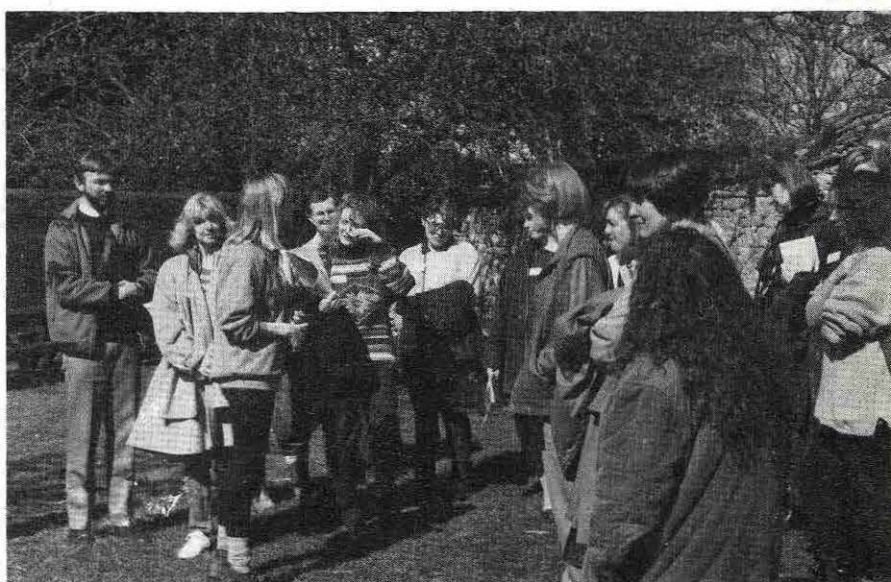
ISSUE 1 SEPTEMBER 1994

BIOLOGY CURATORS GROUP



We present the first issue of the *Biology Curator* which replaces both *BCG Newsletter* and the *Journal of Biological Curatorship*. The basis of the idea is to combine the elements of both newsletter and journal in one publication. This issue is enhanced by the collection of papers from the April conference on the theme of education, and wherever possible future longer papers will relate to a particular theme. As you can see the two 'halves' of this issue are of unequal size and are clearly differentiated (I hope) by the difference in column width. Please bear with your editorial cell for the immediate future as this innovation will take a little time to settle down and allow us to judge the size of the contents of future issues more accurately. As always your comments will be welcome – particularly if they help to ease the lot of the busy editors. Meanwhile, enjoy this bumper issue. Several items have had to be held back for lack of space but will appear in future issues.

Mike Taylor (Perth) will continue to act as coordinating editor and as the compiler of the news section with Jane Mee (Shropshire), while Charles Pettitt (Manchester) will compile and edit the more technical papers and any book reviews. Addresses and telephone numbers are given on the back page. Do please make contact if you have any news or an idea for a longer article. Far too many members keep their lights under bushels so please do not assume that all your colleagues know about a particular project. With budgets tight and less travel available, keeping track of developments and interesting tidbits becomes more difficult and the role of this publication ever more important.



BCG/GEM members at Cogges Farm, April 1994

Design a logo – a cash prize of £25 will go to the person who can design a suitable new logo for BCG. The logo should be suitable for inclusion on publications and letterheads and supplied in a camera ready form, rough sketches are not acceptable. The decision of the committee, which will be conveyed in time for you to blow your winnings at Christmas, will be final. We also offer a second prize of a year's free membership to the runner up.

Correction – many thanks to Gerald Legg at the Booth Museum for indicating the errors in the printing of Velson Horrie's article in the series on spirit preservation in the last *BCG Newsletter*. The word processor has produced 250C and 350C instead of 25°C and 35°C. If chocolate really melted at 350C Cadburys would be in severe trouble!

Disaster again – is it something

about Scotland? Not flood this time but fire. Richard Brinklow, Keeper of Natural History at Dundee writes – In the afternoon of Tuesday April 19th 1994, a serious fire occurred on the roof of the Natural History Museum in Barrack street, Dundee. Contractors were repairing an area of flat roof at the time and it is thought that an overheating tar boiler was the source of the blaze. The fire was spotted almost immediately by a member of staff returning to the building leading to a rapid evacuation and attendance by the emergency services. This undoubtedly resulted in the consequences being much less catastrophic than they might otherwise have been.

The natural history collections housed within the building were completely undamaged both by the blaze and the water used to control it. The displays, notably the recently com-

pleted "Head for the Hills" gallery featuring Highland wildlife, were affected by smoke and falling debris, while the temporary exhibition gallery, fortuitously empty for an exhibition change over, took the brunt of the blast from an exploding gas canister – tar was found embedded in the far wall! Finally, the roof itself, especially the ornamental glazed dome, suffered extensive damage.

The City of Dundee District Council is committed to fully reinstate the building, but the repairs and hopefully also some modest upgrading will be a lengthy process. Barrack Street Museum is not expected to reopen to the public until early in 1995.

PEOPLE

Ray Barnett has written in with an update on the new structure at Bristol Museums. In January last the two curatorial sections of Geology and Natural History were united within a single Natural Sciences Section. Ray was appointed from Assistant Curator (Natural History) to be Senior Curator, Natural Sciences. Shortly afterwards Anne Hollowell (previously Curator, Natural History) was appointed curator, Biology and Peter Crowther (previously Curator, Geology) and Roger Clark (previously assistant Curator, Geology) were both appointed as Curators of Geology. Phillipa Burrell (previously Museums Assistant) was appointed Centre Manager of the Bristol Regional Environmental Records Centre. All existing staff were retained despite the re-organisation, and Phillipa's position considerably improved. Bristol is still suffering from severe under-funding for such a large service, but, in the present economic climate, that does not appear to be a unique position.

DIARY DATES

Oct 17-19 1994. MDA Standards Workshop, Portsmouth. Practical sessions on the new UK Documentation Standard 'Spectrum' will include sessions on the life sciences. Details from MDA, Cambridge, tel 0223 242848

Oct 19 1994. Evening meeting of the Society for the History of Natural History at the Natural History Museum. Talks on Robert Mylne's geological map of London, historically important herbaria in the NHM and the entomology manuscript collection at the NHM. All welcome.

Oct 22 1994. Malacological

Pioneers. One day meeting at the Linnean Society. Flyer enclosed.

Oct 26 1994. Bones. The BCG autumn meeting to be held at Stoke on Trent. Members will be mailed direct with further details. Any offers of papers to the BCG Chairman please. Address below.

Nov 2-6 1994. BCG Study trip to Holland. Any late bookings to the Treasurer please. You'll be really sorry if you miss it! Just think of all the boring post-visit chat "In Amsterdam ..." Remember Madrid and be there if you can.

Nov 30-Dec 1 1994. GCG Seminar, AGM and field trip: The geological display – new directions in interpretation. National Museum of Wales, Cardiff. Details from Tom Sharpe (tel 0222 397951 x265).

Jan 25 1995. Half day SHNH meeting on Sir Hans Sloane at the Jamaican High Commission, London

April 19-21. International conference on the value and valuation of natural science collections, Manchester. Second circular now available. Contact Charles Pettitt (address below). So far there have been over 150 replies to the first circular from 24 countries with offers of over 30 papers.

WANTED

Dorete Bloch at the Zoological Department of the Museum of Natural History, FR-100 Torshavn, Faroe Islands is seeking information on the whereabouts of specimens of the extinct Faroese, White-Speckled morph Raven, *Corvus corax varius* Brunnich, the last of which were seen in the Faroes in 1902, 1916 and 1948. The last specimens obtained for European museum collections at the turn of the last century. There are known specimens in Copenhagen (6) and Leiden (1) but various publications refer to specimens in London, Liverpool and Tring as well as in private collections on the continent. Any information on extant specimens to the address above please.

Mr Ian Anstruther is trying to trace a collection of snakes brought over from India circa 1857 by Dr John Collis Browne of 'Chlorodyne' fame and given to an unknown museum. Please forward any information to Mr Anstruther at Barlavington Estate, Petworth, Sussex, GU28 0LG.

After a distinctly shaky start the UK Systematics Forum is getting down to work. This new initiative is funded by

the Office of Science and Technology and its primary role is to promote co-ordination and communication amongst institutions with major biological and palaeontological collections as well as the wider systematic community, and to develop priorities for systematic work. The creation of a Directory of Current UK Systematic Expertise and Research is considered to be an important first step in strengthening the discipline of systematics. The information collated in this directory will be made available to interested parties and used as a tool to inform governmental policy makers of the current situation in systematic research – a role made possible by the Forum's links with OST. Anyone in the UK currently involved in systematic research whether at an amateur or professional level, biological or palaeontological, is strongly urged to contact the forum for inclusion in this important information source. For more information contact: E.Watson, UK Systematics Forum, FREEPOST (LON 91), c/o The Natural History Museum, Cromwell Road, London SW7 5YZ. Tel 071 938 9522.

NATURAL SCIENCES IN THE SCOTTISH BORDERS

The creation of a completely new, permanent curatorial post in the field of natural history is something of a rarity these days, when many larger museum authorities have frozen existing posts when vacant. However, three years ago the combined efforts of Roxburgh District Council, Scottish Museums Council and the Borders Museum Forum successfully managed to reverse this worrying trend and create a new post within Roxburgh District Council in the Scottish Borders.

The undoubted commitment of these Authorities to the care of natural science collections in the Borders is based on the 1986 Museums and Galleries Commission report "Museums in Scotland" – the so-called Miles Report. This document identified large geographical areas in Scotland where natural science collections had no specialist staff to curate them for many years, if at all. The report recommended the appointment of trained natural history curators, on a shared basis if necessary, to cover these areas and to enhance the care and use of these collections whilst also adding to their number and the valuable information they hold.

Having started the post in October, 1991 and spent some time assessing the collections in the Borders, the first task was to write a comprehensive five year Development Plan to structure and coordinate forward progress. This document has since proved to be invaluable both in support of any grant aid applications and in providing a seemingly endless work programme. The main remits of the post include the management of collections and subsequent research and publication where possible; the creation of an interpretive strategy to include the provision of new, permanent natural history displays and touring exhibitions for the Borders; the creation of a Biological Records Centre for the Borders using Recorder software; and a development of environmental education in conjunction with the Borders Environmental Education Forum.

This remit is much the same as that of most other natural history curators except for a specific element of income generation involving project work for the other three District Councils in the Borders. This initially took the form of collections and interpretive strategy formulation on their behalf followed by a scheduled implementation of suggested projects over a period of the first few years. Income from these sources, as well as from grant aid and income from a touring exhibition, has totalled about £25,000 in less than three years, a situation which rests quite well with elected members!

The collections at Hawick Museum, the base for the natural sciences in the Borders, is the usual small, old Antiquarian Society/local authority museum mixture of old taxidermy mounts, a small number of named Lepidoptera collections in various conditions, a small herbarium, a number of egg cabinets, a mixed geological collection, and an assemblage of single specimens/artefacts of varying origins. The level of data with specimens is, at best, mixed: most of the Victorian geology has no provenance, the Lepidoptera collections have no data on the pins and the collection has been shuffled slightly in the past, whilst the herbarium has fairly good data, as does some of the smaller collections e.g. antique wooden salmon models.

The initial rationalisation of these collections involved the completion of a programme of disposal of extremely poor quality/condition taxidermy, whilst also employing our local taxidermist to produce extremely high quality mounts to gradually replace some of the 60-70% of the taxidermy collection which has been destroyed. The remaining specimens have been cleaned and repaired for use with schools and temporary displays.

New specimens from the Border Taxidermy Studios in Hawick provided an excellent opportunity to create Roxburgh District Museums' first touring exhibition in the form of an exhibition on the history, value to conservation and the artistic merits of taxidermy – "Nature Preserved". This has been touring the Borders museums for 18 months and is now touring Scotland until early 1995, all the while generating a modest income, part of which has been invested in the production of another touring display on angling.

This second exhibition has been created as part of a Borders-wide strategy to interpret the River Tweed, one of the largest, cleanest and best salmon waters in the country. Entitled "Where's the Catch?", the display is aimed at non anglers in an attempt to explain why those of us who are afflicted with this sporting madness spend vast amounts of time, energy and money apparently achieving very little. It explores the obvious hunter/control of nature/ love of the countryside/ historical traditions of the sport against a backdrop of the Tweed and will tour some of the museums in the Region.

Routine documentation and cataloguing work revealed that the herbarium, largely Borders and Northumberland material, was collected in part by Sir Walter Elliot, a local Laird, who spent 40 years in India sending crates of specimens and cultural artefacts back to the new Archaeological Society and museum in the 1860's. Further research has shown that his expertise was not limited to a good aim with a shotgun, but extended to numismatics and Hindu religion, subjects upon which he wrote definitive texts.

This research has informed the creation of a new permanent gallery – a re-creation of a Victorian gentleman's study – which looks broadly at the development of natural history from the times of Columbus and, more specifically, at the growth of the Hawick Archaeological Society and the contributions made to its progress by Sir Walter. Scottish Natural Heritage gave a generous 50% grant

towards the gallery which opened in April this year. As well as interpreting the museum's collections of natural and cultural artefacts and providing a wealth of educational possibilities, this gallery acts as a prelude to a conservation gallery planned to open later next year which will bring the story of natural history in Roxburgh up to date.

Computer listing of the contents of this same herbarium has allowed the production of county species lists to be sent to BSBI Recorders who have found one or two interesting new records, whilst the Royal Botanic Gardens are now aware that their large collection of Indian plants from Sir Walter Elliot is complemented by specimens in Hawick Museum. Having finally received information from the last of the BSBI recorders, the production of a full catalogue and background report is now imminent.

The proposed role of Hawick Museum as a Local Records Centre for site and species data is also soon to be realised: Scottish Natural Heritage have given a grant towards the purchase of a database system, including map plotter and graphics scanner to facilitate the production of well presented output from the system. At the moment any input into the system is being delayed by the update of Recorder software by English Nature, although a Steering Committee has already been created to oversee the management of the Centre and verify dubious records. As soon as Recorder 3.2 is available the real work will start – there could be as many as 500,000 existing records spread around the Borders, all to be processed in conjunction with new data.

It is almost three years since this post was appointed and there is a tendency to feel that only a small dent has been made in the amount of work to be done... which, of course, is the nature of our profession: the more one does, the more one needs to do! It is gratifying, however, that other countryside organisations in the Borders have given their support to the continuing natural sciences work of the museum, and there are now many opportunities to contribute to regional strategies and initiatives in one of the most beautiful parts of the country.

Hopefully, the aims of the Miles Report in 1986 have been fulfilled, at least in part, and there is certainly enough work still to be done – enough for a lifetime. It remains to be seen

how issues such as Local Government reorganisation and the shift to a unitary authority will affect the operation of the museums in the Borders, but with some good fortune and a prevailing wind the task of curating, collecting, researching and interpreting the natural heritage of the Borders will continue for many years to come.

John Harrison
Natural Sciences Officer
Roxburgh District Museums Service

Summary of Museums Association Meeting held in Doncaster

The aim was to establish a forum where the MA, federations and specialist groups could come together, perhaps two or three times a year, at different venues around the country. Discussion indicated that twice a year would be a reasonable aim, and the next meeting may be in Bristol later this year.

The meeting was in general quite interesting, and it is useful to be able to confront the MA directly. However one little hiccup concerned the notification of the specialist groups. Although all of us had received invitations, generally via our institutions, MA claimed that they had also gone to the specialist groups as well. In fact neither the chairs or the secretaries of the BCG or GCG appear to have received any such invitation, thus potentially leaving out the whole of the Natural Sciences curatorial community. A small issue perhaps, but one I hope would not be repeated. In fact, committee members from both groups were present at the meeting.

Stephen Locke spoke on the current situation at the MA and its plans for the future. He sees the role of the MA as being to raise the standards of museums, but a principle means to do that would be by the underwriting of professional standards. He stressed that the core values of the Association would be retained, but hoped the Association would become open to a wider range of applicants than at present, shop managers being a cited example.

This led onto the review of the membership structure, and in particular the way in which the applications for associateship were to be assessed. The aim was to make the assessment more rigorous and more relevant, while again opening up the areas of museum work that could be eligible. The gaining of the diploma as a prerequisite for asso-

ciate membership was to be removed, and assessment by portfolio and interview were proposed. The award would be made on the basis of both training and experience, with the ability to demonstrate a commitment to their institution as a museum. Thus associate membership would be given on the basis not only of what they had been trained to do, but also on what they had actually done. It was accepted that criteria would be difficult to define for some areas of museum work, and also that problems might arise with respect to those people who had been awarded this status under the older regulations.

Barbara Woroncow then said a little about the (possible) forthcoming local government review. The general impression seems to be that not enough is known or decided at present, so it is difficult to know what to do (*Only in England - Ed*). Some points were made. Particular problem areas were likely to be break up of county museum services, smaller museums with a wide remit (eg. The Yorkshire Museum), and pastoral care posts not based on any institution, (eg, Gloucestershire, Cumbria and Ryedale).

The MA were to make a statement of general principles, and to set up a working party to look at any potential problems. Letters had been sent out to those museums that look as though they might be at risk, but the response has so far been poor.

Brian Hayton gave some rule of thumb points for pragmatists:

- Know what you are doing.
- Ignore what voices on high are saying. They won't know any more than you.
- Don't assume it will be alright on the night. However don't assume all change is bad.
- Keep your masters happy.
- Know who your friends are and keep them.
- Make more friends.
- Find out who writes policy and talk to them.
- Blow your own trumpet. Run information campaigns.
- Stay in charge of your own situation.

Discussion indicated that many people were still very much in the dark. The MA will put more information in the Museums Journal.

Along with a certain amount of specialist discussion, there was one topic of more general relevance. Cathy Niblett gave a talk on the provision for

disabled people in museums. This will be covered in the next round of registration, and may be a requirement rather than an option. MAGDA have a range of documents designed to help people deal with problems of disabled access, and Cathy gave some guidelines on how to meet the minimum standards.

- Conduct a disability/access audit.
- Always work in consultation with disabled people.
- Look at all types of disability. Some may be less apparent than others.
- Establish a working party which includes disabled people.
- Draw up policy and a timetabled action plan. Have this endorsed by your governing body.
- Review your progress as part of your normal review procedures.
- Be grateful for criticism, and act on it.
- Promote public support.

It remains to be seen how successful these meetings will be, but they have the potential to be a useful forum, doing interactively what is otherwise covered less effectively in the Journal.
Steve Thompson, Scunthorpe Museum

REVIEWS

Duckworth, W.D., Genoways, H.H. & Rose, C.L.

Preserving Natural Science Collections: Chronicle of our Environmental Heritage

National Institute for the Conservation of Cultural Property, Inc. 1993. 140pp. 25 photographs. 1 figure.

This publication is the result of a joint project between NIC, the Association of Systematics Collections and the Society for the Preservation of Natural History Collections. The publication consists of an executive summary (4pp); Chapter 1 - Significance and value of natural science collections (11pp); Chapter 2 - the scope and nature of the conservation challenge (13pp); Chapter 3 - Meeting the challenge - recommendations and strategies (14pp); Bibliography (38pp); Glossary of selected terms (16pp); Appendix A - natural science conservation training program (7pp); Appendix B - recommended topics for research and technology transfer (7pp); Appendix C - Project chronology (2pp); Appendix D - project participants and contributors (13pp); and Appendix E - Resolutions from the International Symposium and First World Congress on the Preservation

and Conservation of Natural History Collections.

This is a useful addition to the literature. Much of the discussion and many of the recommendations will be familiar to UK natural history curators who have read *Biological Collections UK* (1987) and the *MGC Standards in the Museum Care of Biological Collections* (1982).

Recommendations include the following: 'An intensive graduate program in the conservation of natural science collections be established immediately to train a core group of conservators'; 'An ongoing graduate program in the conservation of natural science collections must be established to train conservators for the future';

'Conservators from other field be made aware of the special needs of natural science collections...';

'Institutions must develop, support and encourage education and interdisciplinary professional exchange as investments in collection care'; 'The natural science community should seek the transfer of information and technology from other conservation fields, scientific disciplines and industry'; 'Efficient methods to document specimen preparation, sampling, and other treatments or use should be developed to ensure the research integrity of the collections'; 'Databases and networks should be developed and maintained to provide the widest societal access to the information inherent in natural science collections'.

The bibliography includes many general works on conservation and draws mainly on US material although there are references to articles in the *Geological Curator*, and the *Journal of Biological Curation*. As might be expected, many of the more specific references are drawn from *Collection Forum*.

It seems likely that different solutions will be adopted in North America and in Britain. To some extent the publication has been overtaken by events in the UK and many of the recommendations have already been incorporated in the *MGC Standards*.

The forthcoming *Manual of Natural History Curatorship*, a BCG project, will provide a more in-depth analysis of many issues relating to natural science collections and particularly specimen preparation and preservation.

Geoff Stansfield

International Symposium and First World Congress on the Preservation and Conservation of Natural History Collections – 3 Volumes. Dirección General de Bellas Artes y Archivos, Ministerio de Cultura, Madrid, Spain. 1993. Vol 1 (312pp) edited by Palacios, Fernando; Martínez, Carmen & Thomas, Barbara; Vol 2 (426pp) edited by Palacios, Fernando; Martínez, Carmen & Thomas, Barbara; Vol 3 (439pp) edited by Rose, Carolyn L. Williams, Stephen L. and Gisbert, J.

The three volumes give an account of the Congress which took place in Madrid in May 1992.

Part 1 of Volume 1 includes papers presented at the opening ceremony; a summary of the symposium; report from the resolutions committee; the resolutions themselves; and remarks made at the closing ceremony. Part 2 includes 28 papers on the functions and management of natural history collections.

Part 1 of Volume 2 includes 20 papers on natural history collections in different countries and institutions and Part 2 includes 20 papers on the preservation and conservation of natural history collections.

Volume 3 includes a preface and remarks at the opening and closing sessions. Section 1 includes 6 papers and an introduction on challenges facing the preservation of natural history collections. Section 2 includes 9 papers and an introduction on collections at risk and museum responses to changing social and economic climates. Section 3 includes 7 papers and an introduction on current activities and programmes. Section 4 includes 9 papers and an introduction on future directions and strategies.

From the above it will be clear that the three volumes represent a significant publication and a challenge to the reviewer.

The preface, resolutions, opening and closing remarks and introductions are printed in full in both Spanish and English. Other papers are presented in Spanish or English with abstracts in the second language.

Perhaps the most remarkable aspect of the Congress was that it brought together so many natural history curators and so many senior museum directors. In some ways the most significant papers are those by the directors and senior staff of the national museums. These include those by Thomas E. Lovejoy, Assistant Secretary for

External Affairs at the Smithsonian Institution (The role of natural history museums in a changing world); Robert Hoffmann, Assistant Secretary for Science, Smithsonian Institution (Expanding use of collections for education and research); Alan R. Emery, Director, Canadian Museum of Nature (Changing philosophies, roles and responsibilities); Jean-Claud Hureau, Sous-Directeur, Museum National d'Histoire Naturelle, Paris (Recent factors affecting the care and preservation of the Paris Museum of Natural History collections: developments and strategies); Neil Chalmers, Director, The Natural History Museum, London (Achieving strategic change: natural history collections for the 21st Century); Frank H. Talbot, Director, National Museum of Natural History, Smithsonian Institution (Museums on the knife edge); Des Griffin, Director, Australian Museum, Sydney (Planning for the 21st Century and preparing for the next 500 years).

As might be expected many of the papers related to practice in museums in Spain. The UK was well represented and of particular interest to UK readers will be the papers by UK delegates which included Peter Davis, University of Newcastle upon Tyne (The preservation of fish collections: an historical perspective and Computer databases as an aid to collections research); Paul F. Clark, The Natural History Museum (Museum storage containers: back to the future); Robert May, Professor of Zoology, University of Oxford (Global change: the need and concern for collecting and preserving); Peter Crowther, Bristol Museum (Questions of acquisition: conflict and compromise in a regional museum); Phil Doughty, Ulster Museum (Collection assessments and long-range planning); Francis Howie, Safety and Conservation Advisor, The Natural History Museum (Natural science collections: extent and scope of preservation problems); and Velson Horie, Conservation Department, Manchester Museum (Conservation in Europe).

There are many other useful and interesting papers, too many to describe in this review. If it is of any help, most of these will be added to the Art and Archaeology Technical Abstracts on-line database in the near future. (See separate note in this issue).

Geoff Stansfield

PUBLICATIONS

Manual of Natural History Curatorship – The projected publication date is now the end of September 1994. The Manual will be 352 pages and priced at £45. The original proposal to produce an inexpensive manual in a relatively short time proved unrealistic. Individual contributions far exceeded the brief and in spite of drastic editing the manual is twice the size envisaged. Much of the delay has been caused by the increase in size, the use of free-lance editors by HMSO, and the need to cross-reference the various chapters. There are extensive bibliographies and a comprehensive index, the corrected proofs of which were returned to HMSO on August 1st.

Art and Archaeology Technical Abstracts – Members might like to know that for a number of years I have been submitting abstracts of papers relating to the conservation of biological and geological collections, drawn from monographs, the *Geology Curator*, *Journal of Biological Curation*, *Collection Forum* to AATA abstracts. The abstracts are printed in the two volumes published annually, and on-line. Suggestions for additional abstracts would be welcomed.

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Tel: (0533) 700770. E-Mail Express GBR-UL-DMS. Internet GBR-UL-DMS@IMMEDIA.CA

Flora Mesoamericana – The first volume of this seven volume Spanish-language project is now available. In this volume (Alismataceae to Cyperaceae) alone, one new family, two new genera and 104 new species are recorded, making the about 5% of the species in the volume new to science. This ambitious project is an exercise in international collaboration and further details are available in the UK from the Natural History Museum. No price given.

Hortus Eystettensis, The Bishop's Garden and Besler's Magnificent Book by Nicolas Barker – published in Nurnburg in 1613 the original book detailed the contents of the Prince bishop of Eichstatt's magnificent garden. Nicolas Barker tells the story of the 25 special hand-coloured copies of this famous book, now in collections all over the world. With 150 reproductions from the original edition. Available price £40 from Turpin Distribution Services, Blackhorse

Road, Letchworth, Herts SG7 1HN or from the British Library if you are passing their shop. The BL copy is currently on display in their Exhibition Gallery, Great Russell Street, London WC1.

PERSONAL THOUGHTS ON THE LEICESTER NATURAL SCIENCES CURATORIAL COURSE

Being relatively new to the world of curation I was encouraged to attend the natural sciences curatorial course at Leicester University. My colleagues were glowing in their praise of the course when it was held in Sheffield and were intrigued to see how it had developed since.

Monday – Participants came from as far afield as Malta and included curators (4) doing the one week course or a part time diploma (2) and students (3) doing full time museum studies.

The course started with a look at the "Historical Context" of Natural History Collections; how fashions and scientific research have formed the material which is in museums today. If all that was too heavy for a Monday morning, the next task was a bit of active research. We were given a famous (dead) naturalist to research over the week and off we trundled with maps to try to find the library and more importantly somewhere to eat!

After lunch Derek Lott from the Leicester museum gave us a colourful slide talk on biological recording and protected species legislation. He made clear the talk was usually aimed to the public, however it was perhaps a little too general for the audience who were already "turned on" to the subject.

Next topic was called "Do it yourself collecting policies". We were asked to group ourselves into national, local or university museums to discuss the ethics of collecting from each view point. The ensuing "discussion" covered who should collect what and where!

Tuesday – The field work day. In the morning we visited Ulverscroft nature reserve. This was a joint effort between Derek, Simon and Stephen Grover, a botanist from the Ecology Unit. Derek demonstrated various insect trapping methods, some of which "he had prepared earlier". These included pitfall traps baited with fish heads that even the foxes were not too sure about. Simon and Stephen discussed plant surveying, habitat assessment and management. During which a

large and loud JCB was carrying out some drastic looking habitat management on the reserve. Lunch was at a nearby pub with understanding bar staff. We traipsed into a posh looking restaurant area wearing muddy boots and waterproof coats. Little did they know, I had tubes of live beetles in my pockets.

The afternoon session concentrated on geology. The first site was Tilton railway cutting. The muddiness of the site was fully appreciated by the people who wore trainers rather than boots. Here we looked at geological layering and collected bags of mud (which we later discovered contained microfossils). The second site was Thistleton quarry. Donning our bright yellow hard hats once again we descended into the depths of the quarry. For the non geologists, the surveying meant hitting bits of rock and looking to see if you could find anything.

Wednesday – Preservation, Preparation and Conservation day (or the day you get to play with high tech equipment). In the morning we discussed the various techniques used to treat collected material, then we had a chance to try it ourselves. The bag of mud was boiled with an unspecified amount of caustic soda for a long time until we produced a smelly dried out mess, move over Delia Smith! From this you could extract microfossils. The Tullgren Funnel method of insect extraction "encouraged" the insects to move away from a hot lamp and into an awaiting jar of alcohol preservative. Next we attempted to card beetles. A tribute to Derek's skill and experience is how easy he made it look. Even with Derek's handy hints on how to give the beetle a natural pose, my beetle ended up so contorted it looked as if it was breakdancing. Then came a video on the preparation of animal skins. The queasy among us were scribbling detailed notes as a diversion to actually watching the gruesome spectacle. On hindsight it was less gory than I had anticipated.

After lunch we had a tour behind the scenes at Leicester museum. Grace, a geology conservator, talked about conservation problems and preventive techniques and materials. We had a go at removing matrix with an air abrasive pen. After that we had a roam around the collections to look at past and current techniques for conservation & preservation. This included caterpillars

which had been blown up to twice their size, freeze dried bananas and the radioactive geological material.

Thursday – The aim of the day was to learn about systematics, taxonomy and identification. We spent the morning trying to do examples of cladograms and phenograms. Simon had provided some useful examples for us to work through to get the hang of the principles. We got bogged down in the maths and didn't have time to cover the nomenclature and taxonomy aspects very thoroughly.

The identification workshop in the afternoon was a replica of the museum diploma practical exam. John Martin provided specimens for teams to key out, identify and then discuss in hypothetical curatorial situations. The strangest item was a horse hair ball.

Friday – This morning we reported back on our historical research. By this time we had spent a week getting lost around the library and now had a clearer idea on which books were most useful. Simon then told us how we should have done it! This was followed by a video on the Natural History Museum. The next topic tackled was neglected collection assessment and restoration. Once again this was group work solving hypothetical scenarios. The course ended with a fun identification quiz.

On comparison with the Sheffield course I would say they appear extremely similar. From the point of view of a person attending the one week course only:-

* I would have liked a more comprehensive coverage of issues and situations encountered by curators. For example, environmental education was not mentioned within the one week course. The subject is covered in a separate course.

* The time could have been more packed, I would have enjoyed evening sessions. Contact in the evenings was limited because we were all staying in separate accommodation.

* The course was designed to be 1/2 biology and 1/2 geology. Personally I would have liked to course to be a 1/3 botany, zoology and geology. Not enough plants and too many rocks!

I thoroughly enjoyed this course and have learnt a lot. I would advise anyone new to natural history curation to try to get on it. The course notes were easy to follow and well organised. My thanks to all those who ran and tutored the course especially Simon Knell also

to NMGM for allowing me to attend.

*Sam Hallett, Assistant Curator
Botany Department, Liverpool
Museum*

COLLECTIONS AT RISK

The Committee of the BCG place a high priority on counteracting any downgrading of the care and curatorship of natural history collections which may lead to them being placed at risk. It is the role of the Monitoring Cell, namely myself, to collect and bring to the attention of the Committee information on any such collections. The Cell, however, relies on the vigilance of all members to monitor situations at local level and to send information to me, in confidence, as early as possible. Subsequent action may vary from discrete monitoring to strong letters of protest from the Chairperson, depending on the wishes of the member concerned.

On the reverse side of the coin, however, I would also like to hear of any good news relating to collections, "New post created", "Collections saved!" etc..

*Mike Palmer (in confidence), Natural
History Centre,
Liverpool Museum,
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LETTERS

Dear Editor – I admire and envy the initiative and energy shown by Hampshire Museum Service in obtaining £95,000 for their discovery centre for natural science and active learning centre for history ('SEARCH for Science in Hampshire – the background' B.C.G. Newsletter 6:3), but why did Chris Palmer have to introduce their new strategy for 'natural science provision' with such a string of false and outmoded arguments? I quote from his article.

Firstly, '*the trap approaching natural science displays as solely the interpretation of the local natural environment*'. Why 'trap' and why 'solely'? All local environments are unique and this uniqueness is what a local museum is pre-eminently qualified to interpret. Most people's interest in the natural world is aroused by and builds on their experience of their local environment; start there and you can take them anywhere.

Secondly, '*local history, which by definition is very parochial*'. If

'parochial' means lacking in breadth, depth or relevance to the general human condition, then I suggest that this view is seriously mistaken and out-of-date. The work of W.G. Hoskins shows, *par excellence*, to what a profound extent local lives and landscapes are affected by events at national and international level, whether changes in the pattern of land ownership, the spread of the plague or the industrial revolution.

Thirdly, '*the natural environment ... consists of far broader brush strokes*'. Even ignoring the dubious construction of the metaphor, this assertion is no more true than is the contrary for local history. It is, surely, the recording of the minutiae of the natural world which enables us to detect and interpret the affects of natural events up to global level and even beyond, whether the evolution of new organisms, plate tectonics or sunspot cycles? And, in the context of the recording of minutiae, and Hampshire, spare a thought for the founder of local natural history, Gilbert White, who was born, lived and died in that county. He must be turning in his grave!

Fourthly, '*it is conceivable that one display could be created which would be equally relevant at each location in a region*'. This not only ignores the manifest uniqueness of every part of our environment, but would also require a singular lack of imagination and foresight on the part of those responsible.

A different aspect of the case, but when Chris says '*what we needed was a more strategic approach*'; who was 'we'? Did the Museum Service in fact consult its public, the ultimate source of its funding, on, for instance, the demand for '*straightforward taxonomic displays*'?

Lastly, a more general point; why are we still pigeon-holing our knowledge and interpretation of the environment into 'history' and 'natural sciences'? We know that, in the context of most of Britain, this distinction is virtually meaningless, such has been the influence of man on the landscape. Just look, for example, at any one of Oliver Rackham's magnificent series of publications. More important, this approach perpetuates the still prevalent myth that man is in some way independent of the rest of the biosphere, rather than an integral, dependent and very destructive part of it.

It is because the staff structures of most of our provincial museums still echo the disciplinary divisions of the more traditional of our universities and that, even now, we find it difficult to ignore or cross these boundaries? Given the opportunity, what a pity that this excellent initiative in Hampshire could not dispense with the artificial distinction between 'science' and 'history' once and for all.

I am sorry to be so 'crabbit', as they say in our new home, but unless curators can communicate amongst themselves with logic and lucidity, what hope have we of capturing the minds and imaginations of the public at large?

Yours sincerely

Ian M. Evans

Former Assistant Director (Natural Sciences)

*Leicestershire Museums Service
now Drumbeg, Sutherland*

Dear Editor – I and my colleagues at Hampshire County Museums Service feel that Ian Evan's letter in response to my item on our new natural science based education centre, SEARCH (BCG Newsletter 6:3) has essentially missed the point. The piece was intended to introduce the project in the context of our natural science display provision for our museums within Hampshire. My underlying argument was that the displays that we currently have do not generally provide a service which supports the delivery of the national curriculum in our local schools.

We have evidence for this conclusion in the form of feedback from various consultations with local education authority inspectors; a specific feasibility study looking at the development of educational opportunities in a fairly new but small natural history display in one of our local museums; and from the findings of professionally undertaken market research.

The development of SEARCH for Science is also important for us in this context. It allows us to concentrate our very limited education resources into one project with good facilities rather than spreading them thinly around nine museums cramped for space. The content and operation of SEARCH was not described fully enough for Ian to comment but the argument that in the real world "history" and "natural sciences" cannot be separated is valid, however, from a practical teaching viewpoint, the national curriculum in

England demands this is done for the ease of covering specific topics. The content and delivery of topics is being developed with the help of teachers and is currently "on trial" with several local schools. It should be remembered that this is essentially an educational facility and its survival depends on providing a service that schools want and are willing to pay for. We cannot afford to "experiment" at this stage but once we have (hopefully) gained a reputation and the confidence of the education establishment then we can look at introducing more integrated topics and begin to influence course content locally.

My note was certainly not intended, and nor was it, in my opinion, a philosophical argument (or judgement) on the current state of "natural science provision" in the museum world (all in one paragraph!). Ian should not be so keen and fast to draw conclusions from an item which was an introduction to another subject (SEARCH development) and not an argument in itself. That said I would still take issue with many of the specific points he raises in his letter.

I should state before going any further that as well as being Keeper of Biology for the Service that I am also Curator of Havant Museum which is operated jointly by the county and district authorities. It is a fairly small community museum consisting largely of local history displays (no natural history!) Since I wrote the text for and was heavily involved with organising most of the local history displays there are some days when I wish I was confined by "the disciplinary divisions of the more traditional of our universities"! In addition, I report to a Havant Museum Committee, which includes district and county councillors, as well as being heavily involved with a museum friends organisation, both of which to some degree reflect the opinions of our public.

My experience as a local curator dealing daily with enquiries from the public convinces me that the demand for local history is very "parochial" (dictionary definition "confined to a narrow area"). I would of course agree with the work of W H Hoskins, and within our own local history displays we do try to put the local example into a wider context, nevertheless, what most people are interested in is the "minutiae" of the history of their neighbourhood, their street, the house

they live in. The historical context may be the same but the examples shown in the displays are different in say Havant to that in Fareham. I admit I would be hard pressed to provide such unique examples to illustrate the topic of urban wildlife, for example, within each community, and so, I would suggest, would most other biologists. Why did I use the words "trap" and "solely"? Well it is perfectly natural to wish to interpret the wildlife habitats close to a museum without necessarily questioning whether this is the most appropriate use of the collections or whether the museum is the most relevant location for the display. For example, in the Borough of Havant the only significant broad-leaved woodland lies within a Country Park. Surely it is more appropriate for us to seek to interpret this type of habitat on site in conjunction with park staff rather than in the limited confines of the museum?

As it happens, we are planning a new natural history gallery at Havant which will deal in detail with the wildlife at the interface between land, freshwater and the marine environment. A totally appropriate subject for Havant with Chichester and Langstone Harbours on its doorstep. But it would also be highly appropriate for Fareham Museum close to the margins of Portsmouth Harbour. But what is the point of repeating this topic using the same examples when another appropriate "in depth" subject could be chosen for the very limited space available? Anyway we simply do not have the collections to be able to do similar displays in all nine of our local museums. This is what I meant by a "strategic approach" and I was certainly not advocating installing "straightforward taxonomic displays" in each of our local museums, merely that they should be considered as part of the blend within the overall provision for the permanent and temporary exhibition programme. Is Ian really trying to imply that a touring exhibition on bats or owls has no place at Havant Museum simply because we have no records for the Greater Horseshoe Bat or Snowy Owl or that such a display would have no general appeal?

In contrast to Ian's assertion that "most people's interest in the natural world is aroused by and builds on their experience of their local environment", it is my experience that it is the popular, topical and global conservation issues which fire the imagination of

today's public, used to a diet of quality natural history television programmes and raised on school or Brownie projects which deal with these themes. Surely the difficulty today is for museums to demonstrate that our local invertebrates are just as important to "save" as seals off the coast of Canada. We can also have an important role in explaining the processes and principles which lie behind these issues and museum biological and geological material is often ideal for this purpose.

Museum displays are not the only means to achieve these objectives. Gilbert White is after all remembered for his writings, not his museum displays. A museum should be judged on

its total provision in terms of access to the collections, specialist workshops, the acquisition and dissemination of data in addition to whatever displays it does or doesn't have. Surely "the recording of the minutiae" both for the natural and human worlds are best dealt with by publications or in the context of a local studies room, much as we have done in each of our local museums in Hampshire, rather than as a book-on-the-wall!

I had hoped that by writing a piece in the BCG Newsletter introducing SEARCH for Science in the context of our overall display policy in Hampshire rather than as just an isolated point of information I might have

been communicating with other curators "with logic and lucidity", but in this I am obviously mistaken! However, I would like to extend to Ian, and any other BCG member, an invitation to visit SEARCH to see for themselves what we are trying to achieve, especially anyone who was unable to see the presentation by Ann Nicol and Isabel Hughes at the Oxford meeting in April.

Yours sincerely
Dr Chris Palmer
Keeper of Biology and Curator of
Havant Museum
Hampshire County Museum Service



THE BCG/GEM OXFORD CONFERENCE
"Using Natural History Collections – Focus on Education."
(*Mon-Tues 11-12 April, 1994, Keble College, Oxford*)

This conference was attended by some 75 people, with a reasonably even mix of biologists and educationalists. In addition to the six papers printed below, there were a number of other activities to keep the delegates busy. On Monday morning Louise Allen and Timothy Walker took a group to the University of Oxford Botanic Gardens for an interesting demonstration of the educational use of living plants. Back at the College Steve Cross and Gina Couch (Liverpool Museum) gave a talk on the Natural History Centre at Liverpool Museum. In the afternoon everyone was driven to Cogges Manor Farm Museum, where a number of guided tours were laid on; unfortunately these filled up swiftly, so a number of us spent a pleasant sunny afternoon exploring the Farm on our own. All too soon we had to return to Keble College for the heady delights of the BCG AGM; GEM members had to make do with a visit to *Curiosity*, a permanent hands-on science gallery.

In the evening we had a satisfyingly alcoholic reception at the University Museum, where various staff offered behind-the-scenes tours. The insect collections had to be seen to be believed. A few of us were privileged to visit the large attic area of the Museum, presently under repair and refurbishment. This was where the celebrated British Association meeting took place at which Huxley and Wilberforce crossed verbal swords over Darwin's theory of evolution. We then staggered back across the road for the Conference Dinner, served in what was reputedly the largest College dining hall in Oxford. And so to bed.

Next day Kate Pontin (London Borough of Hillingdon, Local Services, UB8 1HD) gave an interesting talk on the *Evaluation of Galleries*, and Alison Thornhill (Wollaton Hall, Nottingham) one on *Resurrecting the Long Dead: the creative use of stuffed animal collections*. After lunch the group divided, with half visiting the Botanic Gardens and the rest of us going first to the Balfour Building of the Pitt Rivers Museum. Here Dr Helene la Rue gave us a very interesting talk about the gallery of musical instruments, and the music garden she is establishing, planted with examples of the trees and shrubs from which different instruments are traditionally made. A brisk walk back through misting rain took us to the main Pitt Rivers Museum, where we had an hour or so to absorb the atmosphere of a real museum, crammed floor to ceiling with wonderful ethnographic objects, and hardly any trendy interpretation to detract from them! A last afternoon tea at Keble, with time to exchange cards, say goodbye and, for me, a last chance to twist arms about papers for the *Biology Curator*. Then Home.

Charles Pettitt, Manchester Museum, University of Manchester,
M13 9PL

Keynote Talk: USING NATURAL HISTORY COLLECTIONS – Focus on Education

Dr. Elizabeth Goodhew, Keeper of Education Services, Horniman Museum, London, SE23 3PQ

My brief for the joint meeting was to take a look at learning theory, including the National Curriculum and how it affects our day to day work to touch on the enormous potential of using Natural History collections for leisure learning activities, and finally to consider how we, with our separate areas of expertise, can work together to interpret these collections for the benefit of the public.

Learning Theory

Museums have a distinctive contribution to make to the educational process. They encourage learning from real things. At their best, museums communicate across boundaries of language, culture and time. The immediacy of the real thing can be a marvellous experience -using hands, eyes, mind and sometimes ears, nose and mouth as well. The greater the number of senses involved, the more intense becomes the experience.

Very young children, reflecting on the purpose of a museum, said, "A museum is a place where you put interesting things". Another child on entering the portals of the Natural History Museum in London asked with awe, "Is this a church for animals?"

Young museum visitors faced with mounted and preserved animal specimens constantly ask, "Is it real?" and we can well understand their disbelief at our reply. They know instinctively that there is more to an animal than that. The learning that goes on in a museum is investigative whether through planned and designed displays or through direct access to material that can be handled.

How do we learn?

The constructivist theory of learning states that we construct our own notion about new information on the basis of our existing knowledge. We do not learn isolated facts, separate from the rest of our lives, we learn in relationship to what else we know, what we believe, our prejudices and our fears. Each meaning we construct makes us better able to give meaning to other sensations which fit a similar pattern. This takes time, learning is not instantaneous. We need to re-visit ideas, try them out, play with them, use them, hence the value of well-planned, hands-on displays and activities. Anything learned is the result of repeated exposure and thought. Intellectual skills are gained step by step. As we encounter each new experience, we react on the basis of our past experience, making comparisons and associations to understand it. To optimise the conditions for learning to take place, the learning environment should –

- * provide real objects to learn concrete concepts
- * demonstrate the relationships between concepts to learn principles
- * offer problem-solving activities by applying previously learned principles

Individuals vary in their preference for learning models. The Theory of Multiple Intelligences proposes at least seven different intelligences, each requiring a different approach to accommodate ways in which people learn. I like the quotation (I do not know the source) that, "The true test of intelligence is not how much we know how to do; but how we behave when we do not know what to do". Different 'horses for courses' can be selected to match the preferred learning styles of different groups of people.

Theory of multiple intelligences

- | | |
|---------------------------|--------------------------------|
| 1. Linguistic | (writers and poets) |
| 2. Logical – mathematical | (scientists) |
| 3. Musical | (musicians) |
| 4. Spatial | (pilots, architects, surgeons) |
| 5. Kinaesthetic | (dancers, athletes, mechanics) |
| 6. Interpersonal | (understanding others) |
| 7. Intrapersonal | (understanding self) |

From Davis and Gardener (1993) "Open Windows, Open Doors"
Museum News

We in museums are seeking multiple windows into learning to give access to many more learning styles. Museums are natural settings for individual-centred learning, where an individual is free to map his/her own course. But firstly, you must catch their interest; motivation is a key component in learning.

Motivation

If we can focus on something that fascinates the visitor we start off on the right foot. Sheer size can do the trick. At the Horniman Museum we have a greatly loved, over-stuffed walrus. He now sits, resplendent on an ice floe and people can compare their weight with his by standing on the scales. He has been in the museum since 1901 and I fear there would be a public outcry if parents and grandparents were not able to bring their offspring to see him; Sunderland Museum has Wallace the lion. I do not think that animals in general are a problem. Animals can present a soft and loveable public image. However, nobody – as they said when we had a teaching session at Kew – wants to cuddle a cactus. Whereas reporters flew half way round the world to record the plight of three trapped whales, there is little media coverage of the predicted destruction of a quarter of the world's flowering plants over the next forty years. I loved Kew's use of the Wow! factor. They told us that "In just six days the giant water lily is capable of growing a leaf

strong enough to support the weight of a baby." They told us that, "When the world's largest flower, *Rafflesia arnoldii*, was first discovered, people believed that it was pollinated by elephants". Does that catch your interest? The amount of interest on the part of the visitor is the starting point for all educational planning. The interest that the museum staff have in a particular subject will not necessarily coincide with that of the users. All interpretation must start with the user. This can be a problem for museums, as it is necessary to find the right balance. How do we set about this?

The museums needs to know

- * Who are the actual and potential users?
- * What do they know?
- * What do they want to know?
- * How do they feel about the museum?
- * How do they want to feel as a result of visiting the museum?

In identifying what we learn in museums we can draw a distinction between cognitive gains -the facts we get to know and affective gains - how we enjoyed the process and how we feel about it afterwards. Present opinion is that museums are strong on affective gains, that is feelings and attitudes, and weak transmitters of facts.

One of the fundamental purposes of a museum is to make its collections as widely accessible to as many people as possible. We should help the public to become museum users, not just museum visitors. Help them to see the museum as supporting their own, individual life-long learning, *ie.* as a place to which they can return and develop concepts throughout their lives. Over 80% of museum visits in this country are not part of formal education. It is the individual, either alone or in small groups who is the typical museum learner. However, having emphasised that schools are but a small proportion of the museum visiting public, I return to my brief and devote some time to the National Curriculum.

National Curriculum

The educational challenge of the National Curriculum is stated as, to help young people -

- * to use leisure time creatively
- * to have respect for other people, other cultures and other beliefs
- * to become good citizens
- * to think things out for themselves
- * to pursue a healthy lifestyle and
- * to value themselves and their achievements

The original 1988 curriculum with its ten subject documents was said to have "carved up the seamless robe of knowledge". I am not familiar with either the Scottish or Welsh curricula but understand that the Scottish system avoids the rigid subject based approach and organises content around 'areas of experience'.

The 1988 curriculum expected too much of both pupils and teachers. In the English school year there are 35 weeks; each week has 23.5 teaching hours, giving a total of 822.5 teaching hours in a school year. This is why it has been necessary to slim down and restructure the National Curriculum and examine ways to simplify the assessment of pupils. By January 1995 the Orders for the slim line National Curriculum will be published. Here is the proposed time table.

Timetable for review of national curriculum (NC)

1994	April	Schools Council and Curriculum Authority (SCAA) advises the Secretary of State on Sir Ron Dearing's proposals to slim down the NC in subjects other than English, maths and science.
	May	Consultation begins on proposals.
	July	Consultation ends.
	Sept.	SCAA reports to the Secretary of State with proposals revised in the light of consultation.
	Oct.	Secretary of State's final decisions made.
1995	Jan.	Distribution of the new Orders to schools.
	Sept.	Implementation of the new Orders for Key Stages 1-3.

1996 Sept. Aim to introduce revised General Certificate of Secondary Education syllabuses in NC subjects for key Stage H.

Sir Ron Dearing has recommended that after this there should be no further major changes for five years.

Let me briefly update you on the jargon currently used in schools. To give coherence across the country your child is no longer in Mr. Brown's class or your teenager in 5th Year Senior School. If the little one is aged 6-7 years that would be Year 2 and the older one in Year 11. Reception class is labelled R and the sixth form, (now being encouraged once more) becomes Y12 = lower sixth and Y13 = upper sixth.

Key stages tie in with end of Key Stage assessments KS1 = 5-7 yrs; KS2 = 7-11 yrs; KS3 = 11-14 yrs; KS4 = 14-16 yrs. National assessments are at ages 7, 11, 14 and 16.

Update on schools jargon

Age	Old names	School year	New names Key stage
4 - 5	Reception		
5 - 6	Infants	Y1	1
6 - 7		Y2	
7 - 8		Y3	
8 - 9	Juniors	Y4	2
9 - 10		Y5	
10 - 11		Y6	
11 - 12		Y7	
12 - 13	Lower Secondaries	Y8	3
13 - 14		Y9	
14 - 15	Upper Secondaries	Y10	4
15 - 16		Y11	
16 - 17	Sixth Form	Y12	
17 - 18		Y13	

The core subjects are English, maths and science as competence in language, numeracy and scientific method is needed throughout the rest of the curriculum and indeed in all aspects of life. Science is the area on which I shall concentrate today, while also highlighting exciting areas of working using Natural History collections in other subjects.

Links between natural history collections and . . .

(1) Biology in the National Curriculum

Life and living processes

- (i) Life processes and the organisation of living things
- (ii) Variation and the mechanisms of inheritance and evolution
- (iii) Populations and human influences within ecosystems
- (iv) Energy flows and cycles of matter within ecosystems

(2) Geography in the National Curriculum

Physical geography

Weather and climate

Landforms

Vegetation: animals and soils

Environmental geography

The use and misuse of natural resources

The quality and vulnerability of different environments

The possibilities for protecting and managing environments

Enquiries and requests for publications should be addressed to:

Customer Services Section, School Curriculum and Assessment Authority, Newcombe House, 45 Notting Hill Gate, London, W11 3JB

Tel: 071 229 1234

In the NC for 5-7 yrs the key activities are exploration, using all the senses, contact with living things and the development of different kinds of self expression. Living/Non-Living is for them the first hurdle. At this age many think that moving or active is alive; fire and clouds are perceived as alive.

7-11 yrs may reason that fires and cars are alive because they need fuel, food and oxygen and in more abstract terms they speculate whether fire 'breathes' or reproduces as sparks are thrown

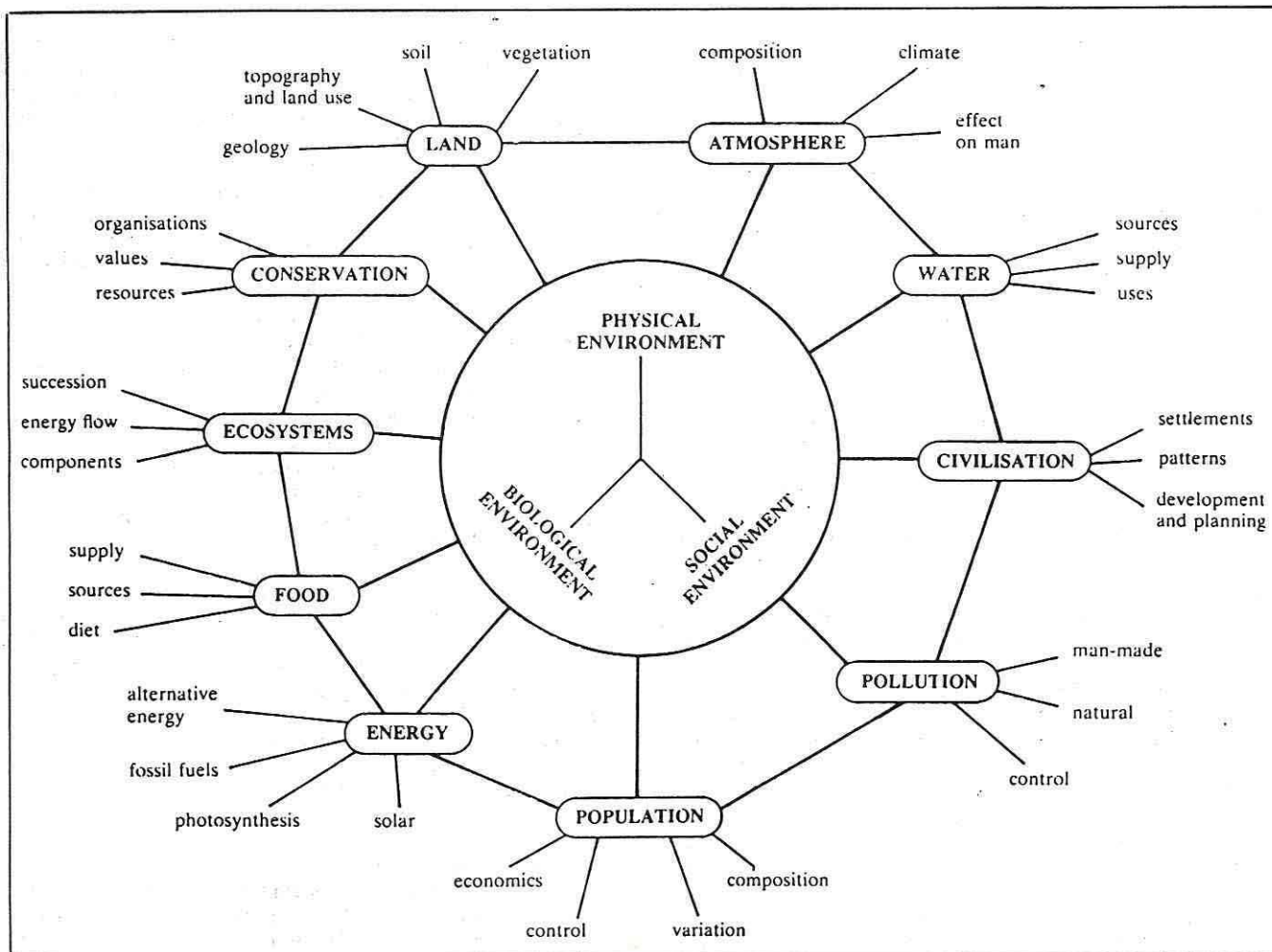


Figure 1. Subject content common to many Biology syllabuses. Reproduced with permission from the NEA Environmental Studies syllabus.

out. For both KS1 and 2 in 5-11 yrs the topics routinely sought by teachers to support curriculum work are – Animals in Their Groups, Animal Movement, and Animal Defences. For 5-7 yrs teachers use animal images in their number work – ‘1 hedgehog has 4 legs, 2 hedgehogs have 8 legs’, or ‘Draw 3 snails on the first leaf and 4 on the next leaf. How many snails altogether?’

A school from along the Old Kent Road had observed two pairs of kestrels nesting in a local playground, and wanted to make closer observation of the birds displayed in the museum. These 6-7 yrs looked at the usual beaks and feet. They looked at beaks specialised for diets of whole animals, seeds, snails, water weed and nectar. The children found the digestive system particularly interesting and were fascinated that some birds swallowed small stones to help them grind their food and that an ostrich would happily eat cacti. The teacher told us that for follow-up work the children divided birds into four groups, water, perching, birds of prey and flightless birds. They experimented with different types of feet made from balsa wood or pipe cleaners to try out ‘swimming’ feet on branches and ‘perching’ feet in water. Flying, swooping, running, hopping, landing movements and courtship dances were mimicked. Using paper, card and balsa wood the children experimented with flying wing shapes, relating them to birds. The children wrote bird words on feathers of cardboard and attached them to a large cardboard cut-out of a bird in flight. They made a nest of ostrich eggs from papier mache to the approximate measurements of 17 cm in length and 1 kg weight of a real ostrich egg. Their teacher added that one of the most important areas that emerged from this study was conservation. These 6-7 yrs were aware of the danger to birds from fishing lines, lead weights, poison and rubbish.

The NC for 7-11 yrs emphasises skills such as those of communication, individual study, using reference materials,

scientific method, observing, measuring, reporting, collecting, classifying, experimenting, cooperation with peers and encounters with adults. First hand experience is important. Scientific activities should allow children to appreciate environmental influences on plant and animal life cycles. Once these processes have been understood locally, the children’s interest can be extended to distant environments. Animals in their groups for 7-8 yrs is often linked to the maths theme of sets. What do members of each animal group have in common? How do the various groups differ? What similarities are shared by animals in different groups? The linguistic precision needed to communicate a scientific experience encourages careful use of language. There is an old story about two men on a train. One of them, seeing some naked looking sheep in a field said, “Those sheep have just been sheared”. His companion thought for a moment and then said, “They seem to be – on this side”. Museum visits reinforce and extend pupils’ vocabularies and language development is seen as an important outcome of a visit, particularly for children with learning difficulties or for whom English is a foreign language.

A class studying small creatures put their feelings into Japanese style Haiku poems. The children were surprised to be asked to write a poem of only three lines, until the teacher explained that although it sounded easy, it was really quite difficult as these three lines should only contain seventeen syllables. Beauty in pattern, colour, shape and function can be explored in music, dance and drama, helping children explore their feelings and develop their ability to express themselves.

A group of 9-10 yrs just looking at an owl found out a great deal about it without any prompting by adults or reading display labels. Here are some of their spontaneous comments – “The feathers make the owl look bigger than it really is”. “It hasn’t got a neck”.

"It's got chubby little legs" "Sometimes they look a bit evil to me". "The face looks like a mask". "It's got huge eyes and the eyes are looking forward just like ours". "The owl looks like an inexperienced hairdresser has been at it". "Look how pointed his beak is". "Yes it looks as if it could break a mouse's back". "The bottom of the beak is curved in. There's a sort of dip in it, like a jug". "It hardly looks like feathers here, it's more like fur". "The feathers on his head are very soft, sort of fluffy". "The wings and tail are not fluffy, they are more shiny". "It's all combining colours, browns, blacks and greys, all different shades". These children were using the education service at Portsmouth Museum.

The NC for 11-14 yrs states that they should begin to make personal decisions and judgements based on their scientific knowledge. Scientific activities should allow pupils to relate environmental factors to human well-being and study the effects of supply and demand and human activity on the exploitation of raw materials including air and water. Museums can help youngsters understand the nature of global interdependence enabling pupils of this age to "think globally and act locally" with a sense of environmental responsibility.

Lastly, the NC for 15-16 yrs states that they should begin to consider the effect of technological developments on individuals, communities and environments. They should consider the impact of human activities on ecosystems and be aware of the exploitation of resources. Currently 85% of pupils are following a double award science course. The single award is designed for pupils who may need for a variety of reasons to spend more time on other subjects. Some schools do three separate science subjects and figure one shows the subject content that is common to many of the Biology syllabuses for the General Certificate of Secondary Education (GCSE).

What can Museums do to help?

In a study John Yorath did on 'Education Provision in Surrey Museums' in 1992 he found that out of fourteen museums only three had part time museum education officers and a few made use of teachers who were temporary, seconded or part time. The majority of school visits were conducted by curators, who clearly enjoyed their contact with children but nevertheless face the dilemma that education work is time consuming and they have several curators who were deliberately not marketing their services fully for fear that they could not cope with the anticipated demand. Whether or not to encourage schools to visit will also depend on what is on offer and far the students have to travel. Visits by pupils in key stages 3-4 will generally have to fit into a two period, eighty minute slot, which may include travel time.

Time spent on teachers' workshops and initial and inservice courses for teachers is time well spent. Similarly time spent in the preparation of simple guides to relate displays to the National Curriculum could save much repetition. Teachers' notes, packs, activity sheets, guides, catalogues, postcards, posters, slide sets, videos, software and laser disks about the museum's collections will help teachers and lecturers prepare their students for museum visits and reinforce learning after the visits.

Curators can often suggest habitats suitable for fieldwork at different ability levels and suggest contacts with organisations and individuals who could help schools extend their studies. Such resources and expertise are valuable not only to schools and colleges but also to individual learners. I shall now touch on some of our leisure time courses that have a Natural History basis.

Leisure Learning

The children's Art and Craft Workshop is open morning and afternoon every Saturday and six days a week in school holidays. This has been going since 1949 and we welcome the first twenty children through the door for each free session. The theme for Easter holidays is 'Desert Designs' which will be interpreted using model making, painting, textiles, pottery and collage. This year's competition theme is 'Small World' and it is heartening to see in the children's work their concern for the 'fragile Earth'. Botanical illustration is an adult course, an intensive week-long course, run

twice a year, always with a waiting list. Botanical spirals were causing them trouble, so by special request we ran a Saturday course with a mathematical tutor, protractors and graph paper. Shells too offer potential for mathematical fun. We are trying to offer windows to different models of learning.

Once a month there are Horticultural Demonstrations in the Gardens and the Horniman Flower Club meets once a month in the Conservatory. More formal courses include 'Garden Design' which we have run for the past two years with the Open College of the Arts. 'The Flower Garden' is a course started at the museum last September in conjunction with Goldsmiths' College. This is one module towards the City and Guilds 'Gardening Scheme'. In the summer we shall have 'Practical Gardening' and move on to 'Trees and Shrubs' in September 94. For many years we have run the Certificate course in 'Ecology and Conservation' in conjunction with the extra-mural department of Birkbeck College.

These examples underline once more that we have many publics. Volunteers help us with ecological management tasks on our disused railway line the last Sunday in every month. There are large groups who watch the horticultural demonstrations and come to talks on Wildlife Gardening or join in Bat Walks. There are those people who seek qualifications or have a more intense interest in the horticultural, ecological or conservation scene. Some want to upgrade their skills as botanical or animal illustrators or flower arrangers and others want to work in family groups making flying creature kites or pop-up cards using the Aquarium as inspiration. All are learning and using the natural history resources of the Museum and Gardens.

The museum networks with many agencies, including Colleges, University Departments, London Wildlife Trust, London Bat Group and many more. We could not do all that we currently manage without their cooperation and we piggy-back on their publicity.

Working together

Education staff in museums are unlikely to have the curatorial expertise of their Natural History colleagues. I am sure that I speak for GEM members in saying that we are most grateful for the instruction on the collections and guidance that Natural History staff can give us. The skills that museum educators offer their colleagues are in concept formulation and the sequencing of learning. They are familiar with language levels for target groups and have knowledge of the needs and expectations of such groups.

I have touched on learning theory, a *souçon* of National Curriculum, leisure learning activities, and the importance of networking. I shall add one *caveat* for 1995. Do not plan any major museum activities between 5-22 May. All the 11 and 14 year olds in the country are going to be tied up with assessments.

Dates to avoid in planning for 1995

May 5-12 National tests in English, maths and science for KS3

May 15-22 National tests in English, maths and science for KS2

In conclusion, the key message I give you today is that natural history curators and museum educators must work together and support each other. Both are in short supply in museums - endangered species almost. Together we have the potential to lay the foundations for an informed community, where individuals will actively participate in the protection of the environment and the careful use of natural resources.

Keynote Talk: CURATORS AND THE CONSERVATION ETHIC

Peter Davis, Museum Studies, Dept of Archaeology, University of Newcastle, NE1 7RU

The challenge.

There is a tiger in the Hong Kong Museum of History. Beautifully mounted, it stares out from a plastic jungle at passing museum visitors, reminding them that the sprawling concrete and neon of the ultimate urban environment was once an area of incredible natural beauty, a true wilderness. There is still beauty in Hong Kong, but of a different kind, the surrounding mountains and

sparkling sea now providing a backdrop to concrete and glass towers which reach for the sky. Nature keeps a small foothold in the public parks of Hong Kong Island and Kowloon, where parrots argue noisily in trees, bats fly by at dusk, and black kite float on the thermals above, patrolling a new kind of jungle.

On a recent visit I was fascinated by the way that even in this seemingly hostile environment, nature still had this small, and to me, important presence. Yet few people, whether locals or tourists, seemed to notice; most ignored it; no-one I met knew what the birds, insects or trees were called. The urban environment, and the need to simply survive, had seemingly made the natural environment irrelevant. In Hong Kong, making money is important, nature is not. Unless of course nature is a source of wealth and survival – (nature is also a commodity as well as a source of enjoyment) – the dried fish stalls, purveyors of fungi, and herbalists shops provide evidence of this, as do the caged finches offered for sale in local markets. It is only here that urban dwellers and wildlife appear to meet. These observations could be repeated in any metropolis on Earth; in any overpopulated urban environment, human beings are becoming almost totally divorced from nature. This fact becomes more relevant, and of increasing concern, as the human population continues to migrate to live in urban situations. So where does this lead us? Will we see a growing population that denies nature exists, that disregards the interconnecting webs that bind us to a wider environment, a population with a total lack of interest or concern for the natural world? As nature is subject to increasing threats from man's activities, primarily through habitat loss, but also from overcropping, pollution and wildlife trade, this is the moment when the human population needs to be most aware, most concerned, about wildlife, wilderness and biological conservation. We have then a real dilemma – on the one hand an uncaring population which feels divorced from nature, and on the other natural habitats and ecosystems which need protection. It is not simply a case of loss of biodiversity, but the role that species play in the long term maintenance of global ecosystems, and ultimately the survival of humankind. Here then lies the greatest challenge to face curators and educators in museums, to be intrinsically involved in the wider movement to document biological change, but perhaps more important, to attempt to raise awareness of conservation issues and change attitudes to wildlife and environment to enable its protection. The 'curators' of the title of this note must therefore embrace all who work in museums, especially those at the cutting edge, the education staff.

It also vital that all specialist disciplines become involved – although biologists might justifiably claim that conservation is their prerogative, all curators can use their collections to good effect to promote conservation messages. The art curator can refer to past landscapes and habitat loss, or the ways that wilderness, plants and animals have always been a huge source of inspiration for artists. The social historian can paint vivid images of the impact of overcropping (the fishing industry) or the environmental impact of extracting natural resources (coal, lead and pollution effects). Archaeologists can, for example, point to the evidence of man's implication in the extinction of a species (mammoths), and ethnographers describe civilisations that have amazing knowledge of local species, peoples that can live as part of an ecosystem without endangering its existence. Costumes specialists? – the impact of the trade in feathers and cat skins, alligators and turtle shell. Everyone can, and should, play a part.

Our changing view of nature.

The idea that man is divorced from nature, that he sees himself as something separate or special, is neither new, nor, despite my earlier observation, confined to city-dwellers. To the native North Americans, the white settlers were identified as being separate from nature rather than a part of it; they had little appreciation of wilderness for its own sake, seeing land and wildlife only as a commodity. Chief Luther Standing Bear (quoted in Botkin and Keller, 1982) said that *"We did not think of the great open plain, the beautiful rolling hills and the winding stream with their tangled*

growth as wild. Only to the white man was nature a wilderness and the land infested with wild animals and savage people".

It has been argued that hunter-gatherers worldwide do not recognise a separate "wilderness"; that it is only with the development of agriculture and herding came the idea that wilderness was distinct from human habitat.

In Europe, humankind has taken a variety of attitudes to nature through history. Many classical Greek and Roman philosophers saw nature as an ordered system, one that was balanced and harmonious. Lucretius however argued that nature was capricious and fickle – that the vagaries of the environment gave man a hard time. When reading the epic poem Beowulf one is reminded that in Anglo-Saxon England wilderness was regarded as dangerous – the word 'wilderness' is derived from the Anglo-Saxon word wild (d) eor – wild beast. Buffon in 18th century Europe described the commonly held view that nature was chaotic and wilderness a '*melancholy desert*'. An alternative view was put forward by the English Romantic poets of the 19th century, who saw nature as something beautiful, sublime and inspiring; this view differs little from the idea of nature as dramatic and powerful, as scenic wonders which uplifted the spirit were 'discovered' by pioneer explorers of the American West.

A real change in the appreciation of nature came in the 19th century, and especially with George Perkins Marsh and the publication of *Man and Nature* in 1864. Here was the first realisation that as land is tamed or changed there are consequences for mankind. It was the first time that the view had been put forward that sustaining human life depends on maintaining the balance of nature. Of course, people had been fascinated by natural history before this; identifying plants and animals, or collecting fossils, was educative, even important in terms of social standing. But post 1864 nature was seen to be important in her own right, and the idea of the land ethic, *ie.* that nature – animals, plants, even rocks – had rights also came into being through the work of Aldo Leopold. In *A Sand County Almanac* (1949) Leopold makes the case that people are responsible not only to other individuals and to society, but also to animals, plants, rocks, minerals, soil and water – the environment.

In the 20th century we have absorbed this feeling for nature; environmentalism has been a driving force in changing attitudes. It may be too late, but we are now taking Marsh seriously – all of a sudden we realise that nature is important to our survival.

I suspect that this is why I felt apprehensive in Hong Kong – a feeling that through the ways in which we could be forced to live in the future we may lose our interest in the environment, may lose sight of our commitment to sustaining it – and ourselves.

Action for the future?

I believe that it is up to us in museums to try and maintain the contact between ourselves and the environment, through our displays and educational activities. People may be puzzled about what we do as curators or educators – *"I spent the weekend sleeping with life-size dinosaur models" ... "I'm running an activity day on snakes" ... "I spent all day making origami animals" ... "I've spent all week pinning out those beetles we collected" ... "Putting fish in alcohol – again"*. For those who don't understand our role, it is very easy to mock. But – I believe that what we do is very important.

As an educated, and perhaps privileged sector, most museum folk have from an early age, been exposed to images of countryside and wildlife. I was fortunate, despite living in an industrial Lancastrian town, to be able to escape easily into the countryside, and as a consequence become fascinated by it. If you are fascinated, interested, and want to know more, and learn more, then respect for wildlife and environment follows. The Senegalese conservationist Baba Dioum echoes this elegantly:-

'In the end we will conserve only what we love. We will love only what we will understand; we will understand only what we are taught'.

I feel very strongly that the end result for museum education about wildlife, whether using biological, geological, archaeological or ethnographic specimens, is to develop and enhance a conservation ethic. I persistently argued this case on the BCG/GCG

curatorial courses – that the ultimate reason why we curate collections, why we put on exhibitions, why we do research, why we devise educational programs, – the ultimate reason is for conservationist ends. Yes, there are other aims along the way – our own intellectual satisfaction, awakening or reviving an interest in wilderness or wildlife in others, the fulfilment from working with children or adults, letters received from classes of children. *'Dear Mr. Davis, thank you for telling me all about sharks. It was fun. Love from Rachel. Dear Mr. Davis, thank you for telling me all about sharks. It was fun. Love from David. Dear Mr. Davis, thank you for telling me all about sharks it was fun. Love from Adam., p.s. I liked the bit about the man being chopped up'*. Enjoy these letters, – despite the ability of some children only to remember the weird or gruesome details, it demonstrates the beginnings of awareness, steps to understanding.

Is it possible that educating people about wildlife and the environment goes further than simply engendering respect? Consider this passage from a poster advertising the display of a whale skeleton at Queen's Square in Liverpool in the mid-19th century:-

'Why are our highways, our streets and our houses, so obnoxious and exposed to depredations, arson and plunder? Why are the lives of individuals in so much danger from daring and sanguinary marauders? Whence are our youth of both sexes, in many melancholy instances, so hostile to society as to be made, by the laws of their country, shocking examples of public justice? The answer is – education is founded upon erroneous principles. The study of nature is entirely neglected, although, next to religion, it is that exact study which propagates, cherishes, and nurses up to maturity, the best affections of the human heart, and the best principles of an orderly and loyal citizen. On this ground a visit to the whale is recommended, and we are glad to see, that it is a subject of unceasing admiration ... it is visited by such multitudes that a hope may be entertained that the grandeur and sublimity of the object is infusing a love for the works of nature into the character of the whole town'.

Perhaps this is a slightly exaggerated claim for the benefits of viewing a whale skeleton, but I still believe that the idea being put forward here is important and even more valid in today's society. The descriptions of Liverpool in the 19th century could equally be Newcastle (or Hong Kong) in the 1990s. So does learning about nature have a real social impact? I can point to no research which confirms it – though in my own naive way I have the suspicion that understanding how the natural world behaves can help us to comprehend the activities of people. And even perhaps like them, and respect them too.

If you take on board these arguments then it is apparent that we have a vital role to play – we can help individuals, society, wildlife, the world. That is a huge responsibility. And it becomes more of a responsibility as our world becomes more accessible, increasingly multicultural, (or even more worrying, monocultural) as at the same time biodiversity continues to fall, and other environmental ills threaten.

Who are our audience for the messages that we in museums are trying to reach? Not just Derby Road First School, Key Stage 3 that's for sure. Our audience must include the elderly, the out of work, ethnic minorities. How do we tackle the difficulties that attitudes to animals or environment in different cultures pose us? How are we, as curators, as educators, going to cope with such demands?

Let's make things a bit easier for ourselves. We are not alone there are other people out there, also trying to convince the world that a conservation ethic is important. Wildlife photography seems to reach new standards of excellence each year, the network of conservation organisations at international, national and local level continue to grow; a new role in conservation education is being assumed by zoos, botanical gardens and aquaria.

It is especially important that museums work with these other agencies to provide comprehensive and cohesive messages – networking is the keyword and it is important. We still don't do

enough of it, and in times of economic hardship we need to share resources and expertise to deliver good educational packages.

Bioparks, missions and audiences.

I spent a few weeks in America last summer working in Philadelphia, researching the American museum approach to environmental education. I met curators and educators in a variety of institutions, and discussed their role in raising conservation awareness and the activities they undertook. I was particularly impressed by the way that live animal and live plant collections are becoming increasingly geared to environmentalism. Zoos and botanic gardens are of course regarded as museums in America, and it seems to me that in that country the distinction between botanic garden, zoo and museum is becoming increasingly blurred. The concept of the Biopark – the combination of live plants and animals and museum displays using objects and interactives has been proposed by the Director of the National Zoo in Washington, Michael Robinson. The recent launch of 'Amazonia' in the Washington Zoo is his first step towards it. I suspect that bioparks exist already, even if not called such, at other institutions in America – at the Missouri Botanic Garden for example. I also suspect that Europe came up with the concept first, through Emmen Zoo in the Netherlands, with its Biochron museum at the entrance, and exciting immersion habitats.

However, what I found particularly interesting in America was the adoption of conservation as a key objective within the mission statements of virtually all the institutions I spoke to or obtained information from. The Missouri Botanic Garden's mission statement reads – *"To discover and share knowledge about plants and their environment in order to preserve and enrich life."* George Perkins Marsh would have been proud of that one.

There are many fascinating displays and activities taking place in American museums, but one deserving especial mention has been taking place in the Academy of Natural Sciences in Philadelphia for a number of years. I mention it because it returns to the theme of who we should be trying to get our messages through to – who our audience are. The project is known as WINS – Women Into Natural Sciences – and it is an effort by the educational staff of the Academy to reach out into the black community of Philadelphia. The target for the scheme is young black women from single parent homes within certain geographical neighbourhoods of the city. The concept is to invite them to become part of the museum team for a day a week, and to provide them with basic training in the natural sciences within a unique, friendly environment. It has been running for many years now, and is a real success – not only have some of the women found jobs within science, but virtually all return to the Academy regularly, some as volunteers, some as visitors, some simply to rekindle old friendships. All the women on the scheme I met and talked to were enthralled by the museum, and delighted to be part of a scientific institution; needless to say they had boundless enthusiasm for natural history – and as a result had become educators in their own right. Indeed, many of them went on to be involved in educational activities within the museum. Who can evaluate what impact this sort of scheme has on society? It is unlikely that the women will influence attitudes to wildlife or environment in their own tough communities; but there has to be some increase in understanding somewhere, even if only a little, perhaps within immediate family.

I think we need innovative ideas such as this; we also need to provide exciting natural history displays, to recognise the ways in which all our collections can be used to a conservationist end. Above all, we need the abilities of people to build on the interest in them to communicate messages, and instill understanding. To do this we need to share ideas and expertise, and that is what the Oxford meeting of BCG/GEM (to which a version of this paper was a contribution) was all about. It is encouraging to see the number of exciting developments that are taking place, and to recognise that museums continue to make a vital contribution to the environmental movement.

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ENVIRONMENTAL EDUCATION AT TOWNELEY HALL ART GALLERY AND MUSEUMS, BURNLEY

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Introduction

Awareness of the consequences of man's impact on the environment has radically increased in the last decade, and there is evidence to show that children exhibit the greatest environmental concern. Their knowledge of global issues such as the destruction of the tropical rain forests, global warming and pollution of the oceans is usually fairly extensive. However, they may well be unaware of problems in their own local environment. Therefore it is essential that education policies ensure that all children receive a sound environmental education.

The introduction of the National Curriculum has helped to formulate a consistent approach to link the environment with all subjects in cross curricular activities. In fact in 1989 HM Inspectorate of the Department of Education and Science produced a booklet entitled '*Environmental Education from 5 to 16 Curriculum Matters*'. This document formally recognised environmental education as one of the cross curricular themes within the National Curriculum.

In response the National Curriculum Council published Curriculum Guidance Document 7 the following year. This document attempts to define a framework for environmental education and provide assistance to implement cross curricular themes and activities. Several interesting and important points were covered (this summarises the approach we have adopted at Towneley Hall Natural History Centre):

The long-term aims of environmental education are to improve management of the environment and promote satisfactory solutions to environmental issues.

Environmental education aims to:

- * *Provide opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.*
- * *Encourage pupils to examine and interpret the environment from a variety of perspectives – physical, geographical, biological, sociological, economic, political, technological, historical, aesthetic, ethical and spiritual.*
- * *Arouse pupils' awareness and curiosity about the environment and encourage active participation in resolving environmental problems.*

Teachers are usually extremely resourceful people; however, in the present economic climate, with resources dwindling and core subjects demanding the greatest financial input, it is vital that museums play a supportive role and hopefully provide facilities for schools to help with environmental education.

The staff at Towneley Hall believes that environmental education is important. Burnley Borough Council have invested and are prepared to continue investing in a variety of resources to help schools and to ensure that every child is given the opportunity to learn about wildlife and the environment first hand through direct experience.

However, this has not been achieved overnight and the rest of this paper will deal with the development of the Natural History Centre and its role in environmental education in Burnley.

The Development of the Natural History Centre

The Natural History Centre was erected in Towneley Park on the site of the two old greenhouses in the old walled garden. The greenhouses were used by the parks department to exhibit various plants and animals on a very informal basis to the general public.

The new building was financed from the proceeds of a municipal lottery at a cost of £35,573 and was officially handed over to the local authority at the end of February 1981.

The original concept of the Natural History Centre was to provide an education facility for schools, colleges and the local community. In June 1986 a decision was made to upgrade the aquarium within the confines of the Zoo Licensing Act 1981 and improve the educational potential of the whole centre.

It was also decided to make the exhibits relevant to the local area by displaying fauna and flora found in and around Lancashire. In order to display as many diverse organisms as possible and demonstrate relationships between these organisms it was decided that the display should contain seven ecosystems...

- (i) Stream
- (ii) Canal
- (iii) Predator Tank
- (iv) Lake
- (v) Estuary and River
- (vi) Tidal Rock Pool
- (vii) Sub-Littoral Area of a Rocky Sea Shore

It was felt that within these biological niches it would be possible to show how physical and biotic factors influence the relationships between various organisms and the effect of the organisms on their environment. The aim was to demonstrate aspects of ecology such as competition, dependence and interdependence food chains and food webs.

The Educational Role of the Aquarium

The original concept of the aquarium was to provide a series of displays showing the variety of freshwater fish and invertebrates found in and around the Burnley area, and marine animals found around the coastline of Lancashire. To date we have exhibited a wide diversity of water life with associated behavioral mechanisms, e.g. schooling in salmonoids and symbiosis between shrimps and sea anemones. Feeding patterns have been used to illustrate food chains and food webs to many children during practical sessions. The 'Catch' from a day's pond dipping is usually transferred to a suitable aquarium for closer detailed examination. This has enabled the staff at the Natural History Centre to interpret many aspects and objectives of the National Curriculum, and encourage and develop an interest and appreciation of all forms of life. Live displays are dynamic and provide an excellent vehicle for promoting an attitude of curiosity and scientific enquiry, and are extremely useful in experimental and investigative work in the study of biology. In the Pond Life Package simple experiments have been set up to help children make and record accurate observations, and to analyze, interpret and draw conclusions from the data and other biological information.

The live exhibits at the Natural History Centre have a very important role in education, and can stimulate children to realise the importance of wide range of conservation problems, as well as providing an insight into aspects of biology which are not normally seen in the classroom.

In order to realise the full educational potential of living displays the design and maintenance has to be of very high standard, with careful consideration given to inherent problems in running a closed system.

Environmental Education in the Galleries, Classroom and Park

"There is a groundswell among young people of concern for the natural world. This is the foundation on which we can build a wider understanding of the issues. It is important that we capture this enthusiasm and that no opportunity is lost to develop knowledge, understanding and concern for the environment through school education".

Angela Rumbold, MP, former Minister of State of Education and Science

Helping children adopt a positive approach to the environment should be central to environmental education. Promoting positive attitudes to the environment is essential if children are to value it and understand their role in safeguarding it for the future.

Encouraging the development of attitudes and personal qualities such as...

- * *appreciation of and the care and concern for the environment and for other living things*
- * *a respect for the beliefs and the opinions of others*
- * *a respect for evidence and rational argument*
- * *tolerance and open-mindedness*

(Curriculum Guidance 7 *Environmental Education* National Curriculum Council) will contribute to this process.

We are extremely fortunate at Towneley Hall to be situated in about 300 hectares of mixed woodland, moorland and recreational areas such as golf courses and playing fields, with access to the South Pennines. The grade one quality River Calder flows through Towneley Park, and there are also several streams; other aquatic features include two major areas of standing water (the ornamental pond in front of the main hall, and the Deer Pond). There is a fenced off area of woodland which is managed as a nature reserve specifically for birds, with hides and access for wheelchair users.

The Natural History Centre stands at the junction of two nature trails, and consists of a classroom, two exhibition areas, and an aquarium. It is permanently staffed by a Natural History Technician who maintains the aquarium and is very much involved in the environmental education role of the Centre.

Several educational workpacks have been developed, including:

- Discovering Insects
- Mammals, their Tracks, Trails and Signs
- Life in Ponds and Rivers
- Measuring and Identifying Trees
- Discovering Birds

Each package consists of worksheets, information sheets, instructions for teachers, preparatory work assignments, and information for future projects. All equipment and materials for use during the teaching sessions are provided by the Natural History Centre.

Two additional workpacks are currently being developed, for Weather and for Geology

The Weather Package will be aimed at Key Stages 2 and 3 in Science in the National Curriculum and will be contributory to Attainment Targets 1-4. There will be a considerable practical input from the children to develop the following aims

- * *Understanding key concepts*
- * *Using scientific methods of investigation*
- * *Appreciating the contribution science makes to society*
- * *Understanding that learning in science contributes to personal development*

Several sets of weather measuring equipment have been purchased for hire by schools. This equipment includes rain gauges, thermometers, barometers, hygrometers and anemometers. Full instructions are provided with suggested projects, charts and information on subjects such as clouds, storms and seasonal variations.

Additional equipment has been installed at the Natural History Centre, including a satellite dish and personal computer which receives transmissions from geostationary satellites orbiting 36,000 km above the earth. This allows children to predict the weather and produce weather maps; infra-red images can also predict temperature gain and loss on the land and sea.

We are also hoping to install equipment to process LANDSAT DATA produced by very high resolution satellites, which can show extremely detailed land features. The resolution obtained from LANDSAT can be as close as 10 metres, and features such as crop types, urbanised areas, pollution in waterways, and even buildings and individual streets can be seen.

It would be possible to provide cross curricular themes with the Weather Package and the very nature of this and all the other packages supplied by the Natural History Centre provide a practical 'hands on' experience. The practical activities offered by the Centre are grouped into four basic types

basic skills, e.g. pond dipping, using a microscope, measuring trees with a clinometer, preparing an insect key, use of wind gauges, barometers, etc.

observations, e.g. involves sorting and classification with the use of keys, examining different fossils and rock types, work on tree species looking at similarities and differences.

illustrations, e.g. descriptions of insects for keys, cloud types and formations, dissections of owl pellets for small mammal surveys.

investigations, e.g. small mammal surveys, insect surveys during 'mini-beast safaris', fauna and flora recording schemes, growth of plants, ecological surveys.

The Natural History Centre offers half and full day sessions, and we hope by the end of each session that each child has gained a little knowledge or understanding of some of the concepts we have explored during our investigations, but more importantly have developed their curiosity and imagination by questioning and trying to explain things.

The Future (Where do we go from here?)

We have a fairly well developed service with about 140 schools per annum visiting the Centre from as far afield as Carlisle in the north and Nottingham in the south. We have had to introduce a charge of £25.00 per visit which to date has not had too much effect on bookings. However, the staff at the Centre feel we need to take stock of the work we do and reassess some of our methods. We have monitored the service both in a quantitative and qualitative way for several years and, in the light of the current economic climate and with another local authority reorganisation looming over the horizon, a change in the way we operate may well be necessary.

When the Centre was set up in the early 1980's we were the only agency operating in this field in Burnley Borough Council. Since the 'Green Revolution' many other organisations, such as Lancashire Wildlife Trust, BCTV, Groundwork, and the local authority's Environmental Services, offer some sort of environmental education, so there is an element of competition. However, several working groups and partnerships have been formed to tackle projects like Burnley Borough Council's Environmental Strategy, and the Wildlife Strategy. It is the policy of the staff at the Natural History Centre to be involved at 'grass roots level', consequently we take part in all aspects of committee partnerships and working groups, e.g. we are actively involved in the Wildlife Advisory Group, on the council of the local Wildlife Trust, and on the working groups for formulating a range of strategies. So all the groups concerned with environmental education meet on a regular basis, work in harmony, and hopefully eliminate duplication. This harmonisation of working methods and the exchange of ideas has helped tremendously to modify some of our teaching methods and provide practical suggestions and savings by highlighting some of the errors which have been made.

For instance many of the schools which visit the Centre are limited in the amount of time they can spend, e.g. they usually arrive at 10.00 a.m. and leave at 3.00 p.m. with about 1 hour for lunch. Ostensibly they are with us for approximately four hours. Many of the practical projects require an element of instruction, although we do impress on teachers when we send out the workpacks that we assume some knowledge and key words. Therefore, for example, if we have to train children in the use of a microscope we have lost valuable teaching time, and not everyone will reach the same standard. To overcome this problem we use a projection unit with a live box so everyone will see the same image. In many instances we find that time spent outdoors on fieldwork is a better investment, e.g. a 'mini-beast safari', or a pond dipping session, with follow up work back at school.

The museum's natural history collections are used to some extent in a didactic display, or for tactile sessions with younger children, but on the whole most of the more common specimens, such as small passerine birds and some of the common mammals such as grey squirrels, are easily seen in the woods around the Centre. The Centre has a slide library of over 1,200 transparencies arranged in specific lectures. At one time these lectures were offered on a regular basis, but after monitoring the response, especially in some age groups, a conscious decision was taken to withdraw this service. The same is true for video tapes. Again there are a large number available, but in the short time we have to work with school

groups, forty minutes watching a film on pond life does not compare with spending forty minutes around the pond with a net. We still make use of these visual aids, but only in special circumstances. We have tried to learn by our mistakes and the learning curve is still climbing. The 'Kiss Principle' is a method we have tried to follow especially with young children. If you sneak up on them and introduce some scientific concepts and ideas, with an element of fun, when they are not looking they seem to retain some of the knowledge. An example of this can be seen during the 'mini-beast' safaris.

Originally we supplied every child with either a sweep net or pooter – chaos reigned with little success. The simple concept we were trying to get across was the diversity of organisms. However, we didn't achieve this. Gradually another method evolved where we gave every child a plastic specimen bottle with the instructions to use their eyes and collect different types of invertebrates. At this stage very little information on individual species was provided. At the end of the field trip the children construct their own key using various physical characteristics. To date this has been very successful, with many repeat visits for follow up work. It also relieves pressure on the ponds, which are booked solid from May to September.

Building up a Network and Maintaining Links

Initially the Natural History Centre operated in isolation. However, it was soon apparent that we could offer a more effective service by building up links and liaising with departments within Burnley Borough Council and with schools and community groups.

We have organised INSET Days for teachers, and we have built up links with teacher training colleges. We are also in the process of organising small working groups of enthusiastic local teachers for educational projects, and to provide a forum for discussion and feedback. We wanted to encourage different teachers, different sections of the planning department, and different voluntary organisations, to make contact, thereby creating an awareness of the opportunities that are around in the environmental field. Another function of these 'cluster groups' of teachers is to pool resources and gain access to a variety of grant funding bodies.

Access to grant aid and maintaining a high profile within the environmental education field is fundamental. Several organisations are based in the Centre. The Young Ornithologists' Club, which is the junior branch of the Royal Society for the Protection of Birds, meets regularly in the Centre; in fact, the staff are actually involved. Since the YOC was formed in 1990 we have raised over £5,000 in grants from a variety of sources including English Nature, Shell UK, and the Urban Programme, to purchase textbooks, binoculars, telescopes, recording equipment, and for environmental projects. These projects include habitat creation, tree planting, creating ponds, etc. The RSPB, which is the parent organisation, also believes it is essential that educational policies ensure that all young people receive a sound environmental education. The RSPB is also very active in producing resources and providing educationalists with training. For instance, they distribute free of charge a newsletter to every school in the country. They have also produced a twenty four page document called the 'Vital Link' which focuses on environmental education.

Practical Environmental Education

There are a number of activities which the Natural History Centre uses to provide a practical hands on experience to create a better environment. These include:

- tree planting or raising trees from seeds
- provide bird feeding stations to attract and examine bird life
- flower planting
- creation of wildlife gardens
- making bat and bird boxes
- creating ponds
- clearing ditches
- litter drives and recycling bins for aluminium cans and newspaper

A lot of these activities have reduced vandalism and imparted a

sense of ownership. Towneley Park, which is to the south east of the town centre, is on the urban fringe. Consequently, public pressure of over 1,000,000 visitors per annum does lead to incidents of mindless destruction. Children who take part in habitat creation and practical environmental education feel a sense of ownership and involvement.

Summary

We are in a fairly unique situation with a purpose built educational facility with a simple 'mission statement':

To interpret the fauna and flora of Burnley and the surrounding area for the educational benefit of the local community.

We have the back up and support of a museum service with substantial natural science collections, and a very sympathetic and supportive curator. The challenge in education and planning is to ensure we win the 'hearts and minds' of local people especially children, who fortunately are now more environmentally conscious than ever before, and schools are going to demand more environmental education.

So, to summarise, we must be positive. We should recognise what is already happening in schools, encourage good practice, spread the new around, and promote environmental education as a cross curricular activity which can be fun and stimulating.

Reading List

Royal Society for the Protection of Birds (1991) *Environmental Education on Integrated Approach*, Proceedings of a One Day Conference held in Manchester on 28 November 1991.

National Curriculum Council (1990) *Curriculum Guidance 7: Environmental Education*.

National Curriculum Council (1989) *Curriculum Guidance 3: The Whole Curriculum*.

DESIGNING ACTIVITY SHEETS FOR NATURAL HISTORY COLLECTIONS

Bill Clarke and Carol Levick, Education Officers, Natural History Museum, London, SW7 5BD

The Education team at The Natural History Museum in London use activity sheets to help visitors interpret the Museum's natural history and geological exhibitions. In this article you can find out exactly what we mean by 'an activity sheet', why we use activity sheets as a means of communication, how we structure the sheets and how we develop new sheets.

What are our activity sheets?

Our activity sheets are booklets of words and pictures, from 4 to 8 pages long and either A4 or A5 in format. The words are written to direct users to make close observations of particular specimens or displays. The pictures may guide them to find certain objects, or help to focus their observations.

Each activity sheet covers a sequence of 'teaching points' – specified objectives that we wish to communicate. The teaching points are linked to make a 'storyline'. Each activity asks the sheet's user to make some observations. Then, the user has to process (think about) the observation. The user also has space on the sheet to record what they have found out.

Why do we use activity sheets?

The Natural History Museum in London has a wide range of exhibitions covering many aspects of life and earth sciences. Themes as diverse as gemstones, dinosaurs, marine conservation and British woodland are explored. Yet all the exhibitions have something in common; they have been designed for the Museum's typical visitor, a 'committed learner' with an adult reading age and an adult understanding of concepts.

Clearly, many visitors do not fit this description, in particular the 200,000 children who visit the Museum each year in organized school groups. Almost 90% of these students do not have an adult reading age. The children benefit from support in interpreting the

specimens on display and learning from the exhibitions. They and their teachers have particular needs which must be met by the visit, and so require help to focus on and make sense of the exhibits.

We find activity sheets to be an effective way of providing support for such large numbers of visitors. The activity sheets can take account of the difference in reading age and conceptual understanding between the sheet's user and the exhibition's intended audience. Each activity sheet is designed to 'bridge the gap' for a particular target audience, and therefore make learning in the Museum more stimulating and enjoyable.

What do we think makes an appropriate activity sheet?

An activity sheet should enhance both the learning experience and enjoyment that the Museum's exhibitions can offer. Our activity sheets ...

- * have clearly defined aims and objectives – 'teaching points'
- * have a 'storyline' – a sequence of teaching points that progresses clearly from one point to the next
- * emphasize direct observation of the **objects** on display, not the text
- * use a variety of methods for collecting information (and using senses other than sight where possible)
- * invite a range of cognitive responses
- * use a variety of methods of recording information
- * require observation in the exhibitions for their completion
- * have a user-friendly, lively feel
- * have an interesting and attractive layout.

How do we make our activity sheets lively, interesting and accessible?

We use a variety of techniques to ensure that our sheets are accessible to the widest possible audience, and to ensure that they maximize the possibilities for learning. Variety is the key. We aim to engage the visitor in different kinds of activities and use different methods to make the activities work.

Observing, thinking and recording

For each exhibit involved in the activity sheet, we ask the user to make an observation (to look, listen, touch). We might even ask them to smell or taste if these are ever appropriate!

We then ask them to do something with that observation, to carry out some kind of cognitive processing. For example, they might compare or contrast, deduce, calculate, describe or give an opinion.

The activity sheet then gives an opportunity to record some information, either as part of the observation or part of the thinking process. A variety of recording techniques are used – writing, sketching, shading, ticking, circling or matching/linking. The structure of the sheet gives visual cues for how much free writing is needed. Most of our sheets require very little free text response. We want to emphasize their observation and thinking rather than their writing and spelling skills.

Types of questions

'Low order' questions need a simple, mechanical response. These can introduce an idea, give confidence by confirming that the user can cope with the activity sheet, or consolidate what they have learned. 'Middle order' questions involve some thought and deduction. 'High order' questions are open-ended and encourage the user to give opinions. These may have many acceptable answers. This hierarchy allows teachers to assess a range of responses to evaluate understanding of key ideas.

For example, imagine a student observing a polar bear in a glass case, with a large photograph of its icy environment in the background. A low order question might ask the student *What colour is the bear?*, a simple observation requiring only a mechanical response. A middle order question might ask *Is the bear well camouflaged in its environment?*, requiring the student to compare the bear's fur to the dominant colour of the photo and make a deduction. A high order question might ask the student *How does the bear's colour help it to survive in the Arctic*, requiring the student to relate the concept of camouflage to hunting and hiding

strategies. Each type of question is equally valid in assisting students to learn from observation.

Text

Since the text used in our exhibitions is geared toward an adult audience, an activity sheet for students under 14 should rarely, if ever, require them to read the text on display. The text on the activity sheet should be appropriate for the age of the defined audience. The text is made as simple as possible to deliver the concept. We have chosen a font called *Syntax*, with modified 'a's and 'g's, which is clear and easy to read.

Illustrations

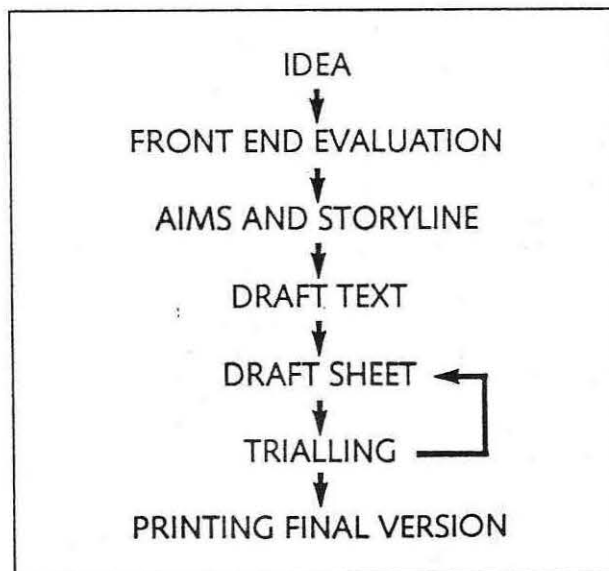
Pictures have several uses. They can provide visual cues for finding an exhibit (a potential problem in a large, busy exhibition). Others form part of an activity – and must be completed by the user, or compared to the actual object. They can involve matching or contrasting exercises. The drawings on our sheets do not provide a substitute for observing the exhibits themselves. Although our pictures are not used simply to 'pretty' the page, the illustrations used to support the activities will tend to add interest value to the sheets.

Pictograms

We include 'pictograms' on the activity sheets to help younger users to understand the nature of each activity. A simple human character is shown 'doing' whatever the user is asked to do. For example, the character may be looking, reading or matching. In addition to clarifying each task, the pictograms also provide distinct visual cues for the start and end of each activity on the sheet. Pictograms are currently being used on all sheets for students under 14.

Procedure for developing an activity sheet

This flow chart shows the stages followed in the development of our activity sheets.



Initial ideas and front end evaluation

The initial idea for an activity sheet could come from talking to visitors, from teachers' suggestions or from the National Curriculum. Our 'front end' evaluation (the information we collect before starting a new activity sheet) allows us to assess whether the proposed idea would be worth pursuing. The education officers will talk to teachers, members of the public and especially children to find out what the students do and do not understand. In this way we become aware of common difficulties or misconceptions. We also

try to find out which topics are the most interesting or useful to the visitors. From this investigation we will agree the teaching points for the sheet or series of sheets.

We define the aims and write a storyline

The originators of the sheet will define the target audience and the teaching points. They will then link these points in a coherent order to form a 'storyline'. They will consider the appropriateness of the content for the target audience, the number of aims, the logical order of the teaching points and the route to be followed in the galleries.

The originators then circulate the aims and storyline to the whole education team and invite comments. This will identify any obvious problems with the sequence. Since this early phase has required only minimal investment of the originators' time, it is easy for them to remain open minded and to reject any unworkable teaching points. In smaller museums, anybody working alone to design sheets could benefit from the view of a colleague or local teachers before progressing further.

We prepare a draft sheet

Once the storyline is agreed, we write a draft of questions and activities. The originators will take care that the language is appropriate, that the activities involve learning from objects, that a range of questioning levels and recording techniques are offered and that the layout is clear. Rough sketches and drawings are included. The originators will bear in mind the time expected to complete the sheet, which should range from 20 minutes for a Key Stage 1 pupil to 50 minutes for a Sixth form student.

The draft sheet will be circulated amongst the education team, and they will try it out in the exhibitions. Then, we hold a progress meeting to discuss problems with locating exhibits, following instructions, answering questions or with the layout of the pages. This meeting is part of the sheet's formative (early stage) evaluation. The purpose of the meeting is solely to identify problems. The solutions to these problems will be found later by the sheet's originators.

We try the sheet with the target audience

After the progress meeting, the originator/s will refine the draft sheet and produce a final version to try out with representatives of the target audience. This trialling extends our formative evaluation, and is the real test for any sheet.

The originator will trial the sheet with several groups. We aim to trial with at least six groups (6-10 students at a time) with varying abilities and background knowledge of the topic being explored. We emphasize to the students that it is the sheet that is being tested, and not themselves. This is an important point to make, especially with younger volunteers.

We observe their behaviour and conversations as they find the exhibits, tackle the activities and record their findings. We time how long it takes to complete the activities. We can also see how much assistance, if any, they need from their accompanying adults.

If at least 80% of the target audience can successfully complete 80% of the activities on the sheet without help, then we feel it is appropriate for the target group. The activities should boost confidence and invite the children to succeed, but also provide some interesting challenges. This balance is essential in achieving a worthwhile activity sheet. A sheet which is completed with a 100% success rate by all students may indicate a lack of challenge or stimulation.

We also trial the sheet with students a little younger and older than the focal age range to assess the sheet's full usefulness. In this way we can have greater confidence in recommending the sheet to teachers of different age groups. We do not print a 'suitable age range' on the sheets, but leave the final decision to the children's educators.

Further refinements are made after each trial until the originator is happy that the sheet will 'work'. A final trial forms the summative evaluation (information collected after the completion of the sheet's design). When any final problems have been sorted, the activity sheet is ready to be printed!

Who is involved in writing our activity sheets?

Early procedures involved the whole education team and representatives from the Graphics and Exhibition Design teams. This large group meant that meetings were often frustratingly slow. We now design activity sheets working in pairs (sheet originators), working under the direction of an activity sheet coordinator, and feeding ideas to the whole team at key consultation points. This has proved far more productive.

Some concluding remarks

In these notes we have not attempted to support all of the reasons for following certain procedures with specific references to research. It has not been the intention of this paper to compare the success of 'distance-learning' techniques with other teaching strategies. However, we have included an annotated bibliography for readers wishing to explore further a full range of considerations when developing activity sheets.

The Natural History Museum's education officers produced about 20 new activity sheets in 1992-93, for students ranging in age from 5 to 18 years. We found that the methods of producing sheets developed with experience, and later sheets progressed more smoothly, as we learned from our earlier efforts.

When someone is designing activity sheets, each natural history collection presents its own unique learning opportunities and difficulties of interpretation. Therefore, this description of the way in which The Natural History Museum's Education team works is not intended to be prescriptive. However, we hope that readers will find a lot of common ground and be able to benefit from our learning experience.

Some considerations for designing activity sheets

It can be useful to use a check-list when designing your first few activity sheets. Although many aspects are not complicated, it is possible to overlook a point when there are so many to consider. The following list could provide a basis for checking.

Practical points

- * Are the exhibits easy to find?
- * Are the exhibits easy to see (suitable height for child and well lit)?
- * Is it appropriate to touch the object (would the exhibit suffer wear or could there be any irritation to the user)?

Educational points (general)

- * Will you provide teaching points to help interpret a display or can you provide objects to help students learn the teaching points?
- * Can the students explore the exhibits by visual observation only or by touching and listening too?
- * What prior knowledge or skills do you expect of the students?
- * Do you want the activity sheet to provide the basis for follow-up work after a visit to the exhibition / handling of objects?

Educational points (activity sheet)

- * Have you clearly identified your target audience?
- * Have you defined your teaching points?
- * Does the order of the teaching points seem sensible (are the teaching points progressive and 'connected')?
- * Have you given clear instructions for finding the exhibits?
- * Have you made each task clear for the user (observe – cognitive process – record)?
- * Is there an interesting range of observations to be made?
- * Is there variety in the cognitive skills used (measuring, comparing or contrasting, deduction, interpolation etc.)?
- * Have you provided a variety of techniques for the user to record the findings of their observations and thoughts?
- * Is there a selection of types of question (mechanical/closed – deductive – open/higher order)?
- * Is the language level appropriate for the target audience?
- * Are the skills involved appropriate?
- * Will you use illustrations to locate exhibits?
- * Will you use illustrations as an integrated part of the activities on the sheet?

- * Would pictograms (symbols) be appropriate for consolidating the tasks on the activity sheet?
- * Have you provided a summary of what the user has learned?

And overall...

- * Does the sheet appear interesting and attractive?
- * Will the user have fun learning from the activity sheet?

The education officers at The Natural History Museum, London, have developed this structure for designing and developing activity sheets so that a very large number of young visitors can benefit fully from an extensive range of adult-oriented exhibitions. We have found the sheets to be successful and popular and hope that our experiences may prove useful to readers wishing to develop their own activity sheets.

Activity sheets: reading list

The following references provide greater in-depth analysis of the cognitive processing that occurs when people use activity sheets to help interpret exhibits. Research-based justification for questioning skills and the influence of sheets on visitors' behaviour in exhibitions are also explored.

Durbin, G. (1989) Improving Worksheets, *Journal of Education in Museums* 10 pp: 25-30. [A clear and accessible article with an emphasis on questioning techniques].

Fry, H. (1987) Worksheets as museum learning devices, *Museums Journal* 86 (4), pp: 219-225. [A survey of changing attitudes to worksheets with a positive tone and a helpful bibliography].

Hall, N. (1984) *Children, Materials and Interpretation*. in Hall, N. (ed) *Writing and Designing Interpretive Materials for Children*, Design for Learning and Centre for Environmental Interpretation, Manchester Polytechnic. pp: 27-35. [A thought-provoking discussion of the way that written materials help or hinder a child's interpretation of a display and a view on the role of interpretation in the learning process].

Jones, L. and Ott, R. (1983) Self-study guides for school-age students, *Museum Studies Journal* 1 (1) [Emphasizes the value of learning from objects and focuses on types of questions. Looks at collaboration between museums and schools].

McManus, P. (1985) Worksheet-induced behaviour in the British Museum (Natural History) *Journal of Biological Education* 19 (3) pp: 237-242. [An example of how to assess the effects of the use of activity sheets in exhibitions. The sheets referred to are no longer in use at The Natural History Museum. This research shows that some techniques used to elicit a response on activity sheets can cause problems].

Wright, A. (1984) *Writing Interpretation Materials for Children* in Hall, N. (ed) *Writing and Designing Interpretive Materials for Children*, pp: 77-88. [Design for Learning and Centre for Environmental Interpretation, Manchester Polytechnic Concentrates on cognitive processing when children interact with objects].

Other useful references to activity sheets (worksheets) can be found in the following articles...

Davis, H.B. (1980) Kids have the answers: do you have the questions? pp: 64-68 in *Instructor* 90. [Looks at types of questions and their implications].

Durbin, G./Morris, S./Wilkinson S. (1990) *A Teacher's Guide to Learning from Objects*. English Heritage. ISBN 1-85074-259 6.

Durbin, G. (1989) Evaluating learning from historical objects pp 12-13 in Hooper-Greenhill, E. *Initiatives in Museum Education*, Department of Museum Studies, University of Leicester. ISBN 0 951005-0-3.

Grinder, A.L and McCoy, E.S (1985) *The good guide: a sourcebook for interpreters, docents and tour guides*. Ironwood Press, Arizona. ISBN 0-932541-00-3. [Looks at questioning strategies].

O'Connell, P.S (1984) Decentralizing interpretation: developing

museum education with and for schools. *Roundtable Reports* 9 (1) pp: 17-22. [Designing material in collaboration with teachers].

Reeve, J. (1981) Education in glass case museums *Journal of Education in Museums* 2 pp: 1-6. [Suggests ways of working with displays of material which cannot be handled].

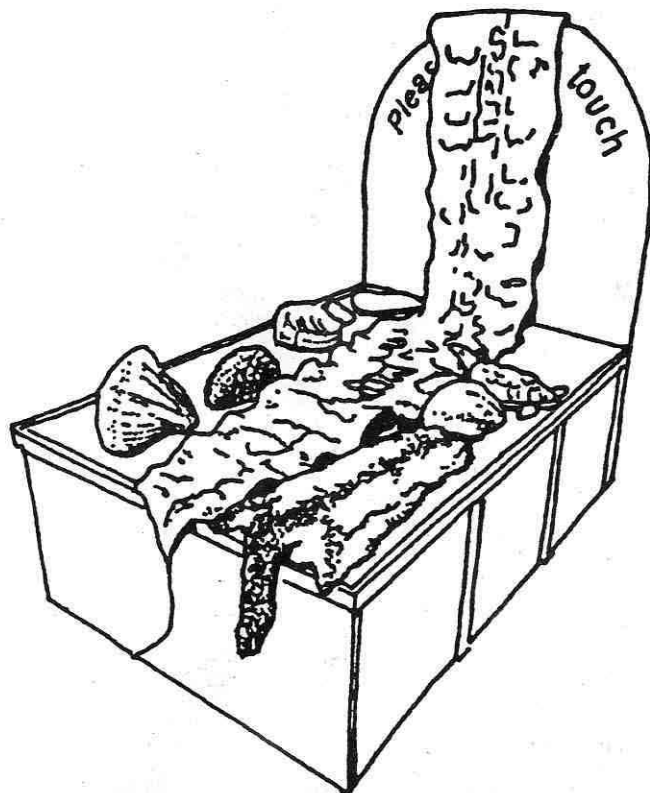
THE TRAVELLING DISCOVERY CENTRE (TDC): What we have discovered while it has travelled.

Amanda Pearson, *Travelling Discovery Centre, Natural History Museum, London, SW7 5BD*

The Natural History Museum's Travelling Discovery Centre (TDC) has been on the road for four years. Sponsorship from Marks and Spencer has enabled us to take it to a number of venues free of charge. These have included museums, countryside and environmental centres, and even a shopping mall.

If I were asked to identify one lesson I had learned from my journeying with it, it would be this – **never assume anything**. Bearing this in mind, let me begin by explaining what the TDC is and the service it offer.

Based on the permanent Discovery Centre at The Natural History Museum, London, the TDC aims to encourage first hand investigation of natural history. A series of hands-on activities are used; visitors can stroke a python skin, become a seashore detective, or hunt for fossils. The exhibitions philosophy is one of learning by doing...



Children aged 7-11 years can visit the centre in booked school groups during term time whilst at weekends and during holidays it is open to the general public.

The element that makes the TDC visitors experience particularly memorable is its explainers. These people have three important functions to fulfil. First, and most importantly, they are there to interact with visitors, and to enhance and extend their learning experience. Secondly they ensure the space functions smoothly (sharpened pencils, enough worksheets, correct specimens in appropriate boxes), and thirdly they can keep a keen eye out for wandering specimens!

To those of you concerned about taking your specimens out from behind their protective glass I should add that in 4 years of being on

the road we have only ever lost one specimen – a piece of granite. During its four year history the TDC has developed from a temporary exhibition visiting a temporary gallery into an event coming to town! We now offer a series of support activities ranging from story telling to art workshops to scientists corners!

For the BCG/GEM conference I was asked to summarise what I had learned whilst touring the exhibition. This produced a check list as follows. I hope it will be useful for anybody planning to tour an exhibition. The majority of my discoveries relate as much to touring exhibitions in general as to touring natural history in particular.

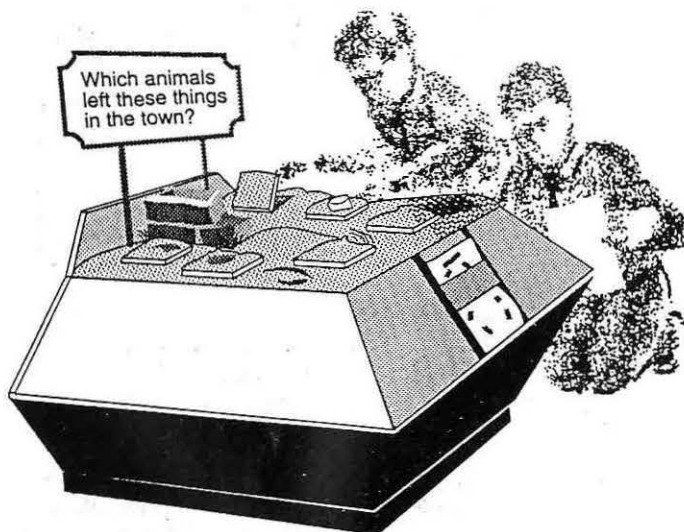
What criteria would you use to assess a venue?

Always visit a venue to vet the space. Your idea of 100m² and that of the venue's curator may be very different!

Consider...

Practical issues – what does the venue offer?

- * a suitable sized space
- * power source (if required)
- * storage (for crates etc)
- * access for installation purposes
- * access for disabled visitors



Plus/minus points

- * proximity of public transport
- * closeness of other potential venues (near enough to keep transport costs down, far enough away to have a different audience)
- * previous visits to area/venue

Political points

- * what is your policy on charging?
- * what is the attitude of venue staff to your exhibition – can you work with them?

How would you transport your exhibition?

This is not just a question of getting from A to B, but packing and unpacking, loading and unloading. A national carrier may be able to offer you transport at a cheaper rate – but will they give you peace of mind?

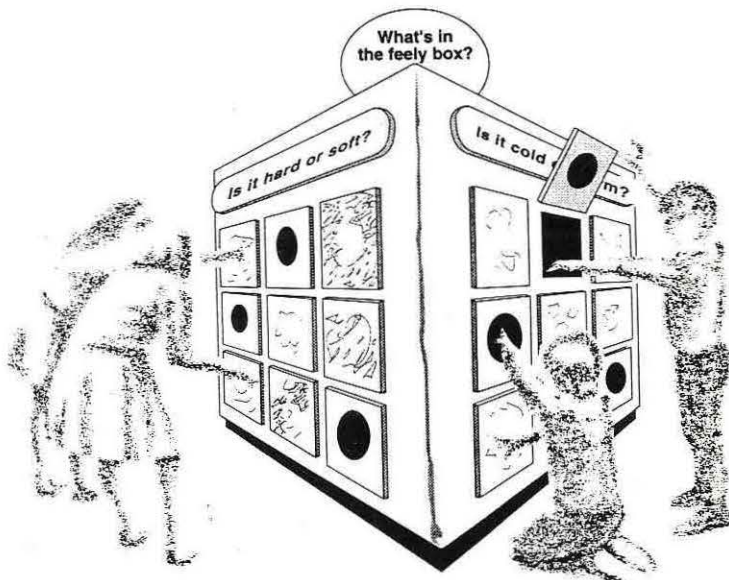
Consider... cost v reliability

Options include

- * staff and vehicle from host venue
- * local firm in area visited
- * local firm in place of exhibition origin – this is my preferred option. We work with the same people every time, and have thereby developed a good working rapport.

How would you staff the exhibition?

In the case of the TDC, volunteers have been recruited through



local volunteer bureaux, sixth form colleges, PGCE courses, The University of the Third Age and museum 'friends' associations. Two part time supervisors are also recruited, on a short term basis, from the area hosting the exhibition. We look for friendly approachable personalities rather than scientific experts – but if a candidate can offer both, so much the better! Training is provided in terms of the exhibition content and questioning skills.

Consider...

- * what staff cover does your exhibition require?
- * what qualities or skills should staff possess?
- * who can offer such skills or qualities?
- * what will you offer them?

How will you promote the exhibition to teachers?

Consider...

- * Teachers need to be given plenty of notice – Preliminary information should be sent out two terms in advance of a visit. Main promotional events should happen a term prior to the visit.
- * Teachers have to deliver the national curriculum – Make sure your exhibition will help them do this. TELL them how it will do this.
- * Teachers need to feel valued – Feed them – they'll remember you! Offer tea and cake or a buffet. Wine can double attendance figures!

How will you promote the exhibition to the general public?

As well as the usual posters and leaflets, try ...

- * AA signs – these can be arranged at a relatively low cost, compared to other forms of publicity and people trust them!
- * an official opening
- * a series of connected, themed events – as the press promote these, your exhibition continues to get a mention...

Any other considerations...?

Think about...

- * written terms and conditions
- * using a single liaison point/person
- * hidden administrative costs to exhibition originator
- * marketing opportunities
- * evaluation!

I hope this list can help anchor BC readers in the sea of developing and organising a touring exhibition!

After four years on the road I am still receiving approximately four enquiries a week, and have a waiting list of host venues 12 months long. This is partly because the exhibition hire is free, but also the reputation we have gained for delivering a complete package for staff training and additional events.

There are many hands-on centres dealing with physical sciences and chemistry in this country. By comparison natural history is

poorly represented. Some healthy competition out there would be welcomed! A pack of explanatory and activity sheets relating to the TDC is available on request from the Author.

SETTING UP AND TRIALLING A HANDS-ON NATURAL SCIENCE MUSEUM: Why Hands-on Natural Science in Hampshire Museums Service?

Ann Nicol (SEARCH Development Officer) & Isabel Hughes (Hants County Museums Education Officer), 'SEARCH' 50 Clarence Road, Gosport, Hants PO12 1BU

As a County Museums Service, Hampshire collects on a regional basis within agreed subject areas: Hampshire history (incorporating archaeology), Decorative arts and Natural Sciences. Yet the service has no 'County Museum'. Instead a series of small local museums in towns around the county are provided, many in partnership with the relevant district council. The County collections are displayed in these museums in so far as they are considered appropriate to what is largely a 'local story'.

Clearly this is limiting for natural sciences collections. Displays in many of these museums have also tended towards dioramas of local habitats using the most 'attractive' specimens for such displays – large mammals and birds. Providing further specimens for study has been considered but space for activities, particularly those involving microscopes and lenses, is limited in most of the museums in our care.

When a building became vacant at Gosport, adjacent to one of our museums, and available for the Museums' Service's use, this was quickly seen as an opportunity to set up a facility where natural sciences could be developed in their own right.

The building in question was an old school with a number of classroom spaces which could fairly easily be made into handling areas. The existence of three blocks of toilets was also an obvious asset!

A small working party, consisting of Keeper of Biology, Marketing Officer, Education Officer and the Curator of Gosport Museum, drew up a draft plan for the facility for our committee to approve. Some key issues were decided upon at this stage, including the need to appeal to schools and family audiences, with specialists to be planned for after these groups had been considered, and to provide interpreters on hand able to help visitors get the best out of specimens and exhibits. A Development Officer was appointed to work specifically on the scheme. Finally a name was found for the centre – SEARCH for Science.

Setting up SEARCH for Science

The next step was to consider the main ingredients necessary to set up the hands-on natural sciences centre. Several components were required right from the start to allow SEARCH for Science to develop: accommodation, money, time, an enthusiastic development team, and curators who don't mind specimens being used.

The design of SEARCH for Science facilities was to allow for use by groups of different ages, with provision for visitors to get close to specimens and handle them, plus equipment such as microscopes to look at the specimens, and a demonstrator to lead the group.

The physical layout of SEARCH for Science

The chosen decor is plain cream walls, grey worktops and green trim to fit in with the present decor of Gosport Museum. We used corded carpet tiles for flooring, and fixed worktops around the edge of the room providing tabletop space, which uses the space efficiently. Other tables in the room are arranged in small 'workstations', suitable for small groups of pupils to fit around – we feel eight is really the minimum number of workstations to provide for an average class size of 30+. We chose a standard height of 720mm for all of the worktop and table space in the centre and 760mm bench width. We did consider having some lower table heights for smaller children, but reckoned that they cope with these heights at home, and it is time-consuming to have to change around

the tables between one session and the next for groups of different ages. We used adjustable racking and bracket shelving for display space, and decided on recessed louvred strip lights to cut down the problems with reflection in some the glass-fronted display cases.

Storage space was necessary both within the room and in another area, for equipment and specimens. Several cupboards were built under the fixed benches, and there are some additional free standing cabinets including three Hill's type cabinets for storage of small biological and geological reference collections.

All of the activities in SEARCH for Science would be to do with observing the collections and being 'scientists'. It therefore seemed most appropriate to concentrate on providing ways of helping people look, especially at the smaller specimens, so we chose a variety of magnifying devices. We now have a number of illuminated magnifiers (x2 to x4), conventional microscopes (x10 to x20) and two video microscopes. The video microscopes consist of a Monozoom7 high power lens, Panasonic CCTV video camera, a 21" scientific monitor, and a Schott fibre optic light source. This arrangement gives magnification on the monitor of from x16 to over x300.

Some functional aspects of the facility

The physical layout and equipment generally work well when groups visit SEARCH, but a couple of points have become obvious over a period of time. For activities involving hands-on contact with biological specimens, teachers agreed that it is important to ensure proper hygiene procedures (hand washing). We found that this could be a time consuming part of each session unless very tightly organised.

The chosen table heights seem fine, even for the youngest visitors (age 5). The only height problem is in the use of the conventional microscopes – boxes of different heights for the children to stand on would help.

Preparation equipment

It is essential to have access to a specimen conservation service of some kind, or at least supplies of materials like paint, insect setting equipment, cleaning materials, and specimen repair materials.

Access to a good library and/or budget for a selection of good general reference books, children's reference and story books, has been a great help when planning sessions. Amongst the most useful pieces of equipment behind the scenes are: word processor, laser printer, photocopier, laminator and all the usual office equipment. These have enabled us to produce quick, professionally finished written materials for school sessions.

Specimen choice

Basically, many specimens specifically prepared for display are fine. Standards of taxidermy should be high – it is counter-productive to put bad specimens out for educational work – they may only succeed in putting potential adult visitors to museums off for life! However, specimens may have to be displayed or treated in a way that makes them more 'handle-able'. We have tackled this by putting small and fragile specimens in glass-topped boxes, and are looking into the feasibility of embedding specimens in clear acrylic. It has to be remembered that some specimens have a high 'yuck' factor (e.g. spirit material), and it is a problem to find a good way of displaying them. There are also problems with herbarium material in that very often it doesn't look much like the living thing! Examples of economic botany (wood, seeds and other plant products) are usually better for handling activities.

The two main considerations when choosing specimens are safety of specimens and safety of visitors.

Thinking about the safety of specimens, robust specimens on open display are usually fine, but a limited amount of damage will occur. This can usually be limited with an explanation to each group at the start of their visit, and also making sure the teacher and helpers are briefed on the nature of the activities before the session.

Thinking about the safety of visitors, it must be explained to the teacher that the session involves contact with fur and feathers, so

that they can inform parents before the visit takes place. Care must be taken also to avoid any old specimens which may have been treated with arsenic soap or any other toxic chemicals, or which may have bits of wire sticking out. Mounted specimens should be on solid, bottom-heavy bases, but not too large to be moved around. Geological specimens to be picked up and handled by young children should be large enough to see the key features but small enough not to cause injury if dropped.

The trialling process

With a relatively long lead-in time before SEARCH for Science opened (Sept 1995) it seemed important to test out our facilities and the types of learning programmes we wanted to offer, through trial schemes. To do this we needed to recruit a 'client group', willing not only to undertake these trials, but also form a partnership with staff at SEARCH for Science.

From the start we felt we needed to develop particular education programmes for schools rather than have them "graze" through the facility in a totally self-directed way as happens in many hands-on facilities. This was partly because we saw this as the best way to address directly the needs of the National Curriculum.

We decided our first client group would be Key Stage 1 and 2 children and their teachers, and proceeded to contact directly all the infant and junior schools in the Gosport area. Being near SEARCH we felt it would be easier for us to build up an informal relationship with these schools – it would be easier for either side to meet up at short notice. We enjoy a good relationship with Hampshire Science inspectors and advisers and they have provided advice and encouragement for the scheme.

Of the twenty nine schools we contacted, nineteen agreed to an interview. Of these, six schools subsequently made a total of 28 trial visit bookings. We made appointments with the Science co-ordinator, and in some cases the Head teacher also attended. Meetings took place in the individual schools at a time that suited the teachers – invariably after school. It was important to show that you were putting yourself out for them. Postal surveys and letters are notorious for going astray – teachers are inundated with them, and often don't reply even though they may be interested in what you are doing if you talk to them. We were also convinced that making personal contact would encourage teachers to 'stick with it' – possibly out of a sense of guilt!

At these meetings we showed some prepared visuals to explain

what we intended to do at SEARCH for Science. It was important to explain that this was not a 'museum' as they might know it. To keep up the pace of the meeting, and make sure that similar areas were covered with each school we used an agreed format of questions. We were careful, however, not to be too rigid with this, and used the questions as a prompt for conversation, although we did record the answers.

Based on these discussions we have since commissioned a postal survey for the whole of Hampshire and the adjacent areas – 1,200 schools would have been too many to contact personally! The survey asked detailed questions about pricing, distances schools are prepared to travel, and what are seen as the most relevant visits for developing National Curriculum Science work.

Another decision based on these client group discussions was the first three topics to be developed for Key Stage 1 and 2 audiences: Food chains, Materials, and Diversity of Life. These topics were worked up and lesson plans were presented to teachers at an after school meeting. 30 teachers attended, and they were given the opportunity there to make bookings for a session on any one of these topics.

Those booking in were expected to enter a 'contract' with us. We would provide the session free of charge – we intend to make a charge for the interpreter's time when we are fully open. In return the teacher would be prepared to come to a pre- and post-visit meeting and to provide a written or oral evaluation of their session according to a format developed by us.

At the time of writing six schools have taken part in 17 trials. The kind of things we have actually been doing with schools so far have been themed sessions using a selection of appropriate specimens. The typical structure has been an introduction followed by activities using equipment and specimens.

The feed-back about these sessions has so far been positive, but not nearly as bland as typical teachers' evaluations. Too often teachers can be grateful for anything you do for them, and are keen not to offend you and make much comment other than the extremely positive. Specific problems and issues are talked about. However, we still feel that teachers are being 'polite' with us, and next year we will be working with the South East Museums Education Unit (a wing of SEMS) with them perhaps carrying out the evaluation for us, as a third party. We will also be working with them to look at the issue of training our interpreters.

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