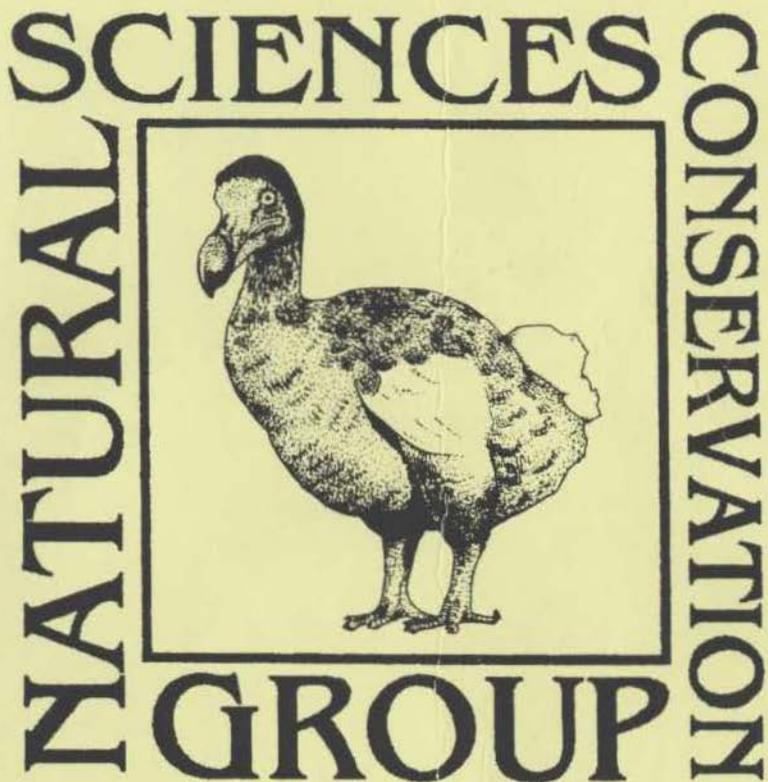


Natural Sciences
Conservation Group
Newsletter

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The Society

The Natural Sciences Conservation Group promotes: research and exchange of ideas; advances in technical and ethical standards; the public profile of the conservation and preservation of natural science collections and objects; training; and publications.

Membership

The Group is keen to open its membership to all those involved in the care and conservation of natural science objects and encourages their active participation.

Annual Subscription

Students (UK only)	£8.00
UK personal	£10.00
Overseas personal	£12.00
Institution	£25.00

Newsletter

The Newsletter is a forum for articles, views and opinions on the care, conservation and curation of natural history and associated material. The Newsletter is produced three times per annum (January, May and September) and is free to all members.

Advertisements

1/4 page	£15.00
1/2 page	£25.00
Full page	£50.00

Instructions for Authors

Material should be type-written and double-spaced in A4 format and if possible accompanied by a text file or Word document on disk (Dos-formatted). The pages should be numbered and the position of any tables and/or figures should be indicated on the hard copy. The names of animal and plant species should be underlined and the authority name given in full for the first time used, thereafter they may be omitted. All references should be given in full. Articles and other items for inclusion should be submitted to the Editor at least three weeks before the publication date.

Opinions expressed in the Newsletter are not necessarily those shared by the NSCG Committee, the Editor or the membership at large.

Editorial

"Give me a museum and I'll fill it." Pablo Picasso (1881-1973)

Welcome to Issue 16 of our Newsletter.

What a great start to the year, I've been suffering from foot in mouth disease, which although does not deny access to the countryside, does lead to embarrassing statements, somewhat in common with the those of our government. Unfortunately, some museums are suffering due to the foot and mouth crisis, especially those in rural areas or those which are open air with livestock. However, with countryside off-limits we may well see an increase in visitors numbers to those museums fortunate enough to be in foot and mouth free zones.

I was recently at the National Museum and Galleries of Wales, Cardiff, outside the front of the building were large signs stating that the museum was now offering free admission, this being part of the governments' new initiative for "universal access", in return those museums which join the scheme will be given VAT refunds on their purchases. It will be interesting to see how many museums take up this offer and what effect it will have on both visitor numbers and money available for collections.

The BCG meeting "Digital Learning" held in January was very well attended and extremely interesting. Although rather internet biased there were very instructive talks and useful ideas. However, we must ensure that our directors, administrators and others involved in the funding and the day-to-day running of our museums remember that the computer and the internet are tools to make our collections more accessible and manageable and not a replacement for them.

The upcoming two day conference "The Future of Collecting: Collections of the Future" to be held in Oxford should stimulate some interesting debate. I have found that there are many camps as to what collections exist for: some see them as merely a resource for display, whilst others see them as a purely scientific research tool. There are a good range of talks and the usual tours, and of course the conference meal, where we should enjoy a novel way of dining and some karaoke.

Cheers, D.

View from the Chair.

Dear members,

This the last "View" I shall be writing as chair of the NSCG. My term of office comes to an end at the next AGM. You may be interested to know that I am the only chairperson to have actually served the full term of office of three years.

Other occupants of this exalted position have had exciting things happen to them such as new jobs, promotion, leaving the country or having babies, which has meant they have had to resign before their term of office came to an end. However, an exciting professional and personal life is not for me, and I have been able to devote three years of my time to the NSCG, whether you have wanted me to or not.

During my three years I am happy to say that our membership has grown, and the group has gained certainly a national, if not an international, following. We are not a big group when compared with other curatorial and conservation organisations, but we are certainly a well known and active group. I became vice-chair of the National Council of Conservator-Restorers, NCC-R, late last year and it will soon be the NSCG's turn to take over the chair of this organisation. The NCC-R being the umbrella organisation for all the conservation groups in Britain, means it is in an enormously influential position, and to have a member of the NSCG as vice-chair and chair will enhance our reputation and ensure that issues affecting natural sciences conservation are heard.

On a less than happy note I have to report the closure of the North West Area Museum Service, with the loss of natural science conservation posts. We are seeing a change in how conservation is viewed by government and senior managers in the museum world, (see the article Death by a Thousand Cuts in this issue). Conservators have been happy to remain in the background diligently going about their business, whilst others grab the headlines and publicity. This has led to a worrying trend in job losses in conservation and "outsourcing". Conservators must be more pro-active in publicising themselves and the profession to our employers and the public. If people are ignorant of what we do and the importance of what we do,

we cannot be so surprised if we are not valued. Stand up and tell your local council, members of the public and the local media about conservation. Waste no opportunity to publicise yourself and the profession!

The group has run two seminars this year. A *Best Value* seminar in Stoke, and a *Pyrite Decay* seminar at the Natural History Museum, London. I would like to see such informal seminars become a regular part of our diary. Both were well received by those who attended, and there was much positive feedback. We hope to run another on the conservation of spirit collections in late October/ November. But this will be the decision of the next chair.

I will end with a call to all you clever and dynamic people out there to give a lot of thought to serving on the committee. We are losing Adrian Doyle and Vicky Purewal from the committee this year. My thanks to them for their help and support over the years. These people need to be replaced, and we also need a secretary.

I am anxious that the committee not become just the same faces every year. If you are interested in serving on the committee let one of us know before the AGM.

And talking of the AGM I hope to see you all in Oxford for our two day joint conference where you can tell me what a splendid chair I've been and buy me a drink. Please make every effort to attend, I definitely need the drink!

See you in Oxford.

Bob Entwistle.

The receipt book of G N Maynard 1829 to 1904

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A few years ago the "receipt book" of George Nathan Maynard, the curator of Saffron Walden Museum from 1880 to 1904, was discovered in Ipswich Museum. The book contains details of the receipts or recipes and procedures used by Maynard. The procedures give details on how to make different adhesives for different materials, pest control methods, how to make casts and prepare specimens. Many of these procedures refer to natural history reflecting the Victorian interest in the natural world.

The book consists of "receipts" copied from books, information from colleagues or cut from newspapers. I have translated a number of the natural history "receipts" from their original Victorian word for word as Maynard wrote them. All spellings mistakes are his!

Cements adhesives consolidants, and varnishes

Cement used by Dr Buckland for cementing large and ponderous specimens of fossils etc.

"Frank Buckland says "many of the larger bones and fossils at Oxford have been mended with a whitish coloured cement which is exceedingly hard and tenacious and among the Deans papers I found the following characteristic letter from Dr Wollaston enclosing a receipt for this white cement for large and ponderous specimens. It runs as follows:-

" My dear professor, - I send your great gunship, (along with the rhinoceros tooth) sundry specimens cemented in my fashion. Try them, break them do what you will with them, relying for full explanation on yours ever truly H Wollaston!"

The cement mentioned above is thus made;

1 part beeswax

4 parts resin

5 parts powdered plaster of Paris

Warm the edges of the specimen and use the cement warm."

The above appears word for word in a book entitled "Curiosities of Natural History" by F. T. Buckland published in the 1860's. Buckland was an eminent natural historian, partly responsible for debunking such myths as the bones of extinct animals being those drowned by Noah's flood.

Receipt for making Dr Bucklands Cement

A paste for labels etc. which he always used.

1 part finely powdered white sugar

3 parts powdered starch

4 parts finely powdered gum arabic

All by weight. In mixing use cold water. Rub the above ingredients, dry, well together in a marble mortar; then very little at a time add the water till it is the thickness of melted glue, put it in a wide mouthed bottle and cork it closely."

"To make paste that will not turn mouldy

Mix the following ingredients with 4oz of flour

½ oz powdered acacia

1oz glycerine

20 drops oil of cloves

Mix this with a pint of water and make into paste in the usual manner."

"Cement for mending shells used at Paris

Gum arabic one third

Sugar candy two thirds

White lead."

"To harden soft Fossils

Bones found in gravel pits etc. are often in a very fragile state.

In order to harden them they should be washed over frequently with a mixture of common glue and whitening; a little experience will indicate the proportions in which the materials should be used, there being always more glue than whitening."

Cement for Repairing bones etc

Old Plaster of Paris and Whites of egg is an excellent mixture for repairing broken bones of skeletons etc, it being the constituent of which bone is formed.

Why "old plaster of Paris? Any ideas out there.

Cement for sealing spirit Jars

"Insoluble glue. Soak ½ lb of best glue in cold water until quite soft, melt in kettle. When quite dissolved pour in 1 oz of hot saturated solution of bichromate of potash and well stir. It is now ready for use: apply with a brush.

Put to dry in full daylight for a day or two.

The stock kettle of glue must be kept in the dark.

The above I believe would be well adapted for sealing objects in bottles with spirits such as snakes, lizards etc."

"Cement for covering Jars etc containing spirit

The jars containing the specimen are closed up by sealing the tops with a cement composed of 3 parts by weight of gutta percha and 2 of asphalt. In preparing this cement the asphalt must first be gradually melted and the gutta percha added in small pieces – a few at a time - the whole being stirred at frequent intervals. It must be put on hot most conveniently with a small knife which as well as the cover glass should first be warm. A small weight should be placed on the top of the jar until the cement is set hard.

See p78 of the Museums association 1892 were further information may be found."

"Cement for ivory or mother-of-pearl

Dissolve one part of isinglass and 2 of white glue in 30 of water strain and evaporate to 6 parts. Add 1/20 part of gum mastic dissolved in ½ a part of alcohol add 1 part of zinc white. When required for use warm and shake up."

Gum for mounting beetles on cards

Take 5 or 6 small pieces of the finest and most transparent gum tragacanth, or gum dragon, with rather less than the same number of pieces of

clear gum arabic, put them in a wide mouth bottle with about a wine glass full of cold water, in a short time, 24 hours at most, the gum absorbs the fluid and swells, then add half as much more water and stir the mixture which on being left alone for another 24 hours at most will be ready for use. The mixture should be dull white of even texture and not quite fluid.

Varnish for eggs crustacea etc.

Common gum 4oz, gum tragacanth ¼ oz. Dissolve these in three pints of water, add to the solution 20 grains of corrosive sublimate and 20 drops oil of thyme dissolved in 4 oz spirits of wine; mix it well and let it stand for a few days to separate: the clearer part is to be used for varnish: the thicker part forms an excellent cement.

From Mr Clarke.

If any readers have samples of the above adhesives and 'cements' I would be interested in hearing from them, with a view to seeing how well they have survived the last 100 years.

Methods of preserving fleshy and soft specimens of objects.

Such as anatomical objects and natural objects in section etc Steep the object for about 3 weeks in a preparation of which Glycerine forms the principle part – thus, Glycerine 5 parts, carbolic acid one part, water three parts – The object if flat is placed in a dish and secured in its position with the aid of Plaster of Paris in which it is partly embedded, but in such a manner so as not to hide the surface of the object, by this means the specimen is prevented from shrinking, and thus kept in the form and condition required. The specimen is then kept in a suitable vessel embedded in the plaster and thus kept after being covered by the preparation alluded to above, and thus kept covered with a glass to prevent evaporation etc – after being thus kept for about 3 weeks when the liquid is removed and the object will be ready for its permanent finish, in this manner it will retain its elasticity and can be mounted and taken from its mount and examined at pleasure.

The above is the method adopted by Prof Macalister of Cambridge for preservation of his anatomical specimens in his museum of anatomy – he tells me that he prefers this method to placing them in spirits.

Would this plan answer for fungi? GN.

Maynard also made fungi casts. Below is a letter dated 16th July 1884

Dear Mr Maynard,

Since my return to town I have made enquires about casting materials for delicate structures, and the one which is most thoroughly recommended is a mixture of the finest gelatine dissolved in water thickened to the required consistency with whiting and zinc white. This preparation possesses the additional advantage that it can be used an indefinite number of times by simply re-melting. I shall be glad to hear if this proves of any use for your fungi cast: if not I will make further enquiries. I shall be glad to hear from you at any time.

Yours truly Mr E Russel Budden.

I found fungi casts in Saffron Walden Museum when I visited in October. I had hoped, together with Lynn Morrison, the conservator, to analyse them. Unfortunately this was not possible.

Fungi or flowers to dry them.

Prepare some (*indistinct word here*) sand by putting some it into a pail and pouring water upon it and stirring it round. Repeat this process until the sand is free from dirt and clean. The next thing is to dry it and this is best done by spreading out upon a board and placing it in the sun. This must when dry be first poured through a fine sieve to take away the dust, and then a courser one to get all the grains of a uniform size. In this we place our cut flowers or fungi in an upright position as (*indistinct word*). Taking care that they do not touch each other, then are completely buried in a shower of sand gently sifted upon them. If they are succulent they must be dried in an oven, ordinary flowers will do by being dried in the sun. They must be gathered when quite dry.

The heat from the sun is most satisfactory but it will take two or three days. The oven is the most expeditious plan, for two or three hours are sufficient for it to (*indistinct word*). Solution for preserving lizards, snakes etc.

Bay salt ½ tt - Arsenic 20 grains -
Corrosive sublimate 2 grains - Boiling water (i.e. rain water) 1 quart.
This liquor requires to be changed once or twice at least.

I unfortunately have no idea what the tt in bay salt stands for.

Polishing shells

Marine shells are cleaned by rubbing with a rag dipped in common hydrochloric acid till the outer dull skin is removed, washing in warm water drying in hot saw dust, and polishing with chamois leather. Those shells which have no natural polished surface may either be varnished or rubbed with a little Tripoli powder and turpentine on wash leather, then fine Tripoli alone, and lastly with a little fine olive oil bringing up the surface with a chamois as before.

Maynard gives detailed instructions on mounting 'Quadrupeds', reptiles, birds and fish and insects. These are quite long and involved and I presume that those interested in such areas are well versed in these older taxidermy methods. However, here are some extracts from these instructions.

Mounting Reptiles

Reptiles with legs are skinned and stuffed as quadrupeds. The skin requires nothing more than well cleaning and may be stuffed immediately after flaying.

Reptiles without legs require a nicety in stuffing, to make the skin appear smooth when turned into different form. Vipers all placed zigzag.

Mounting fish

Fish are most difficult to preserve of all animals to make them retain their colours and keep their scales. Cut the fish open in the belly from the head to the tail, and take out all the flesh, you must be particular than none remains, for it will destroy the colour of the skin. Use for the carcass along piece of cork and fill out the skin with cotton, sew it up and fix it on a piece of board. Then set the fins with needles or pieces of wire made sharp for that purpose; dry it slowly by a fire, after which take the wires from the fins and they will remain in the position they were dried.

Those with scales must be skinned on a cloth wetted with alum water, for it greatly assists in preserving the colour of the skin. After wet it, (with scales), in flaying with alum water.

Preservative for skins of birds etc.

Mix a little plain white soap and water in a saucer until it is of the consis-

tency of thin paste or gruel, add enough powdered arsenic to make it tolerably thick, work the whole together and apply with a coarse when required.

Experience will soon teach you how much mixture you require for the work on hand. It is better to mix it as required for the job on hand.

Birds – Composition for preserving the skins ie, keeping the moth from injuring them.

Burnt alum ½ lb		Burnt alum ½ lb
All spice 20 oz		Pepper ¼ lb
Tobacco grounds ½ lb	or	Corrosive sublimate 20 oz
Magnesia ¼ lb		Camphor 20 oz

To remove stains of blood from birds

Any clotted blood that may adhere to the feathers can be removed by the thumb and finger nails, if there is not much of it, but when any (indistinct word) extent of plumage is stained recourse must be had to water and the application of plaster and water alternatively will soon cleanse the worst stains

For removing grease use benzine followed by plaster alternately until the plumage is thoroughly clean – but the pristine beauty and gloss of feathers can never be quite restored, so greatest care should be exercised when skinning birds to prevent the feathers getting stained.

To clean furs

The Russians clean their furs with sand made hot in an oven. W Echo Nov 22 1890.

Mounting Insects

Larger, should have their intestines taken out from underneath and filled with cotton. Beetles do not require it.

Kill them with spirits of wine; nip thorax with finger and thumb.

To preserve stout bodied moths etc

To preserve stout bodied moths such as the death Hawk Moth. Mr G woods plan.

Cut the body A from the thorax B in the way shown and then from the body at C extract the contents and humours of the body with some pieces

of wire etc bend in the form of a hook. After the contents are well cleared out dress the body and whole insect with a solution of corrosive sublimate dissolved in spirits of wine made as follows;

1 part of spirits of wine or methylated spirits to a teaspoonful of powdered corrosive sublimate, shake and then settle. After the insect is perfectly dry stuff the body with cotton wool which has previously been saturated with the above solution and dried. Then glue the body to the thorax and it is finished for setting.

NB to test whether the spirit has too much or too little corrosive sublimate, dip a black feather into it and when it is dry if any trace of the sublimate is seen, add more spirit try the same experiment and if the sublimate is not seen it is the correct strength.

From Mr J G Woods Oct 10th 1884

To remove grease from insects

Grease may be removed by soaking the insect in pure rectified naphtha or benzoline even by boiling them in the same if necessary. When the bodies only are greasy they may be broken off, numbered and treated as above. After the grease is thoroughly softened the insect should be covered up in powdered pie clay or French chalk which may subsequently be removed by means of a small sable brush.

Mouldiness in insects

This is completely remedied in insects by immersing them in boiling water, and after brushing them with a camel's hair pencil, drying them thoroughly and returning them to their places: in other insects spirits of wine carefully applied with a camel's hair pencil effect a cure.

Extracts from Maynard's note on pest and fungus eradication

Killing insects

Mr Stephens has recorded the following method for killing moths etc, with the leaves of the common laurel: - "take three or four juicy leaves, (the younger the better, with if a more powerful effect is required a small portion of the tips of the stalk), of the common laurel: break or cut them into small pieces quickly between two stones in a thin piece of paper; scrape up the produce in the latter with as little exposure to the air as can be avoided, and fix the mass by a pin in the corner of the collecting box in which the

living insects are to be previously placed; keep the box closely shut and in about 5 minute very specimen will have expired. It is necessary that the external air should be excluded otherwise the fumes of prussic acid which are evolved from the crushed leaves will become too much attenuated to affect the respiratory organs of the insects, and the latter will partially revive if too speedily exposed to the verifying influence of a purer atmosphere

"For killing moths in bird cases

Cyanide of potassium 10z Water 1oz Mix and dissolve

NOTE THIS IS VERY POISONOUS

About ¼ of the above should be placed in a glass or well glazed earthenware basin and ½ oz or so of tartaric acid added. The case to be closed immediately after the acid is placed in the basin or what ever is used to hold the solution which ought to have plenty of space above the liquid to avoid its running over while effervescence thus preventing the spread of the cyanide, (which is of a very greasy nature), from disfiguring the cases. This may remain for one month or so and after time should be replaced as long as live moths make their appearance, and afterwards applied only at such times when the larva come from their eggs which should be observed in the winter and spring of the year: when the moths are once kept down the tartaric acid may be used in its crystallised form which does not take up the poison so quickly and the cyanide will last longer

The above quantity is for about every 6 feet of cases.

Ed John Tuch, Wallington."

Insects attacked and destroyed by mites etc

Insects attacked and destroyed by mites etc and also the larva of Dermetites Ptinites and Tincites, is very much avoided by attending to these rules ; put every specimen into the draws perfectly dry, never leave the glass of and keep a good supply of camphor always in the drawers.

Moths and their eggs

Feverfew as a preservative against moths etc

Feverfew is a wonderful preservative of clothes birds skins and linings of carriages. The moths will not come near any place where it is Benzine Collas will destroy the eggs of moths etc as well as take out grease spots.

Feverfew contains pyrethrum, an ingredient of many insecticides.

Moths in Carpets (Newspaper Cutting)

I have found the following an excelent plan to kill moths in carpets: sprinkle with methylated spirit (or still better but more dangerous) , Benzine; cover with stout paper, and pass a hot iron over the paper, when the spirit becomes vaporised passes through the carpet in an active condition, and destroys all insect life. The above method may occasionally be practised round the edges of a damp room with good preventive results. here is also a dry powder called Tar Camphorene, which can be used in the same way.

The above is a newspaper cutting from an advice column

To kill moss etc upon Tombstones.

A strong solution (say 10 grains to the oz) of corrosive sublimate, (ie bichloride of mercury), in spirits of wine will kill the moss that grows upon tombstones and in the engraved letters and prevent its germinating again.

Another method a few pages on says

To kill moss or lichen upon tombstones etc

Mr F Buckland in referring to the moss etc, that grows upon Gilbert White's grave stone says that the best solution for killing it is a solution of corrosive sublimate in spirits of wine, a strong solution say 10 grains to the ounce, it will not only kill the moss etc, but prevent it germinating again. See Bucklands edition of White's (*indistinct word here*) Selbourne pap 317.

I have only quoted G. N. Maynard's receipts or procedures for natural history. Readers interested in his receipts for metals ceramics and glass conservation or those for plaster casting and electrotyping etc. will have to wait.



Conference Report Preservation and Conservation Issues Related to Digital Printing October 2000

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Introduction

This two day conference was held at the Institute of Physics, London. The conference was divided into two sections. The first dealt with materials and technologies, whilst the second covered issues related to preservation and conservation. The following has been compiled the talks given at the conference, and is presented as an overview of the information given.

Materials and Technologies.

Commercial printing is experiencing great changes as digital printing technologies continue to develop at a rapid rate. Digital printing is enabling publishers to exercise greater flexibility in how, and what, they publish. Many academic titles are now printed on demand, with the publishers holding no stock of the title. Digital printing is also enabling 'out of print' books to be easily reprinted in small runs, and there is a growing market in personalised material where the purchaser selects what part of a publication they require e.g. course notes. It is envisaged that in the next 5 – 10 years digital printing will account for 10% of all commercially printed material.

However there are still a number of problems with commercial digital printing. Colour costs are still very high, and although many publishers use the same paper quality as traditional litho printing, the overall durability of the prints is unknown. Such issues with the inks and toners used in the digital print process need to be resolved before acceptance in hard copy archiving.

Digital printing has also made the world of quality publishing available to the home or small office. This has led to a plethora of small scale publi-

cations churned out on home computers. Such publications can be of great value, representing local culture, language and folklore; or could be the production of identification keys or species lists. The problem is one of trying to archive this information, and the durability of the papers and inks used to produce the material. Essentially these publications are endangered documents because of the small print runs and low quality of product material.

There is also the wider challenge of trying to track bibliographic information. The digital age makes it very easy to alter a publication. The ease of data transformation affects the authenticity of digital data, and has associated data protection problems. Digital documents should hold data on changes made to the original data to allow referral to the original reference. There is also the problem of copyright as information becomes increasingly online. Will we require digital archaeologists to access these digital archives in the future?

Digital Print Systems

There are a number of key digital printing technologies now available. Monochrome printing can now be considered a reasonably stable and mature technology, it is colour printing that is developing very rapidly. These technologies, commonly known as non impact printing or variable image printing, offer more flexibility than traditional Litho printing. Essentially the technologies available are;

Electrography. This is the technology that is used in a photocopier or laser printer and uses an Organic Photoconductor (OPC) drum to apply the image to the paper. Dry toner technology uses powdered pigments, but a liquid toner, where the pigment is carried in an emulsion, can also be used. Originally the dry toner systems used a milled pigment which gave irregular particles. This has now been improved through the use of synthetic polymer toners which have a more consistent particle size.

Inkjet Technologies. A number of techniques are used at the ink-head.

- Drop on Demand (DOD) can apply the ink in a number of ways. Heating is known as thermal drop and the ink needs to be able to withstand a wide range of conditions. Piezo electric uses a small current to apply the drop, and this allows the ink chemist to be more flexible in design. Once printed UV or IR can be used to cure the ink.

- Continuous droplet inkjet. These run at higher frequencies than DOD heads. The ink droplets are streamed by charged plates.

Modern methods of manufacture are constantly improving inkjet technology. The actual ink jets can now be manufactured using semiconductor production methods, allowing the ink-head to be formed from silicon wafer. Inkjet technology is still rapidly developing, and offers great flexibility in the range of inks that can be used, and the variety of substrates that can be printed on.

Dye Diffusion Thermal Transfer (D2T2). A thermal transfer ribbon contains the dyes which are applied through a thermal head. Dyes need to have high thermal stability.

Papers and Inks.

Paper factors: Whatever ink technology is chosen, the paper used is still a very important choice. The development of digital printing has required papers to be adapted for the printing processes used. Electrographic monochrome printing is now a commodity process, but early paper grades did not accept toner well. This led to the development of 'enhanced toner grip' papers. However the result is now that the best paper to use will depend on the machine being used for printing. For example the commercial Xeikon digital press has over 500 qualified grades of paper. Papers developed for use with toners need to be smooth, have a stable surface charge and have stable moisture properties. Colour electrographic printing uses charge generation in materials to help give colour. Toners can be about 90% resin, with 5 to 10% colorants, and use charge generation materials as additives.

Inkjet systems, while not as fast as electrographic systems, will print on a wider range of substrates from textiles to specialist art papers. The quality of the printing is a combination of the inks and their colorants, the ink volume, the tonal balance and the print head paper gap (effects definition). The development of inkjet papers needs to consider a number of factors;

- The whiteness of the paper: usually defined by the pulp used.
- Consistency of thickness: required to achieve a consistent definition.
- Good fibre formation to reduce pinholes in the matrix.

- Internal and surface sizing: this effects the sorption of the ink carrier into the paper.
- Smoothness and porosity: prevents ink drop splash and creep and gives texture to the paper.
- Archival properties.

Increasing use is now made of coated papers in digital printing. The development of coatings helps give the paper the correct 'feel' or look, but is also an important part in the control of the ink media on the paper. Increasingly this is leading to the development of matched media. This is where the ink and the paper are developed together. Coated papers come in a variety of types:

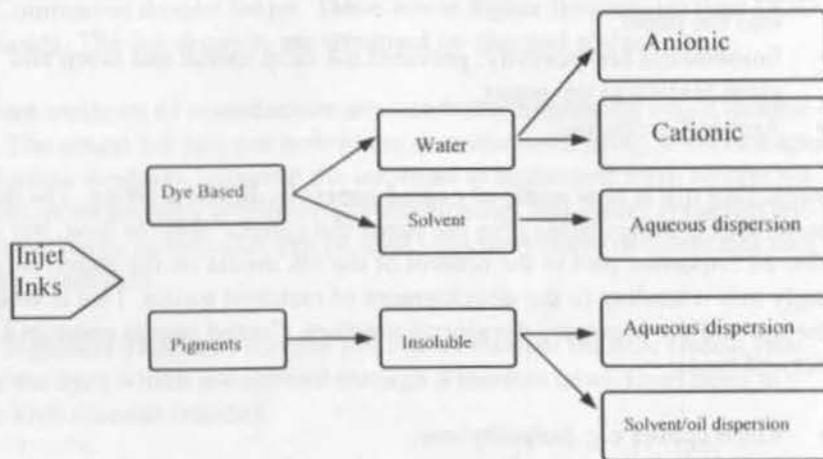
- Resin coated e.g. polyethylene.
- Non-resin coated e.g. Baryto coated (used for over a 100 years in traditional photopaper); clay coated; rawbase.
- Films, such as aqueous coated polyester.

The resulting paper structure can be a simple coating over the paper base, or much more complicated, using multiple layers to control how the paper handles the ink, responds to colour and its overall durability. The top layers in resin coated papers are known as the receiver layers, and over the resin coat. The receiver layer is important in that it handles the sorption of the ink carrier, controlling the movement of the dye on the paper. These receiver layers (of which there can be up to 6) can be of two distinct types;

- Swellable polymers such as gelatin – these are slow to dry.
- Microporous coatings – faster drying due to capillary actions.

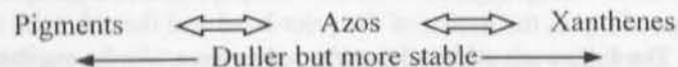
Underneath the receiver layers, the resin and the paperbase, can often be found a polyethylene back coat, designed to stop paper cockle and curl when it is printed.

The inks used in inkjet systems are available in a wide range of formulations depending on the nature of the print-head and the substrate to be printed. The following chart summarises the range of inks available;



When a dye based ink-drop hits the paper, the dye is 'fixed' in the top layer, while the ink vehicle is absorbed into the lower layers, and this is where the receiver layers control the rate of drying. Dyes tend to use additives such as sulphonic acid, which has a good hydrogen bonding characteristic, to aid diffusion into the coating of a paper. Fixing the dye in the receiver layer also helps to reduce the effects from oxidation and other degradative mechanisms. Pigment based inks reside on the surface, making the inks slow to dry and to have problems with smudge and smear. This can also make the mixing of secondary colorants very difficult with pigment based inks.

The range of dyes and pigments makes colour printing with inkjet technology a complex subject, but this is an area that is seeing constant development through the synthesis of specific dyes which need to be light stable, have equal fade, water-fastness and a good black. Colorants in inks can be summarised as follows;



The stability of the image is not only dependant on the colorant, but on the substrate and the environment. Inorganic pigments are the most stable due to their ionic lattices, but their colours are very limited and tend to dull. The colouring power is very poor and many are confirmed or suspected poisons and carcinogens. Organic colorants are less stable, but give virtually unlimited colours, which are vivid and high colouring, and which tend to be safe. Organic colorants can be natural dyes; man made or organic pigments.

Conservation Issues

There are a number of key issues arising from digital printing. The most obvious concerns relate to the archival quality of the different types of digital prints. How long are they going to last? What are the effects of environment? How will the colours fade? Also of growing concern to conservators is how do you identify the digital print process that has been used? Many artists are now using digital printing, and many of these are mixing the process with traditional printing media such as silk screen. This can make the identification of the processes used in such material very difficult. This is becoming more complex as digital print technology continues to develop and improve. This is resulting in the development of a web site through the Electronic Media Group of the American Institute for Conservation. The site is being designed to pool information on digital printing as an aid to identifying digital prints.

Tackling the immediate issue of the archival quality of digital printing. This is a terribly difficult query to answer. The quality of digitally printed media is going to vary, depending on the process used (electrographic or inkjet), the machine used and the paper media selected. Archival testing of electrographic prints has demonstrated this variability. Recent work on electrographic prints at the Graphic Technology Research Association in Germany found;

- Variability in rub resistance of prints between machines. This is due to the differences in the way machines treat papers e.g. Canon and Xerox put a thin layer of silicon over the print resulting in more durable images.
- Lightfastness tests, using Blue Wool standards and Xenon arc lights, found electrographic prints to be very good.

- Print finish was tested with a peel force tester. This found great variability between the different printer manufacturers, with Canon tending to be the better.
- Influence of the paper. Not every paper can be used with every printing process. Certain papers will be better for each printer type.

The Centre de Recherches sur la Conservation des Documents Graphiques in France have looked at the light stability of ink jet prints. Their studies utilised artificial ageing tests on prints made with the IRIS process on a variety of supports. Colour photographic prints on Fuji Crystal Archive and Fuji Pectro were used for comparison. The test were carried out using metal halide and fluorescent lights. The dye fading was monitored using densitometry, and measured as a percentage change from known standards. This work found that dye mixes appear to have faded less, whilst differing supports gave differing fading levels to the dyes, although coating treatments did help improve dye stability. It was also found in this study that exposure to the different light sources gave variable results e.g. it was noted that the fluorescent lights damaged prints more than higher levels of exposure with a metal halide light. This suggests the influence from the spectral distributions of different light sources.

Work at the Library of Congress in the USA has looked at the effects of humidity levels on IRIS inkjet prints. The work found that in high humidity there were shifts in the orange tones. This is due to the magenta dye being more soluble as a result of its smaller molecular size, causing a decided magenta shift. Recent developments in inkjet dyes have attempted to resolve this by making the magenta dye molecules larger.

The thermal stability of inkjet prints has also been looked at from a conservation perspective. At the Camberwell College of Arts, some preliminary work used accelerated ageing at elevated temperatures. Colour changes are not a linear function of duration of thermal ageing. There may be an induction period before rapid change occurs. The colour stability is going to relate to the area of colour, its tone, the substrate used, the ink used and any coatings. This study used 59% RH and 80°C in an unsealed environment, with air being allowed to circulate. The sample patches were aged for 14 days and then examined with a chromometer and spectrometer to assess movements in colour. After 14 days it was found all the papers

tested had yellowed significantly. The colour patches showed no significant dot spread, but all had perceptible colour changes with all the ink paper combinations tested. Much of this change in colour can be attributed to the yellowing of the paper substrate, causing a loss in brightness and an increase in yellow saturation.

In Summary

Digital printing is a rapidly developing technology. This pace of change presents many issues to users requiring archival quality, and has related conservation issues. However the quality of digital printing is constantly improving, and some manufacturers are making great claims as to the long term stability of their latest ink and printer ranges. However of equal importance to image quality is the quality of the substrate used. Think carefully about the paper that is used, and be aware that there is increasing development towards matched media.

Information Resources

- Preservation of Inkjet Hardcopies. <http://www.knaw.nl/ecpa/publ/jurgens.html>
- Digital Prints: Technology, Materials, Image Quality and Stability. <http://www.foto.unibas.ch/~rundbrief/les33.htm>
- Wilhelm Research – testing of inks and papers. <http://www.wilhelm-research.com/>
- American Institute for Conservation. Useful for the Electronics Media Group and their associated links on digital printing. <http://aic.stanford.edu/>



BCG-Trip to Budapest Natural History Museum. October, 2000

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Hungary's records and collections of flora, fauna and fungi have come through a notorious historical period of shifting politics, wars and revolutions. The Museum, founded in 1802 as part of the Hungarian National Museum, was given the basis of its collections through Count Ferenc Széchenyi and his wife Julianna Festetics who collected minerals and plants; the first zoological collection was donated in 1811. Since then the collections have been saved (or not) from disasters (the flood of 1838), including periods of lack of interest and funding, but most survived until the second World War and then the Hungarian uprising of 1956 when a bomb and subsequent fire destroyed between 30-60% of the collections!

The museum is divided into 6 departments, the directorate administer: Exhibition and education, Zoology, Botany and palaeobotany, Anthropology Palaeontology and Mineralogy. Each of the departmental heads outlined the collections under their care, together with a brief history of their main donors and losses in 1956! Before this, however, we were warmly welcomed by the director, István Matkási, who showed us the way all(?) Hungarians start the days work with a 50ml glass of Palinka (fruit-flavoured Schnapps)!! This certainly had the effect of relaxing us but not too much!

The percentage of destroyed collections during the 1956 revolution varied from department to department, the mineralogical and palaeontological collections were the most badly damaged, although entomology suffered with the loss of the entire Diptera collection.

The scientific part of the Museum itself is housed in a former military riding academy and on our arrival we noticed that the courtyard was full of cement mixers, diggers and earth movers which, given the recent weather, muddied our footwear before proceeding indoors! As we moved around the museum and its collections, we noted the large size and importance of their surviving natural history collections. Despite its rather neglected and

chipped 19th century architecture, which will be restored in time the offices have recently been refurbished resulting in harmonious and fully equipped work areas. It is hoped to open fully in 2002.

The display part of the Museum is run by the education and exhibition department and is housed in a nearby building that the government purchased in 1995 for a song since it was just a shell burnt out during the 1956 uprising. This has been renovated and presently displays a large array of imaginative eco-displays from a Noah's Ark, showing zoological biodiversity at an entertaining but educational level to dioramas and hands-on interactive for children. The displays covered the full range of the museums' departments including ethnography and anthropology, botany and palaeontology, zoology geology and using real specimens wherever practically possible. Interested careful and sometimes lightly humorous designs and subtle eco-messages but not overwhelmed by a vastness of displays.

The remaining part of the afternoon was devoted (to me) to exploring the botany department housed nearly a mile distant. One would never guess at the destruction of so many specimens in World War II and 1956, although 650K C-P specimens were saved along with 34K 18th century and Linnaean specimens. Since then collectors have been busy, particularly in the flora-rich Carpathian area (known as Carpatho-Pannonicum). Huge herbarium cabinets filled with species of plants and fungi, including many type specimens. We were also shown many botanical illustrations by the botanical artist Vera Csapody who continued working until her death aged 95!

Knowing of my interest in lyophilic-preservation, I was also shown their Christ-beta LMC2 freeze drier with a working temperature of -50°C that could prepare about 100 fungal specimens in one session. Other techniques for preparing fungal herbarium mounts were also shown. Of particular interest, was that of Herppel-Bohus involving gentle pressing onto cellophane to avoid shrinkage and resulting in perfect flat specimens. This involves some preparation time but had the advantage of preparing fungi to show external and internal morphology without specimens taking up much space.

Having not known what to expect (the museum was one of the few not listed in our tourist guidebook) I came away feeling that my knowledge had been enriched and despite all of its former problems the museum definitely has an important standing in other European national museums. The NSCG held a Pyrite Decay Meeting on 27th February at the



Pyrite Decay Meeting

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E-Mail: A.Doyle@nhm.ac.uk

The NSCG held a Pyrite Decay Meeting on 27th February at the Natural History Museum. The day, which was an experimental format, was split into two discrete events:

The morning was taken up by 6 excellent and varied presentations covering topics relating to pyrite decay problems including Curators needs, Preventive and remedial treatments including a case study, barrier films, pyrite mineral and paper label problems.

In the afternoon, the 25 attendees visited the Palaeontology Conservation Unit to watch demonstrations of 2 treatments for pyrite decay: Ethanola mine thioglycollate and the Ammonia/Polyethylene glycol treatment. It was also an opportunity to have a good nose around and discuss other conservation issues.

The event was a success for both the organisers and attendees although the bad weather north of the border prevented some people attending. I also I believe the format hit the right balance.

A full report will appear in the next newsletter, but in the meantime I would like to thank those people who made the event a success notably Paul Brown, Sue Lewis, Bob Entwistle, Jill Kerr, Paul Davis, David Gray, Caroline Buttler, Alison Stooshnov, Joy Irving, Gill Comerford, Kevin Webb, Michelle Laundry.

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A questionnaire, included in the meeting pack, has given us an idea on what the membership would like to see in a further 1 day meeting and has been useful feedback - watch this space! Caroline Buttler, Alison Stooshnov, Joy Irving, Gill Comerford, Kevin Webb, Michelle Laundry.

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"Death by a Thousand Cuts"

The meeting of the UKIC Archaeology Section December 2000

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The loss of conservation posts and conservators

On December 12 the UKIC Archaeology Section organised a half-day conference to discuss the worrying trend in conservation job losses in local authority and county council run museum services.

"Over the past decade conservation posts have been lost in local government and other public sector organisations. Three quarters of museums services believe their in house conservation services are now inadequate.

How will the new moves towards regional government and local councils Best Value performance plans affect this process? How can UKIC arrest the decline?"

What happens today in local government museums may have repercussions for national museums in the future. The conference was very well attended with conservators from both groups of museums representing all sectors of the conservation profession. The speakers were all interesting, sometimes controversial, sometimes thought provoking, sometimes highly entertaining and sometimes all four at once. Much lively debate ensued, which resulted in some draft proposals that will be presented to the UKIC council.

John Price – Consultant conservator and formerly of English Heritage.

JP quoted the UKIC mission aims and objectives, saying that the high standards of conservation UKIC hoped to promote were not helped by the loss of conservation posts. Whilst UKIC is not there to defend the jobs of individual members, the loss of conservation posts means a lessening of conservation awareness, less conservation being carried out and loss of money for conservation purposes. JP stressed the need to lobby and/or make friends with local or county councillors.

Conservators are needed in the field, for display and long term collections care. Perhaps conservators were regarded by some councillors or museum managers as bit like dentists, no one enjoys visiting them but they are regarded as a necessary evil!

Another threat to posts is the present Best Value initiative which local government is legally bound to implement. This is similar to the old CCT whereby in-house services can be out-sourced if they are deemed to uncompetitive when compared against the private sector. This gives local authorities the ammunition they need if they wish to out-source conservation.

In Best Value, local Government services are compared against the 4 C's,

- Challenge: are the services under review really necessary?
- Compare: the services are compared with those provided by the private sector.

- Consult: the users of the service are consulted on what they would wish the service to provide.
- Compete: how does the in-house service measure up to the services provided in the private sector?

Local government finances are very complicated. Museums are not a statutory service, and councils are not legally obliged to provide them. They are funded out of the locally raised Council Tax, and their funding is usually the first to be cut when savings have to be made. JP was passionate in his defence of local authority museums and the service they provide, and hoped that UKIC would lead the fight to make sure that local authority museums keep their conservation services.

George Monger – Independent Conservator

GM was the conservator at the Museum of East Anglian Life in Stowmarket Suffolk. He was made redundant 5 years ago after the local authority cut its grant to the museum. Savings had to be made and the museum trustees decided that conservation was something they could no longer afford. This decision was taken despite the building of a brand new conservation laboratory, and a recent report that stressed the importance of conservation to the museum.

GM has seen more and more people going freelance after being made redundant. He thinks the loss of posts has led to a lowering of standards in collection care, and a worrying trend in inexperienced museum staff taking on conservation work and using inappropriate methods. He is now a freelance conservator and he travels round the country taking on conservation contracts. Over the past 5 years he has been very busy and work has been forthcoming. GM gave some personal accounts of the work and projects he has taken part in.

Tim Shadler Hall – Reader in Public Archaeology at the Institute of Archaeology.

TSH is not a conservator but a curator and as such it was interesting to hear a non conservator's point of view as to the problems facing our profession. TSH emphasised the importance of conservation but more importantly the need for conservation to get its message across to the public. Conservation needs to show the public as a whole and not just other mu-

seum professions, that it plays an essential role in the protection the country's heritage

TSH quotes a recent survey in which members of the public were asked what they thought was the most important function of a museum. The display of objects came out top and research came at the bottom for the list.

TSH quoted the survey as evidence that we live in changing times when the public as well as the government demand value for money. There has been a change in management styles and a growing demand by government for more flexibility in its workforce. This has resulted in more posts being contracted out and less work being carried out by in-house specialists.

However this cost cutting by out-sourcing only works in a stable environment. If there is a disaster or difficulties of some sort, the system breaks down and falls apart. TSH also stressed the importance of having hard facts and statistics at hand when arguing a point. No one knows the exact number of museums in Britain, which TSH finds amazing. Some recent surveys have put the number at around 700 others 1200. Thus there is a lack of knowledge and statistics as to what is actually taking place in the museum world. Over the last 15 years, there has been a large reduction in funds for local government activity. This has had a knock on effect in the non statutory services such as local museums. The buzz words of recent years are "social inclusion" "community" and "access". Conservation must and does have a serious part to play in all these areas. TSH said that museums are unique in not only having an obligation to the future but also to the past. Conservation has a key role to play in fulfilling these "intergenerational" responsibilities.

The North West Museums Service is due to fold quite soon with the loss of its conservation unit and its experienced conservators.

TSH said the North West Museum Service had decided to take a more "strategic approach" to conservation, which he took to mean a lot of people writing reports about what should be done but nobody actually doing it. TSH said that management thinks that consultants will solve their problems, but they are not necessarily the answer.

Conservation's promotion of environmental conservation on its own has led to curators seeing this as a means to reduce their conservation staff. Environmental conservation on its own will result in the neglect of collections and their eventual loss.

The conservation profession needs to re-examine its preciousness and its exclusivity which, in TSH's view, have done it no favours. It needs to become more accessible to the public, more "sexy". If Time Team can carry out 3 day digs on TV and popularise archaeology so successfully why can't conservation do something similar?

In TSH's view access means the use of collections and most probably the eventual loss of some of the objects but this is a price in his view which is worth paying. The collections are there to be used.

Finally he stressed the worth of in house conservation as opposed to contracting out. The in house conservation staff have a loyalty and commitment to the collections and the institution which cannot be bought.

If I had to sum up TSH's talk in one word it would be promotion. Conservation and conservators have to promote themselves and the profession and explain to the public and our masters the importance of our job. Conservators have usually been quite happy to stay out of the limelight but this will not do any more. If we don't promote ourselves, who else will? In these lean times we have to fight our corner.

Pete Windsor from Re:source

PW stressed the importance of having facts and figures to back up arguments. He stressed that conservation is still a relatively new discipline, and that since the war the number of employed conservators has risen sharply. PW went on to say that the major employer of conservators were National Museums, employing 50% of the nations conservators. Over 25% of conservation departments in local government museums and 50% of private sector conservation businesses where one person shows. In his view these set ups were not viable.

Conservators must learn to play the political game. We should not wait to be asked our view but should grasp the initiative before its too late. Tell

Re:source and other government bodies what it is we want and explain to them the importance of conservation. We must make our voices heard.

The following draft resolution was discussed.

This meeting asks the Archaeology Section of UKIC to request the UKIC council

1) To set up a standard working party from members and co-opted specialists to advise on the present and future loss of resources, posts and facilities for antiquities conservation within the public sector, especially local government

2) To make continuous and effective representations at all levels in Government, advisory agencies, national archaeological bodies and local government organisations regarding the nationwide loss of such conservation resources and to consider how to educate and inform the general public of the importance of conservation activities.

These resolutions were revised and adopted.

It was suggested by a number of those present that **all** areas of conservation and not just archaeological conservation be included in the resolution. It was hoped that other specialist conservation sections and societies would add their weight to the resolutions and make representations to UKIC and/or NCC-R as appropriate.

I have waited for a long time for such a debate. But it is really up to us to use our influence and not just hope national organisations will do the job for us.



The WWW

Regional Museum Services



Scottish Museums Council: <http://www.scottishmuseums.org.uk/htdocs/index.html>

North East Museums Service: <http://www.northeastmuseums.co.uk/>

North West Museums Service: <http://www.nwmuseums.co.uk/>

Northern Ireland Museum Council: <http://www.nimc.co.uk/>

East Midlands Museums Service: <http://www.emms.org.uk/>

Yorkshire Museums Council: <http://www.yorkshiremuseums.org.uk/live/>

South West Museums Council: <http://www.swmuseums.htmmedia.co.uk/>

The Southern Museums Agency: <http://www.southernmuseums.org.uk>

World list of Biological journals
<http://arachne.prl.msu.edu/journams/>

Global Gazetteer

<http://www.calle.com/world/>

This is a directory of 2880532 of the world's cities and towns, sorted by country and linked to a map for each town.

IPA Directory of Fossil Collections of the World

<http://ipa.geo.ukans.edu/Fossil/fossil.html>

Conservation Focus

News & Events from the Conservation World

The International Palaeontological Association's Electronic Directory of Paleontologists of the World

<http://ipa.geo.ukans.edu/index.htm>

That is the good news. The bad news is that the directory has only a few dozen entries. You can help. Please open the web page and enter your information. Urge your colleagues to do the same. The directory will become increasingly valuable as more and more people enter information. You can complete the entry in only a few minutes.

What happens if you need to change your entry at some time in the future? Simply enter the new information. When we see that you have two entries, we will delete the old one and retain the new one. If there is any question, we will contact you about it.

I look forward to seeing the directory grow. Eventually we hope to have information on most of the world's paleontologists. When we do, it will no longer be necessary for anyone to inquire of various lists to try to find e-mail addresses or other such information.

Please enter your personal information now and contact me or Dr. Michael Cormack, the web master (paleo@raven.cc.ukans.edu), if you have questions. Please circulate this message to other list.

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Conservation Scientists Group

From: Joyce Townsend (Joyce.Townsend@tate.org.uk)

As you may know, some thirty members of the Conservation Scientists Group met in September to discuss the formation of The Institute of Conservation Science (ICS). They voted overwhelmingly in favour of setting it up. This is reported in more detail on the ICS web page at Instituteof-ConservationScience.org.uk and is now being done by a steering committee of Sue Bradley (BM), Stephen Hackney (Tate), Graham Martin (V&A), Joyce Townsend (Tate) and Paul Wilthew (NMS).

We are planning to hold the first AGM and a meeting on light ageing, on the same day in April 2001.

The ICS now has a list of 37 individuals and one institution signed up for membership, and the steering committee is about to ask them for a financial commitment of £10 for individuals and £20 for institutions, to cover the first membership year, 2001.

Information about meetings, and the outcome of the AGM, will be posted on our web page. ICS members will be receiving emails to notify them when something new comes up on the web page, though it is of course accessible to all who care to look at it. Members will also be able to attend meetings at a lower cost, where we have to charge for catering and facility fees. We hope that you might consider joining the newly-formed ICS.

USA and Canada Disaster-Recovery Sourcebook

New, 9th Edition For 2000/01 of *The Disaster Recovery Yellow Pages*^(tm)

Newton, MA-The updated, "New Century/2000/01" 9th Edition of the Disaster Recovery Yellow Pages, by The Systems Audit Group, Inc.

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Herbariums seminar

3rd May 2001
University of Newcastle upon Tyne

Fee £45 including lunch and refreshments to be held 3rd May 2001 at the University of Newcastle upon Tyne.

Further details on the web at www.ncl.ac.uk/bindery/herbprog.html.

Print and post form to :
Karena Fry,
Bindery, Conservation and Print Services Workshop,
The Robinson Library
University of Newcastle upon Tyne
Newcastle upon Tyne, NE2 4HQ

Tel: 0191 222 5144
Fax: 0191 222 6235

E-mail K.E.Fry@ncl.ac.uk.

Index Herbariorum and Plant Specialists

Updated information for 2241 herbaria (71%) and 7869 people (83%) in 142 countries (86%) listed in Index Herbariorum, edition 8, and its supplements (published in Taxon) is available for searching by institution, city, state, acronym, staff member, correspondent, and research specialty (<http://www.nybg.org/bsci/ih/ih.html>). Telephone and fax numbers and e-mail and URL addresses are included.

Note that the Index is fully searchable on research specialty, so it also serves as a Plant Specialists.

Please review the entry for your herbarium. Send updates and corrections

To: pholmgren@nybg.org

Botanical Collections for the 21st Century

Third International Conference on Preservation of
Botanical Collections,
September 23-26 2001 Beijing, China

General Information

The third conference will be held under the title "Botanical Collections for the 21st Century". The aim of the conference is to promote the preservation, management, and effective utilization of the collections, both living and fossil, and to encourage the sharing and exchange of practical experiments and scientific information related to botanical collections throughout the world.

The conference programme will consist of plenary lectures, paper presentation, and poster sessions on the following proposed topics:

1. Botanical collections: Preservation and Management
2. Database, Images and Web site resources of botanical collections
3. The status and importance of botanical collections throughout the world
4. Contemporary issues facing herbaria

Persons wishing to attend the conference should register before 16th April, 2001. The second circular will be sent only to interested persons and include the scientific programs, profoma for poster and abstract details about registration, accommodation, sightseeing of Beijing city and excursion before 31st May, 2001.

All the correspondence should be addressed to:

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Value of Collections

In the coming year thanks to the sponsorship of many member institutions and two private gifts the Association of Systematics Collections will be undertaking a major communications and awareness campaign (for both internal audiences such as museum directors and trustees) and external audiences (foundations, Congress, and policymakers) on the "value of collections." The campaign will include a toolkit some Web-based materials, a PowerPoint presentation, and booklet so that individual museums and collections-holding institutions may also use the communication materials for local awareness building and fund-raising.

This is an open invitation to all who read this listserv to share with us:

- Case studies of how collections are making a difference (conservation, environmental remediation, forensic science, development of new pharmaceuticals, etc.)
- Literature (individual essays, prepared papers, publications) that can be distilled and utilized in the campaign.
- Your name and particulars if you are interested in advising us or otherwise being involved in this project.

Please send on to me at the ASC general mailbox: asc@ascoll.org.

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