The Biology Curator

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LABELLING SPECIMENS IN THE LIFE SCIENCE DEPARTMENTS AT THE NATURAL HISTORY MUSEUM, LONDON USING COMPUTERS

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INTRODUCTION

Throughout the Natural History Museum, registering or databasing our collections using computers has become the norm and many of us use computers to generate specimen labels. However, few in Life Sciences use specimen registers or databases to generate specimen labels direct, as is the case in Palaeontology and in many other natural history institutions. To reduce additional keyboarding effort, it obviously makes sense, where possible, to generate any required specimen labels from the specimen registers or databases as we are developing them, rather than continue to regard specimen registration and labelling as totally distinct and unrelated tasks.

The Life Science Departments at the Natural History Museum have functioned as autonomous units for most of their existence. It is perhaps not surprising, therefore, that each of the Departments has developed its own methods of labelling specimens. Indeed, there is considerably diversity even within Departments, such that different groups of organisms are labelled using different qualities of paper or card, different inks and different fields of data. Some of these differences undoubtedly arose and continue to exist as a result of the different methods of preservation demanded by the material (dry, fluid or slide-mounted) and the differing needs for different groups of organisms.

However, this review of labelling across the Life Science Departments has identified the possibility of unifying some of the labelling methodology to facilitate computer generation of labels and incidentally, but perhaps just as importantly, standardising on more permanent materials.

MATERIALS

Whatever the state of preservation, the primary requirements are that the media used are as permanent as possible.

Although suitable printers, papers and inks have been identified for printing permanent data labels for dry, fluid-preserved and slide-mounted natural history specimens using computer technology, it may be necessary to continue labelling single specimens or small numbers of specimens with identical data using traditional methods until sufficient hardware is available to all to make these methods no more practical than using a computer. But it should be remembered that specimens so labelled will still need to be databased on a computer! For practical reasons other labels which do not carry primary data, such as maps and those used to cross reference material in the herbarium, would continue to be preprinted and/or be printed using traditional methods.

Papers

All specimens preserved in fluid (alcohol or formalin) require an immersible label printed in permanent ink on 100% rag paper (Wiggins Teape WT HWS 550), Goatskin Parchment Paper (Wiggins Teape) or Resistall (Byron Weston Paper Company; supplied by Preservation Equipment Ltd (UK) and University Products (USA)). Some curators also use a non-immersible label printed on Archive Quality Paper (Conservation Resources (UK) Ltd) or Pancake Particle gummed paper 80 gms/metre (Smith & McLaurin via H.M.S.O.) (identical with respect to data to the immersible label) which is glued to the outside of the glass container in which the specimen is preserved using either the gummed label's adhesive or UHU glue.

All specimens mounted on glass microscope slides require one or two square/oblong labels printed either on Pancake particle gummed paper 80 gms/metre (Smith & McLaurin via H.M.S.O.), or foil back microscope labels (Preservation Equipment Ltd or University Products Inc.) or Archive Quality Paper to be gummed directly onto the glass slide or existing card label (4-sheet Bristol board) using either the gummed label's adhesive, UHU glue or PVA. In addition to labelling each microscope slide with a printed label it is good practice to scratch a unique identifying number onto the glass slide using a diamond point, so that even if the label does become detach the mounted specimen can be associated with its data.

Blick self-adhesive labels do not adhere to glass very permanently and should be avoided.

All specimens preserved dry need a label printed on acid-free archive quality paper (e.g. herbarium sheet labels), 100% rag paper, Goatskin Parchment or thin card (e.g. insect specimens - Mellotex Smooth Ultra White 135 gsm card from Tullis Russell via HMSO).

Herbarium sheet labels are generally glued on to the herbarium sheets with latex glue (J. Hewitt & Sons Ltd) by the plant mounters. Latex glue, however, has recently been tested and shown to severely discolour when subjected to accelerated aging at 50% Relative Humidity and 90°C for 12 days (Annemarie Wierda, Amsterdam).

Tie-on labels, each with a hole punched in it (the hole reinforced with a brass eyelet) are used extensively in Zoology. These eyelets may disintegrate in fluid over time (pers. comm. Oliver Crimmen). Moreover, these labels present a problem for computer generation. In such cases printing onto an adhesive label which is subsequently stuck onto a tie-on label might overcome this difficulty for dry specimens. Alternatively labels could be printed onto a standard label with a wide left hand margin. After printing the left hand edge of the label is folded over and then a hole punched through the double thickness of card to accept a tie.

Inks

Several types of ink are available. Water-based ink such as that used in standard Deskjet printers is not suitable for

labelling natural history specimens as the ink is not waterproof. Indelible or permanent ink is, however, suitable. Misco Computer Supplies Ltd can supply an indelible black ink cartridge suitable for use with a Hewlett Packard Deskjet printer; and Automated Office Products can supply alcohol resistant ink suitable for re-inking dot matrix printer ribbons. Both require the label to be washed in alcohol after drying to remove excess ink prior to immersion in alcohol or formalin. Indian or China ink is generally made from lamp black and animal glue. Printing ink is generally made from carbon black and oil (and sometimes varnish). Unlike indelible inks, they are not suitable for use in Deskjet printers as they block the jets, but Indian or China ink can be used in Rotring and Rapidograph type pens for hand writing labels, even for immersion in alcohol or formalin.

PRINTERS

It is possible to standardise on printers and inks and a few paper/card types for printing labels for all natural history specimens. Three types of printer (laserjet, deskjet and dot matrix) can be used for printing labels for natural history specimens. Each has advantages and disadvantages.

Hewlett Packard Laserjet Printers

Hewlett Packard Laserjet printers can be used for printing non-immersible labels, provided that Hewlett-Packard's ink cartridges (and not less expensive products) are used. Non-immersible labels should be printed on Archive Quality paper or card if this is not to discolour over time due to the effects of ultra-violet light on the toner and paper, which can also effect the permanency of cheaper Laserjet ink (pers. comm. Adrian Rissone).

Labels printed on Laserjet printers or photocopied appear to suffer toner degradation if submerged in an ultrasonic cleaner (Sims, 1989) and are subject to abrasion and excess heat (Daly & Jordan, 1989). However, for many applications (i.e. pinned insect labels) abrasion is unlikely to occur. If there is a risk of abrasion then labels should be printed on a Hewlett-Packard Deskjet printer using a cartridge filled with indelible black ink (see below).

Neither Laserjet printed nor photocopied labels should be immersed in ethyl acetate (used by entomologists as a killing agent) as the toner is soluble and the ink will wash off.

Scaleable fonts are available, the sans serif fonts are easier to read.

Hewlett Packard Deskjet Printers

Hewlett-Packard Deskjet printers can be used to print a permanent immersible or non-immersible label provided that indelible black ink (M6651 from Misco Computer Supplies Ltd) is used to refill the cartridges. Standard Deskjet ink cartridges should not be used as they are not even waterproof!

For immersible labels only 100% rag paper such as Wiggins Teape's HWS WT 550, Wiggins Teape's Goatskin Parchment or Byron Weston's Resistall should be used, however, as other papers tend to break up over time. Immersible printed labels, once dry, need to be washed in alcohol to remove excess ink prior to use. The black ink turns to blue-black overnight, but thereafter seems to be permanent.

Non-immersible labels should be printed on similar paper or on Archive Quality paper or card.

Unfortunately the range of fonts available on a Hewlett Packard Deskjet printer is somewhat limited if using Wordstar 6.0 for DOS, the smallest suitable font being Times 6.0 PC, but most Windows wordprocessors offer a choice of scaleable fonts.

Dot Matrix Printers

Dot-matrix printers, such as the heavy duty "WriteImpact" 24-dot matrix printer (Mackintosh compatible) manufactured by GCG Technologies or the Epson LQ-2550 24-dot matrix printer (PC compatible) and others, can be used for printing labels provided that the ink is alcohol-resistant (pers. comm. Paul Hillyard). Ribbons can be re-inked with alcohol-resistant ink available from Automated Office Products (USA). As with labels printed using a Hewlett Packard Deskjet with indelible ink, printed labels, once dry, need to be washed in alcohol to remove excess ink prior to use. As with Hewlett Packard Laserjet and Deskjet printers only 100% rag paper such as Wiggins Teape's HWS WT 550 Wiggins Teape's Goatskin Parchment or Byron Weston's Resistall should be used for immersible labels, as other papers tend to break up over time.

Non-immersible labels should be printed on similar paper or on Archive Quality paper or card if this is not to discolour over time due to the effects of ultra-violet light on the toner and paper, which can also effect the permanency of cheaper Laserjet ink (pers. comm. Adrian Rissone).

Handwritten labels

If data is written onto an immersible label then permanent Indian ink in a Rotring or Rapidograph pen can be used. Staedtler's mars graphic pigment liner which contain pigmented, waterproof and lightfast ink, are apparently also suitable.

BAR CODES

Some Institutions, including this Museum, use bar codes to uniquely identify specimens. Pre-printed self adhesive labels are used in Botany to uniquely identify herbarium sheets sent out on loan.

Although very small photographic quality bar-coded labels are used by INBIO, Costa Rica to uniquely identify insects, there are practical difficulties in their use. In particular, the labels can only be read by a bar-code scanner if they are not obscured by the specimen. Moreover, the available scanners for the bar-code used often require several passes over the label before the code is read (as is often is the case in supermarkets which use very much larger bar codes). There are also practical difficulties in associating a pre-printed bar-coded label with a particular specimen, especially if the unique numbers are generated automatically in a multi-user environment.

PRINTING

Real difficulties arise from the diversity of fields of data required on labels for different groups of organisms preserved dry, in fluid or slide-mounted. The Data Dictionary compiled for use with the Paradox for DOS Specimen Registers in use in Botany and Zoology, for example, comprises more than 100 fields (including 31 "core" fields), although only a maximum of 51 fields are used in any one database.

It is imperative that a data input form for each different group of organisms is included in the Collections Management System currently under development.

In order to simplify data input and subsequent label generation it is important that only those fields required for each group of organism are included in the data entry form for that group and these fields (or a subset thereof) are included in the report form, which generates the labels.

The data input screen should allow users to enter relevant data for one or many specimens (without the need to rekeyboard the same data for a series of two or more specimens) and assign a unique number to each specimen. This will enable large series of specimens with identical data to be databased with minimum of effort.

The system should offer the choice of printing one or more data labels at one time (as a range) to minimise time and resource wastage.

The system should offer the choice of printer (Laserjet or Deskjet; local or remote networked printer; and the paper tray in the case of multiple tray printers) and the fonts to be used for the label required

Ideally the system should allow the user to preview the printed labels prior to printing.

Some groups, notably insects, will need options to print data labels only or determination labels only or both, as specimens may not be identified at the time they are databased.

Some groups such as specimens in fluid will need options to print data labels of a set number of different sizes and fonts to suit the size of container used to preserve the specimens.

For plants preserved on multiple herbarium sheets there is a need to print continuation sheet labels bearing the basic data and sheet number.

For plants preserved both dry and in fluid there is a need to print identical labels on different papers - immersible and non-immersible.

For some groups of organisms it may be necessary to print identical labels for different methods of preservation e.g. ferns and their spores, insects and their genitalia.

Such is the complexity of the required system, that it may be more practical to direct all printing, initially at least, to a file and then subsequently print this via a word-processor! Particularly since not all required relevant hardware is in place and it will require a great deal of form designing and network configuration for remote printers!

LABELLING PROGRAMME

I have written such an application for registering specimens and generating labels for Entomology in Paradox for DOS . The application is multi-user and network compatible, so that several users can simultaneously enter, edit and print data.

The application could be fairly easily modified to suit any group of organisms, and has been recently modified for databasing library photocopying requests!

The application can be used EITHER for registration of individual specimens OR for label generation OR both simultaneously.

The application automatically assigns a unique specimen number to each record and automatically adds your username and the current date to each record.

If you have a series of specimens with identical data, there is a repeat option which allows you to automatically replicate a record as many times as you wish, automatically assigning a unique number to each specimen.

The application allows you to edit any record. To ensure data security, however, you cannot delete records once they have been committed to the archive, although you can delete a record prior to committing it to the archive i.e. during an input session.

The application can be used for unidentified specimens as there is an update option which allows you to update a record at a later date - to add the identification and then subsequently print a determination label.

Collection data labels and determination labels can be generated from the data for dry pinned specimens, alcohol-preserved specimens or slide-mounted specimens. The application automatically punctuates your data prior to printing, adding such things as parentheses around subgeneric names; a colon after country; commas after state and county (if these are followed by a place name); commas between latitude, longitude and altitude (if included in the data); etc.

Currently, labels are printed to a file which needs to be "tweaked" using a wordprocessor to set the printer type and required font. It is also necessary to reformat the output file to word wrap long lines of text prior to printing and to globally edit sex symbols. Although this is not ideal, it offers considerable time saving over entering raw data into a wordprocessor, using macros or block copy options to replicate labels. It also means that the data has been captured for further use. Moreover, it ensures a consistency of layout and style for all labels. The fact that the file is in wordprocessor format also means that it is possible to edit the label text, the layout, etc to suit your individual needs.

If you opt to print your labels via Wordstar, the file generated by Paradox includes detailed step by step instructions on what to do prior to printing. If you opt to print your labels via WordPerfect or Word, then at present no instructions are included in the wordprocessor file and it would be necessary to check that no label starts at the foot of a column and finishes at the top of the next column (or page). The Wordstar version of the Paradox output file ensures that no label starts at the foot of a column and finishes at the top of the next column (or page).

Insect Order- specific versions of the application, which differ only in respect of additional fields included and range of unique numbers available, are currently being used in Entomology by the David Green to database termite spirit material and by Nigel Wyatt to database British tachinid flies with host data. The application will shortly be used to database the arachnid spirit collections and generate specimen labels as required. The database around which the application is written is currently also being used by Phil Ackery to database birdwing butterflies, by Julia Pope to database swallowtail butterflies and by Carolyn Lowry to database blackflies (all of whom started databasing before the application was complete)

References

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