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Computer Generated Labels for Wet Collections

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INTRODUCTION

Natural history collections preserved in alcohol, or other aqueous preservatives, require labels that accept and retain printed ink without loss of durability in the aqueous medium over the very long-term. For practical reasons, it is also important they can be produced in small quantities at reasonable cost.

Much effort has been spent in recent years to determine the best combination of printer, paper and ink for the purpose. However, any person trying to keep up-to-date with this subject will have met the frustrating problem that suitable products (and their availability) are subject to constant change. Thus the recommendations that we make in this paper are simply those that are practical *at the time of writing*.

PRINTERS

Inkjet: Standard inkjet printers have the advantage of being already in use by many people. While normal inkjet ink (with water-soluble dyes) bleeds immediately on immersion in alcohol (80% ethanol or Industrial Methylated Spirit), most permanent, pigmented inkjet inks, once dry, are stable in alcohol and insoluble in water. In fact they are claimed, by the manufacturers, to be insoluble in all of the commonly used fluid chemicals (i. e. ethanol, ethyl acetate, ammonia, xylene and acetone). Furthermore, such pigmented inks are also more light-stable than inks with water-soluble dyes (Becker & Kasper, 1998).

In general, while prices are reducing, the print quality and the speed of inkjet printers is improving. Inkjets with high resolution are readily available (e.g. 1440 dpi with Epson *Stylus*) and increasing numbers of printers (e. g. Lexmark *5000* and higher) are supplied with cartridges containing waterproof, pigmented ink.

Laser: The lettering image produced by laser printers is precise and many curators claim that their printed labels have remained trouble free in alcohol for a number of years. Nevertheless, many others remain doubtful because labels from this type of printer have a history of poor resistance to abrasion. Many people remember well the phenomenon of 'alphabet soup', where the lettering on laser-printed labels simply came off and floated free in the alcohol (this is commonly seen with labels printed by early laser models from the 1960's and 70's).

In basic terms, the laser-printer method works by depositing dry carbon particles on the surface of the paper and there is little penetration of the paper fibre below the surface. This is generally a weakness but the performance of laser printers varies greatly and is largely determined by the degree of heat and pressure employed. In fact, the manufacturer Hewlett-Packard now claims excellent print strength for its recent models such as the *LaserJet 2100.*

Some curators have baked their labels in an oven (e.g. 30-60 seconds at 160 °C), or simply used a domestic iron, but this is an undesirable complication. Furthermore, the possibility of spraying sealants on laser printed labels is suggested by some, e.g. *Letraset Fix, RTV Silicone, or Krylon Crystal Clear*, but degradation is likely to occur and such methods may not be durable.

Dot matrix: Dot matrix, or impact, printers appear now to be losing ground (in terms of wet labelling) because of their inherent disadvantages: the lettering lacks sharpness, newly printed labels bleed slowly (requiring pre-soaking), and ribbons need frequent replacement or re-inking. Furthermore, over the long term, even after pre-soaking, impact-printed labels in alcohol have tended to fade. However, in step with the on-going improvements with other printing equipment, impact printer ribbons have improved recently and they are now claimed to produce no bleeding at all (University Products).

PAPERS

Paper for labelling should be of archival quality, made of 100% cotton rag, uncoated and with high wet strength. The paper needs to withstand long-term immersion in the preservative without softening or discolouring. Furthermore, the structural characteristics of the paper are important because successful inkjet printing requires deep penetration by the ink into the fibres of the paper.

The following papers have been used for wet labelling :

1. *Resistall* (Byron Weston Paper Co.) is commonly used in the U.S.A. In recent years its manufacture was discontinued but has now been restored (UK supplier: Preservation Equipment Ltd). Packages display a skull and cross bones motif because of the formaldehyde-based coating which makes it resistant to alcohol. It has good resistance to abrasion of the lettering but it is not acid-free and doubts remain about its permanence and archival quality.

2. Arjo Wiggins' *Goatskin Parchment* is also suitable but it can suffer a loss of strength in fluids containing water. In the late 1980's the paper's quality appeared to drop (Carter, 1996) but has now recovered (UK supplier: Arjo Wiggins Appleton plc).

3. Arjo Wiggins *High Wet Strength WT 550* - no longer available.

INKS
(PIGMENTED REFILL INKS for INKJETS)

Now that both printer manufacturers and refillers are providing permanent waterproof inks, variations in print quality and stability might be expected. In recent years, tests at the Natural History Museum, London and at the National Museum of Wales (Carter, 1996) found that *PermaDri* black pigmented ink (used as an ink refill in HP Deskjet 500 cartridges) was alcohol (and water) resistant; it produced a good image and had excellent abrasion resistance.

However, the product sold as *PermaDri* became unavailable as a result of changes concerning the manufacturing company Graphics Utilities. Because of this, the authors of the present article tested various inks to find a replacement for *PermaDri*. We initially found an alternative ink which was equally suitable (in cartridge form): Esselte *Dataline* - "High Capacity Snap-In Kit", black, 94161; batch no. B7.087. Unfortunately, however, this ink also became unavailable because of changes to the company Esselte. We understand that the inks division was taken over by the company Coates Electrographics. From this company, we have now acquired the following ink: "Pigmented black ink JET7534"; batch no. FP02948. This ink is put into cartridges by the company Greenman Toners. The cartridge type is an HP51626A or HP51629. It can be bought from the company Sykom.

TESTS

Tests were carried out to determine the quality and durability of the Coats Electrographics ink compared with that of Permadri. To achieve an accelerated ageing regime, printed labels were subjected to: boiling, storage (in conditions of heat and light), and abrasion (scratching). All labels were printed on *Resistall* paper and left to dry for at least 24 hours before being tested.

Boiling test: Labels were boiled in tubes of 0.1 Molar Hydrochloric Acid (HCl) for one hour. This procedure was repeated using both 80% IMS and de-ionised water. All labels printed with *PermaDri* or Coates' ink were unaffected.

Storage test: Labels were immersed in tubes of alcohol (80% IMS) and placed in a heated cabinet at 40°C for five weeks. All labels printed with *PermaDri* or Coates' ink were unaffected.

Scratch (or abrasion) test: Scratching is defined as: *scraping a scalpel blade across the label in an effort to remove the lettering but without damaging the paper*. We deem the printing to have been successful when the blade cannot remove the lettering without

damaging the paper. We concluded that all labels printed with *PermaDri* or Coates' ink were non-abraded after being subjected to the scratch test.

Long-term test: Labels printed with *Permadri* have been immersed in alcohol (80% IMS) and subjected to daylight by a window for over six years without discernible ill effects. Labels printed with Coates' ink have, at the time of writing, yet to reach two years on test but so far show no signs of fading or other degradation.

DISCUSSION and CONCLUSIONS

Of all the methods available, inkjet printing with pigmented ink is recommended because of: (1) the excellent results; (2) the cheapness and ubiquity of the machines; and (3) because of the dubious history of laser printers.

The two inks tested performed consistently well and it appears from the results that the Coates' ink must be of a similar specification to the original *PermaDri* ink. The printed labels, using *PermaDri* ink, have been stable and durable in alcohol (over six years) and have not been affected by long exposure to light (over six years).

As a back-up for those still unconvinced that printed labels will remain completely durable in the years to come, a unique reference number, handwritten in permanent indian ink, can be added to each computer-printed label.

SUPPLIERS of MATERIALS

Esselte (Machine Supplies Division), Norman Park, Bar Hill, Cambridge CBS 8SS. Tel: 01954 780436, Fax: 01954 782757

Preservation Equipment Ltd, Shelfanger, Diss, Norfolk IP22 2DG Tel: 01379 651527

Sykom Co., Longmead Business Park, Epsom, Surrey KT19 9UP Tel: 01372 746225, Web: www.Sykom.com

University Products, 517 Main Street, Holyoke, Mass 01041-0101 USA. Fax: 1-800-532-9281, E-mail: info@universityproducts.com, Web: www.universityproducts.com

REFERENCES and FURTHER READING

Becker, D & Kasper, K (2001). Digital Prints: Technology, Materials, Image Quality & Stability. http://www.foto.unibas.ch/~rundbrief/les33.htm

Carter, J (1996). A Comparison of Two Papers & Two Inks for Use as Computer Generated Labels in Fluid Preserved Collections. *The Biology Curator* no. 7:

Carter, D & Walker, A (1999). *Care and Conservation of Natural History Collections*. Butterworth Heinemann.

Pitkin, B (1995). Labelling specimens in the life science departments at The Natural History Museum, London, using computers. *The Biology Curator* no.4: 24-27