# Biology Curators Group Newsletter

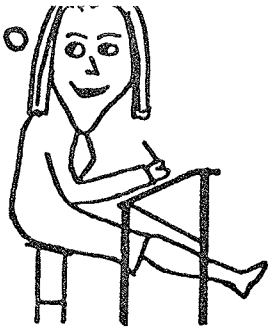
Title: Notes for Diploma Students: Information sheet

Author(s): Not Listed.

Source: Not Listed. (1982). Notes for Diploma Students: Information sheet. *Biology Curators Group Newsletter*, *Vol 3 No 3*, 158 - 163.

URL: http://www.natsca.org/article/1454

# NOTES FOR DIPLOMA STUDENTS



## Information sheet

**Alcohol:** Ethyl alcohol $C_2H_5OH$ (ethanol or absolute alcohol) with not more than 1% water and approx. 75° over proof (OP)*. Diluted to 95-90% by volume = "rectified spirit" (approx. 57-66° OP)

Isopropyl alcohol $CH_3.CH(OH)CH_3$ with not more than 3-4% water

Methylated spirit: ethyl + methyl (methanol) alcohols + acetone (some brands) + methyl acetate + water to give 80-90% strengths

a) mineralised methylated spirit: 90 vols ethanol + 10 vols methanol + mineral oil(s) (paraffin or pyridine) + colouring. Useless for preserving biological specimens

b) Industrial methylated spirit (IMS): 95 vols ethanol + 5 vols methanol to give 99-92% strength (74-60 OP); some brands contain pyridine. Diluted to 70-80% standard biological preservative.

*Proof alcohol = 57% strength at 60°F; by definition 5 vols 90-95% alcohol SPG .838 diluted with 3 vols water.

| dilution by vol. | degrees over proof (approximated) |
|---|---|
| 69% | 22 |
| 74% | 31 |
| 80% | 40 |
| 84% | 48 |
| 90% | 57 |
| 95% | 66 |
| 100 | 75 |

**Formaldehyde:** Commercial grades 40%. A 4% solution adequate for most museum specimens i.e. 10ml formaldehyde (40%) + 90ml water; neutralise with borax or hexamine (saturate stock solution).

**Propylene Phenoxetol/Glycol:** specimens must be adequately fixed before storing in solution no II

| | | |
|---|---|---|
| Solution I fixative: | propylene phenoxetol .. .. | 1ml |
| | propylene glycol .. .. | 5ml |
| | 40% formaldehyde .. .. | 10ml |
| | distilled water .. .. | 84ml |
| Solution II preservative: | propylene phenoxetol .. .. | 1ml |
| | propylene glycol .. .. | 10ml |
| | distilled water .. .. | 89ml |

Colour preservation: modification of Kaiserling's tripartite method

| | | |
|---|---|---|
| Solution I | Formaldehyde (40%) | 400ml |
| | Potassium acetate | 50g |
| | Potassium nitrate | 30g |
| | distilled water | 1000ml |
| Solution II | 80-90% alcohol until colour returns | |
| Solution III | Glycerine | 3000ml |
| | Potassium acetate | 2000g |
| | distilled water | 9000ml |

Some dates in preservation techniques

| Dry preservation | Wet preservation | Osteological in situ preparations |
|---|---|---|
| 484 BC Herodotus Egyptian embalming methods (see Pettigrew 1834) | | |
| *1490 Leonardo da Vinci casting brain ventricles and wax casting of heart (see Dobson 1956) | | |
| 1642 Ole Worm's catalogue of Museum, all dried specimens (see Anon 1642) | | |
| 1656 Tradescants catalogue of museum (probably all dired specimens) (see Allan 1964) | | |
| | 1660 Ashmole showed Charles II specimens "in a solution of Dr Warner's invention" (see Gunther 1927) | |
| | 1662 Boyle recorded use of spirits of wine for preserving tissues (see Birch 1746) | |
| | *1670 Swammerdam mentioned spirits of wine in catalogue to museum | |

| Dry preservation | Wet preservation | Osteological in situ preparations |
|---|---|---|
| | 1681 Grew mentioned liquid preparations in Royal Society catalogue<br><br>1710 Ruysch mentioned liquid preps. in his catalogue<br><br>*1768 Hunter collection - large number of liquid preps. mentioned (see Laskey 1813)<br><br>1786 Seba - many specimens preserved in "kilduivel" (= killing devil or spirits of wine) (see Engel 1937) | |
| 1890† Altmann described method for freeze drying tissues | 1859† Butlerov discovered formaldehyde<br><br>1867† von Hofmann demonstrated production of formaldehyde<br><br>1888† Loew discussed antiseptic properties of formaldehyde<br><br>1893† Blum tissue preserving qualities of formaldehyde; colour restoration in alcohol<br><br>colour preservation 1896† Melnikow Raswedenkow introduced salts into final preservative<br><br>colour preservation 1896† Jores added salts to first solution | |

1894 Schultz published method for rendering whole animal transparent using sodium hydroxide

1904-1912 Lundvall† used alizerine to stain bones

1911 Spalteholz† improved transparency methods

1920 Hochstetter displayed wax impregnated specimens

1922 Kaiserling reviewed development of formaldehyde preservation/colour stability

1926 Noble & Jackle described wax impregnation method based on Hochstetter's technique

1926 Dawson† improved Spalteholz's methods

1927 Hochstetter published his method

Freeze drying
1932† Gersh modified Altmann's methods

colour preservation
1936 Pulvertaft described method using sodium hydrosulphate

Freeze drying
1948† Mercie described method for fungi

1953 Williams† used toluidine blue + alizerine to distinguish cartilage from bone

Freeze drying
1954* Davies described method for whole animals and plants

1956 Owen & Steedman described experiments with propylene phenoxetol as preservative

Freeze drying
1960* Meryman described methods for whole vertebrates (USA)

1964 Harris developed methods in UK

colour preservation
1962 Yoshida described anti-oxident sodium ascorbic method

colour preservation
1965 Waller experimented with Butylated Hydroxytoluene (BHT)

†see Edwards & Edwards 1959 for references

*approximate date

*see Harris 1964 for references

Anon, 1642 Musaei Wormiani Catalogus. Leyden

Allan, M. 1964 The Tradescants. London

Birch, T 1746 History of the Royal Society. London Vol. 1 (p. 84)

Cole, F.J 1944 A history of comparative anatomy. London (p. 446)

Dobson, J 1956 In: Tompsett, D. H. Anatomical Techniques. Edinb. & London (pp. ix-xiv)

Edwards, J.J. & M.J 1959 Medical Museums Technology. London

Engel, H. 1937 The life of Albert Seba. Svenska linnesallsk. Arsskr. 20:75-100.

Gatenby, J.B (Edit.) 1937 The Microtomist's Vade-Mecum (Bolles Lee). London

Grew, N 1681 Musaeum Regalis Societatis, London (pp. 3 &58)

Gunther, R.T 1927 The Diary and Will of Elias Ashmole, Oxford (pp. 67-8)

Harmer, S.F 1938 Alcohol and alcoholometers. Instructions for Collectors No 13. Brit. Mus. (Nat. Hist.) London

Harris, R.H 1960 Alizarine Transparencies. Museums J. 60:99-101

Harris, R.H 1964 Vacuum dehydration and freeze drying of entire biological specimens. Ann. Mag. nat. Hist. (13) 7:65-74.

Harris, R.H 1968 A new apparatus for freeze-drying whole biological specimens. Med. Biol. Illustr. 18:180-182.

Harris, R.H 1978 Freeze-drying of marine) zooplankton (pp. 97-99) In: Steedman, H.F (Edit.) Zooplankton fixation and preservation UNESCO Press Paris.

Harris, R.H 1978 Biodeterioration. Newsletter Biol. Cur. Gp. 8:3-12

Hochstetter, F 1927 Die Paraffindurchtrankung zur Erhaltung von Tieren und Pflanzen in ihrem naturlichen Aussehen. Umsch 31:650-652

Hower, R.O Freeze drying of biological specimens. Washington DC (Smithsonian Inst. Inf. leaf. 324)

Knudsen, J.W 1966 &1972 Biological Techniques Collecting, Preserving and Illustrating Plants and Animals. N.Y & London

Laskey, J 1813 A general account of the Hunterian Museum, Glasgow

Mahoney, R. 1966 Laboratory Techniques in Zoology. London

Martindale 1941 The Extra Pharmacopoeia. London

Meryman, H.T. (Edit.) 1960 Freezing and drying biological material (various papers) Ann. N.Y. Acad. Sci. 85:591-734

Noble, G.K & Jaeckle, M.E 1926 Mounting by paraffin infiltration Am. Mus. Novit. 233:1-7

Owen, G. & Steedman, H 1965 Preservation of animal tissues, with a note on staining solutions. Q. Jl. microsc. Sci. 97: 319-321

Pettigrew, T.J 1834 A History of Egyptian Mummies. London

Piechocki, R 1967 Makroskopische praparationstechnik. Vols 1 &2 Leipzig. Akad. Verlagsgesellschaft.

Ruysch, F 1710 Thesaurus Animalium. Amsterdam

Steedman, H.F (Edit.) 1976 Zooplankton fixation and preservation (various papers). UNESCO Press Paris

Tradescant, J 1656 Musaeum Tradescantianum or a collection of rarities preserved at South-Lambeth neer London. London

Wagstaffe, R. & Fidler, J.H 1955 The preservation of natural history specimens 3 vols. London

Waller, R.A 1965 A method for preserving color in biological specimens. Bioscience 15: 361

Yoshida, Y 1962 A way of making fish specimens with their original body colours kept. Bull. Misaki Mar. Biol. Inst. 3:67-68

We hope that 'Notes for Diploma Students' will appear as a regular feature in future B.C.G. Newsletters. The idea came about when one of us realised that various Newsletter articles, particularly the 'Biodeterioration' special by Reg Harris in 1978, made extremely useful revision notes for the Museums Association Diploma Curatorial Examination. In addition, many of us regret the demise of the 'old-style' curatorial courses, which enabled students to get to grips with biological and geological practices in some depth over a solid eleven day period. This proposed series of notes will at least go towards making up for this loss.

We wish to thank Dr. Ray Ingle (British Museum, Natural History) for permission to reproduce his information sheet, in this issue; and also to appeal to everyone for further articles in the series. Otherwise some gentle arm-twisting may be necessary!! Seriously though, this is an area where B.C.G. can play an active role in training museum biologists, and even the rest of us should find such articles useful 'refresher' material.

- Editors