

Contents

Preface V

Acknowledgements VI

General Part

1 Analytical methods 3

 1.1 Optical microscopy 3

 1.2 Scanning electron microscopy with energy-dispersive X-ray analysis 4

 1.3 Chromatography 4

 1.4 Archaeometric database 6

 1.5 Symbols for analytical results 8

2 Fibres 10

 2.1 Wool 10

 2.2 Silk 11

 2.3 Linen and hemp 12

 2.4 Cotton 12

 2.5 Fibre degradation 14

 2.6 Chemical elements of contaminants and mordants 14

3 Dyeing techniques 16

 3.1 Direct dyeing 17

 3.2 Vat dyeing 18

 3.3 Mordant dyeing 18

 3.4 Dyeing of fleeces, yarns and fabrics 20

 3.5 Double dyeing 21

 3.6 Blending of fibres 23

4 Literature on dyes and dyeing 25

 4.1 Ancient written sources 25

 4.2 Pedanius Dioscorides, *De Materia Medica* 26

 4.3 Papyrus Graecus Holmiensis, Papyrus Leidensis X and other papyrus texts 29

 4.4 Archaeobotanical finds, distribution and scientific names of plants and animals 35

5 Dyeing materials in archaeological textiles from Egypt and the Mediterranean region 37

6 Identification of dyes and dyeing materials by UHPLC-PDA 40

7 Dating 44

8 Tannins and direct dyes 47

 8.1 Tannins 47

 8.2 Safflower 47

 8.3 Saffron 48

 8.4 Orchil 49

 8.5 Henna 50

 8.6 An unknown source 50

9	Vat dyes	51
9.1	Woad and indigo	51
9.2	Molluscan purple	56
10	Red mordant dyes	66
10.1	Dye insects	66
10.2	Kermes	68
10.3	Armenian cochineal	70
10.4	Polish cochineal	71
10.5	Lac dye	72
10.6	Dyer's madder and other Rubiaceae species	74
10.7	Dyer's alkanet	83
10.8	Sappanwood	86
11	Yellow mordant dyes	88
11.1	Weld and weld types	88
11.2	Persian berries	91
11.3	Isparak	91
11.4	Young fustic	92
12	Dyeing experiments with a papyrus plant	93

Catalogue

Cat.-no. 3:	Green woollen fabric with purple ornaments – a reused tunic	99
Cat.-no. 11:	Eight decorative fragments of a tunic with mythological scenes	115
Cat.-no. 12:	Three fragments of a sleeve-tunic/sleeve decoration with clavi	121
Cat.-no. 17:	Six fragments with ornaments of a yellow woollen tunic	125
Cat.-no. 19:	Three fragments of a tunic – neck decoration with figures dancing under arches	132
Cat.-no. 34:	Fragment of a sleeve with a double border with geometric motifs	146
Cat.-no. 51:	Fragment of a loop pile fabric – vine leaves, grapes and animals in medallions	154
Cat.-no. 52:	Loop pile fabric – medallions with animals and vegetable motifs	158
Cat.-no. 62:	Fragment of the edge of a châte-fabric with an oval-shaped ornament	173
Cat.-no. 70:	Silk fragment with dancing figures	183
Cat.-no. 71:	Fragment of a clavus with a leaf-shaped sigillum	192
Cat.-no. 94:	Lower part of a clavus with dancing figures and fringes	195
Cat.-no. 101:	Fragment of a clavus in a dark brown woollen fabric	199
Cat.-no. 102:	Fragment of a clavus with running animals	202
Cat.-no. 110:	Fragment of a tunic's clavus	205
Cat.-no. 111:	Two fragments of a clavus of a linen tunic: fragment 1 from the stripe and the ground fabric with a flatlock seam	208

Cat.-no. 113: Fragment of a clavus of a woollen tunic with stripes	240
Cat.-no. 122: Fragment of a clavus with a wavy line pattern	273
Cat.-no. 130: Fragment of a clavus with a paragauda	283
Cat.-no. 133: Orbiculus with a wine harvest scene	289
Cat.-no. 166: Fragment of a tabula	293
Cat.-no. 167: Purple tabula	297
Cat.-no. 191: Fragment of a tabula	304
Cat.-no. 193: Leaf-shaped ornament	314
Cat.-no. 203: Tapestry with a Venatio-scene	326
Cat.-no. 208: Fragment of a tapestry – neck decoration with clavus	328
Cat.-no. 211: Fragment of a tapestry with a lion	335
Cat.-no. 218: Fragment of an ornament	338
Cat.-no. 231: Textile fragment with Coptic text	361
Cat.-no. 232: Sampler	368

Appendices

Appendix A: Analytical methods applied to the textiles of the Papyrus Collection	373
Appendix B: Results of the analysed textiles from the Papyrus Collection	374
Appendix C: Mordants	377
Appendix D: Blue	379
Appendix E: Red	380
Appendix F: Yellow	381
Appendix G: Blue, black, red and yellow with one dyeing material	382
Appendix H: Red, pink, orange and yellow with mordant dyes	383
Appendix I: Green by double dyeing and blending of fibres	385
Appendix J: Red, purple, brown and black by double dyeing	387
Appendix K: Red, purple, brown and black by blending of fibres	391
Appendix L: Tannins and direct dyes	393
Appendix M: Woad and indigo	395
Appendix N: Molluscan purple	398
Appendix O: Kermes	402
Appendix P: Armenian cochineal	404

Appendix Q: Polish cochineal 406

Appendix R: Root cochineal 407

Appendix S: Lac dye 408

Appendix T: Dyer’s madder and other Rubiaceae species 410

Appendix U: Dyer’s alkanet 417

Appendix V: Sappanwood 418

Appendix W: Weld and weld types 420

Appendix X: Young fustic 423

Abbreviations 425

Glossary 428

Copyrights of figures and tables 435

Literature 436

Curricula vitae of the authors 462

Index 463