

Science and Art

The Painted Surface

Edited by

Antonio Sgamellotti

University of Perugia, Italy

Email: sgam@thch.unipg.it

Brunetto Giovanni Brunetti

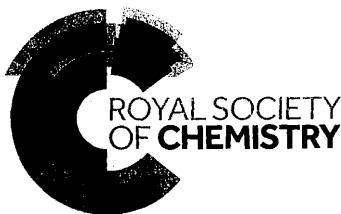
University of Perugia, Italy

Email: bruno@dyn.unipg.it

Costanza Miliani

University of Perugia, Italy

Email: miliani@thch.unipg.it



Contents

Chapter 1	Science and Art—My Two Passions	1
<i>Richard R. Ernst</i>		
1.1	My Pathway Into Science	1
1.2	My Adventures in Tibetan Painting Art	3
1.3	Scientific Tools for the Analysis of Ancient Paintings	5
1.3.1	Age Determination of Paintings	5
1.3.2	Methods of Pigment Analysis	6
1.3.3	Infrared Reflectography	6
1.3.4	Raman Spectroscopy	7
1.4	Exploring Four Thangka Paintings of Different Kinds	8
1.4.1	Thangka Painting with Four Arhats, ET1	8
1.4.2	Thangka Painting of Two Abbots from Taglung Monastery	10
1.4.3	Kalacakra Mandala from Ngor Monastery	15
1.4.4	A Fascinating Glimpse into the Life at Derge Gonchen Monastery	18
1.5	Concluding Remark	24
	References	25
Chapter 2	Study and Laser Uncovering of Hypogean Early Christian Wall Painting of Roma's Catacombs of Santa Tecla and Domitilla	28
<i>S. Siano, F. Fratini, M. Mascalchi, G. Patrizi and B. Mazzei</i>		
2.1	Introduction	28

Chapter 5	The Colours of Indigenous Memory: Non-invasive Analyses of Pre-Hispanic Mesoamerican Codices	94
	<i>Davide Domenici, David Buti, Costanza Miliani, Brunetto Giovanni Brunetti and Antonio Sgamellotti</i>	
5.1	Pre-Hispanic Mesoamerican Codices	94
5.2	The Investigated Manuscripts	97
5.3	Methods of Analysis	100
5.3.1	Measurement Set-up	100
5.4	Results and Comparisons	101
5.4.1	White	101
5.4.2	Black	104
5.4.3	Red	105
5.4.4	Yellow	107
5.4.5	Blue	109
5.5	Cultural and Historical Implications of the Analytical Results	113
	Acknowledgements	115
	References	115
Chapter 6	Material Study of the Codex Colombino	120
	<i>Sandra Zetina, José Luis Ruvalcaba, Tatiana Falcón, Jesús Arenas Alatorre, Saeko Yanagisawa, Marisa Álvarez Icaza Longoria and Eumelia Hernández</i>	
6.1	The <i>Codex Colombino</i>	120
6.2	Methods and Instrumentation	122
6.3	Structure of the Leather Support	123
6.4	Painting Process	129
6.5	Colorimetric Study	133
6.6	Analytical Results	133
6.7	Use of Color	136
6.8	Alterations. The Life of the Codex	139
6.9	Conclusions	143
	Acknowledgements	144
	References	144
Chapter 7	Unveiling the Artistic Technique of the <i>Florentine Codex</i>: When the Old World and the New World Met	147
	<i>R. Giorgi, D. Chelazzi and D. Magaloni Kerpel</i>	
7.1	Introduction	147
7.2	The Analysis of the <i>Florentine Codex</i>	150
7.3	Conclusions	165
	Acknowledgements	166
	References	167

Chapter 8	Colour in Medieval Portuguese Manuscripts: Between Beauty and Meaning	170
	<i>Maria João Melo, Rita Castro and Adelaide Miranda</i>	
8.1	Preamble	170
8.2	The Art of Romanesque Portuguese Illuminations	171
8.3	The Colours of Romanesque Illuminations: a Molecular Approach	174
8.3.1	The Visible: The Colourants	174
8.3.2	The Invisible: Fillers	177
8.3.3	The Invisible: The Binding Medium	177
8.3.4	Concluding Remarks	178
8.4	Medieval Colours: Between Beauty and Meaning	181
8.4.1	Colour Systems	181
8.4.2	Colour Mapping	182
8.4.3	Outlook	184
8.5	Conservation Issues	185
8.5.1	Colour Degradation	185
8.5.2	Parchment	186
8.5.3	Bookbinding	187
8.6	Perspectives	189
	Appendix	190
	Acknowledgements	190
	References	190
Chapter 9	The Wall Paintings of the Monumental Cemetery of Pisa: The War, the Restoration, the Conservation	193
	<i>Alessia Andreotti, Maria Perla Colombini, Mauro Matteini and Antonio Paolucci</i>	
9.1	Introduction	193
9.2	The Diagnosis of Materials	196
9.2.1	The State of Conservation of Casein	197
9.2.2	The Removal of Glues	199
9.3	Environmental Monitoring	200
9.3.1	Volatile Organic Compounds (VOCs)	201
9.3.2	Moisture Condensation	203
9.4	The Planned Conservation	205
	Acknowledgements	207
	References	207
Chapter 10	The Chemistry and Chemical Investigation of the Transition from Egg Tempera Painting to Oil in Italy in the 15th Century	209
	<i>David A. Peggie</i>	
10.1	Introduction	209

10.2	The Chemistry of Binders and the Significance for the Physical and Optical Properties of Paint	214
10.2.1	Egg Tempera	214
10.2.2	Drying oil	217
10.3	Identification of Paint Binders	221
10.3.1	Instrumental Analysis of the Paint Binder	221
10.3.2	Refinement of Analytical Protocols and the Use of Multiple Techniques	225
10.4	Conclusion	226
	References	226
Chapter 11	Multi-criterial Studies of the Masterpiece <i>The Last Judgement</i>, Attributed to Hans Memling, at the National Museum of Gdańsk (2010–2013)	230
	<i>Iwona Szmelter, Laura Cartechini, Aldo Romani and Luca Pezzati</i>	
11.1	Introduction: Hypothesis About the Revaluation of the Triptych Attribution	230
11.2	State of Knowledge on the Triptych	232
11.2.1	Revision of the Historical Background	232
11.2.2	The Intriguing History of the Triptych as a Pirates' War Trophy	233
11.3	Hypotheses on the Origins	235
11.3.1	Preliminary Non-invasive Research	235
11.4	A New Scientific Approach to the Authorship of the Triptych	238
11.4.1	Dating the Triptych	238
11.4.2	New Insights into <i>The Last Judgement</i> by Analytical Investigations	239
11.5	New Approaches to the Heuristics of Proto-Northern Renaissance	245
11.6	Conclusion. Synergy in “Science and Art”: The Case of <i>The Last Judgement</i>	248
	Acknowledgements	249
	References	249
Chapter 12	Science and Conservation at the Florentine O. P. D. and Raphael's <i>Madonna of the Goldfinch</i>	252
	<i>Marco Ciatti</i>	
12.1		252
	References	267

Chapter 13	Underdrawing in Paintings	269
<i>Roberto Bellucci and Cecilia Frosinini</i>		
13.1	Introduction	269
13.2	Three Case Studies	271
13.2.1	The First Case Study: Giotto's Use of Templates for Panel Painting (Figures 13.1, 13.2, 13.3)	271
13.2.2	Second Case Study: Michelangelo Provides Drawings for Sebastiano del Piombo (Figures 13.4, 13.5, 13.6)	274
13.2.3	Third Case Study: Francesco Hayez, a Complete Set of Studio Materials (Figures 13.7, 13.8, 13.9)	279
13.3	Conclusion	282
	References	283
Chapter 14	An Integrated Approach to the Study and Preservation of Paintings Using Laser Light Technology: Diagnosis, Analysis and Cleaning	287
<i>P. Pouli, K. Melessanaki, V. Tornari, E. Bernikola, G. Filippidis, D. Anglos and C. Fotakis</i>		
14.1	Introduction	287
14.2	Holographic Interferometry Non-destructive Testing	289
14.2.1	Assessment of Structural Condition and Defects on Paintings: Priority Maps	291
14.2.2	Monitoring of Paintings' Response to Environmental Changes	294
14.2.3	HINDT Monitoring and Control of Cleaning Interventions	295
14.3	Multiphoton Excitation Fluorescence and Third Harmonic Generation Imaging	295
14.4	Laser Ablation for Analysis and Cleaning	299
14.4.1	Laser Removal of Degraded Varnish	301
14.4.2	LIBS Monitoring of Laser Cleaning of Paintings	303
14.5	Prospects and Limitations	307
	Acknowledgements	308
	References	308

Chapter 15	<i>Mens Agitat Molem: New Insights into Nicolas Poussin's Painting Technique by X-ray Diffraction and Fluorescence Analyses</i>	314
	<i>H. Glanville, H. Rousselière, L. de Viguerie and Ph. Walter</i>	
15.1	Introduction	314
15.2	The Paintings	316
15.3	Analytical Methods	317
15.3.1	Description of the XRD-XRF Portable Prototype	318
15.3.2	Description of the XRF Portable Prototype	319
15.3.3	Investigation of the Samples	319
15.4	Nature of the Ground	319
15.5	A Limited Number of Pigments	322
15.6	Coloured Reflection and Shadows	325
15.6.1	Venus' Face	326
15.6.2	Æneas' Arm	327
15.6.3	Eliezer's Coat	329
15.7	Conclusion	331
	Acknowledgements	332
	References	332
Chapter 16	<i>Designing Nature: Ogata Kōrin's Technical Choices in Irises at Yatsuhashi</i>	336
	<i>Marco Leona, Pablo S. Londero, Jennifer Perry, Kaori Fukunaga, Gregory H. Bailey and Charlotte Hale</i>	
16.1	Introduction	336
16.2	The Metropolitan Museum Screens in Context: Kōrin and <i>Yatsuhashi</i>	337
16.3	<i>Irises at Yatsuhashi</i> : A Summary Discussion of Materials and Technique	339
16.4	The Evidence in Detail: Analytical Techniques and their Application to the Study of the Painted Surface	341
16.4.1	The Continuous Gold Leaf Layer: Terahertz Imaging and X-Ray Fluorescence Spectrometry Line-scanning	341
16.4.2	The White Ground and the Iris Flowers: Microscopic Examination, X-Ray Fluorescence Spectrometry, Raman and Surface-enhanced Raman Spectroscopy, Infrared Imaging, and Visible Reflectance Spectroscopy	343
16.4.3	Changes in Composition: Infrared Imaging	347

16.5	Conclusions	349
16.6	Examination Techniques and Instrumental Parameters	350
	References	352
Chapter 17	As Time Passed by Came Sunset. Christen Købke's View of Lake Sortedam, its Genesis and Colour Changes	354
	<i>Anna Vila, Kasper Monrad, Troels Filtenborg and Jørgen Wadum</i>	
17.1	Introduction	354
17.2	The Underdrawing	358
17.3	The Paint Layer	359
17.4	Pigment Analysis	362
17.5	Written Sources	365
17.6	Discussion and Conclusion	367
	Acknowledgements	368
	References	368
Chapter 18	Examination of Vincent van Gogh's Paintings and Pigments by Means of State-of-the-art Analytical Methods	373
	<i>Koen Janssens, Matthias Alfeld, Geert Van der Snickt, Wout De Nolf, Frederik Vanmeert, Letizia Monico, Stijn Legrand, Joris Dik, Marine Cotte, Gerald Falkenberg, Luuk van der Loeff, Margje Leeuwenstein and Ella Hendriks</i>	
18.1	Introduction	373
18.2	Characterization of Pigments, Paints and Paintings by Spectroscopic and Imaging Methods	375
18.3	Spectroscopic Methods	377
18.4	Spectroscopic Investigation of Van Gogh's Paintings and Pigments	383
18.5	Innovative Ways of Imaging the Works of Van Gogh	389
18.6	Conclusions	398
	References	398
Chapter 19	A Vibrant Surface: Investigating Color, Texture and Transparency in Winslow Homer's Watercolors	404
	<i>B. Berrie, F. Casadio, K. Dahm, Y. Strumfels, M. Tedeschi and J. Walsh</i>	
19.1	Introduction	404
19.2	Analysis Strategy and Methodology	406
19.3	Results	413
	19.3.1 Overview	413

19.3.2	Shift from Opaque to Transparent Watercolor Technique	415
19.3.3	Recurrent and Ubiquitous Pigments	416
19.3.4	Pigments Restricted to a Location or Short Time Period	419
19.3.5	Rarely Found Pigments	421
19.3.6	Use of Mixed Colors vs. Prepared Colors	421
19.4	Conclusions	425
Appendix 1: Instrumentation		426
Acknowledgements		426
References		427
Chapter 20	After the Fact: Evaluating our Interdisciplinary Study of Mondrian's <i>Victory Boogie Woogie</i>	429
<i>Maarten van Bommel, Hans Janssen and Ron Spronk</i>		
20.1	Introduction	429
20.2	The Project	431
20.3	The Findings	435
20.3.1	Composition in Lines	435
20.3.2	Composition of the Larger Colour Planes	437
20.3.3	The Unfinishing Touch	439
20.4	In Retrospect	441
References		444
Chapter 21	Argentinean Murals: Conservation and Characterization of Pictorial Techniques	446
<i>Fernando Marte and Damasia Gallegos</i>		
21.1	Introduction	446
21.2	<i>Ejercicio Plástico</i> and <i>Equipo Poligráfico</i>	447
21.2.1	Identification of Materials and Pictorial Techniques	450
21.3	The Lunettes from Galerías Pacífico and the Taller de Arte Mural	454
21.3.1	Identification of Materials and Pictorial Techniques	457
21.4	Conclusions	458
References		460
Chapter 22	Material and Technical Studies of a Selected Group of Paintings by Candido Portinari, a Major Brazilian Modernist Painter	462
<i>Alessandra Rosado, Isolda Mendes, Edson Motta Jr, Cláudio Valério Teixeira and Luiz A. C. Souza</i>		
22.1	Introduction	462

22.2	The Artist and His Career	466
22.3	Results: Portinari's Materials and Techniques	466
22.3.1	Supports, Grounds and Preliminary Drawings	466
22.3.2	Use of White Pigments	467
22.3.3	The Pigments	467
22.4	Panels <i>Guerra e Paz</i>	469
22.5	Conclusions	474
	Acknowledgements	475
	References	475
Chapter 23	Modern Painted Palimpsests. Deciphering the Artworks of Osvaldo Licini	477
	<i>M. Patti, C. Anselmi, B. Doherty, C. Daffara and R. Fontana</i>	
23.1	Osvaldo Licini: an Introduction	477
23.1.1	Critical Success, Biographical Sketches, Dating Issues	477
23.1.2	The Contribution of Scientific Investigations in Disclosing Licini's Work	479
23.2	Recent Scientific Examinations: Methodology and Employed Instruments	480
23.3	The Investigated Paintings	483
23.3.1	<i>Paesaggio con l'uomo</i>	483
23.3.2	<i>Olandese volante su fondo grigio</i>	484
23.3.3	<i>Angelo ribelle su fondo rosso scuro</i>	488
23.3.4	<i>Amalassunta su fondo blu</i>	492
23.4	Conclusions	495
	Acknowledgements	496
	References	496
Chapter 24	The Burri Project: Research for Technique and Conservation	499
	<i>F. Rosi, G. De Cesare, P. Iazurlo, A. Daveri, M. Vagnini, F. Valentini and G. Basile</i>	
24.1	The Project Structure	499
24.2	Conservative Historical Background of Burri's Work	501
24.2.1	Palazzo Albizzini and Ex Seccatoi del Tabacco: Exhibition History	501
24.2.2	Burri's Materials: Historical Background	502
24.3	Works, Technique and Decay	503
24.3.1	Canvas Group	503
24.3.2	Plastics Group	504

24.3.3	Cellotex Group	505
24.3.4	Theatrical Scenery Sketches	509
24.4	Case Studies: Scientific Investigations and Restoration	509
24.4.1	Non-invasive Scientific Investigation	509
24.4.2	Restoration and Conservation Issues	514
24.5	Conclusion	518
	Acknowledgements	519
	References	519
Chapter 25	John Hoyland: A British Master of Acrylic Painting	522
	<i>Bronwyn Ormsby, Tom Learner, Jo Crook and Patricia Smithen</i>	
25.1	Introduction	522
25.2	Hoyland and Acrylic Paints	523
25.3	The Evolution of Hoyland's Painting Technique: Six Paintings in the Tate Collection	525
25.3.1	28.5.66 (1966) [Tate T00886]	526
25.3.2	17.3.69 (1969) [Tate T01130]	529
25.3.3	25.4.69 (1969) [Tate T01129]	530
25.3.4	Saracen (1977) [Tate T02402]	532
25.3.5	North Sound (1979) [Tate T02403]	533
25.3.6	Gadal (1986) [Tate T04924]	534
25.4	Painting Surfaces, Appearance and Condition	536
25.5	Case Study Surface Cleaning Conservation Treatment: 25.4.69	538
25.6	Conclusions	540
	Appendix: Analytical Techniques	541
	Acknowledgements	542
	References	543
Chapter 26	Outdoor Painted Surfaces in Contemporary Art	546
	<i>Antonio Rava and Oscar Chiantore</i>	
26.1	Artworks in Outdoors Spaces	546
26.2	Materials for Contemporary Outdoor Paintings	548
26.3	What Can Be Found	553
26.4	A Keith Haring Mural in Pisa and its Conservation	558
26.5	Final Remarks	563
	References	564

Chapter 27 The Elusive and Transitory Materials in Contemporary Drawings	566
<i>Antonio Mirabile, Patrizia Moretti and Federica Presciutti</i>	
27.1 Introduction	566
27.2 Scientific Analyses and Measurements	568
27.2.1 Stefano Arienti and the Opera Dedicated to Picasso	568
27.2.2 Sandra Vásquez de la Horra: Paper Impregnated with Wax and Drawing <i>Mi Marioneta</i>	573
27.2.3 Beatriz Milhazes and the Collage <i>Manjary</i>	576
27.3 Conclusions	581
References	582
Subject Index	584